vallee

Consulting Engineers,
Architects & Planners

March 11, 2024

Norfolk County
Community Development - Planning Department
Robinson Administration Building
185 Robinson Street, Suite 200
Simcoe, ON N3Y 5L6

Attention: **Mohammad Alam, Supervisor of Development Planning**

Reference: **750 Old Highway 24 – Site Plan Application**
Verlinda Homes, Waterford, Norfolk County
Our Project 20-128

Introduction

G. Douglas Vallee Limited is the agent acting on behalf of Verlinda Homes regarding a site plan application with Norfolk County. Please accept this package as our formal site plan application for a commercial / retail development located at 750 Old Highway 24 in Waterford.

Please note, this site plan application only relates to the northern portion of the property which was recently severed as part of application BNPL2023254.

Included as part of this package are the following documents:

1. Executed Norfolk County Development application form.

2. A signed copy of the Norfolk County pre-consultation meeting notes (partial comments) and subsequent Development Engineering comments from the pre-consultation meeting held on February 1, 2023.

3. Engineering drawing set prepared by G. Douglas Vallee Limited, including the following:
    a. Servicing plan.
    b. Grading plan.
    c. Erosion and sediment control plan.
    d. Site section plan.
    e. General notes.
    f. Sanitary drainage areas.
    g. Storm drainage areas.

4. Architectural site plan drawing set prepared by G. Douglas Vallee Limited (and others), including the following:
    a. Cover sheet.
    b. Site plan notes – zoning.
    c. General site plan notes.
    d. Site plan drawing.

e. Site plan details.
f. Canada Post details.
g. Earth bin details.
h. OPSD details.
i. Topographical survey.
j. Site plan demolishment details.
k. Building elevations – prepared by others.

5. Functional Servicing Report, prepared by G. Douglas Vallee Limited.

6. Stormwater Management Report, prepared by G. Douglas Vallee Limited.

7. Securities Estimate for work to be completed, prepared by G. Douglas Vallee Limited.

8. Traffic Impact Study, prepared by G. Douglas Vallee Limited.

Not included as part of this package are the following documents:

1. A Photometric (lighting) plan. A sub-consultant retained by the applicant is currently developing this plan. We kindly request that this requirement be a condition of site plan approval.

2. A landscaping plan. A sub-consultant retained by the applicant is currently developing this plan. We kindly request that this requirement be a condition of site plan approval.

Next Steps

We trust that the information in this letter will satisfy the requirements of a complete application. We kindly request that Norfolk County schedule a pre-submission meeting at the earliest possible opportunity to confirm the documents submitted and the required fee payment.

We look forward to continuously working with Norfolk County on this project, and should any questions arise, please feel free to contact me.

Yours truly,

Scott Puillandre CD, MCIP, RPP, MSc.
Planner
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners
H:\Projects\2020\20-128 Orchard Square\Agency\Site Plan\Phase 1 Application\1st Submission\Planning\Draft Cover Letter.docx

Professional Engineers Ontario
Authorized by the Association of Professional Engineers of Ontario to offer professional engineering services.
Ontario Association of Architects

Planning Department Development Application Form

Complete Application

A complete development application consists of the following:

1. A completed, signed, and notarized application form
2. Supporting information adequate to illustrate your proposal as indicated in **Section H** of this application form
3. Written authorization from the registered owner of the subject lands where the applicant is not the owner as per Section N
4. Cash, debit, credit or cheque payable to Norfolk County in the amount set out in the user fees By-Law that will be accepted and deposited once the application has been deemed complete.

Pre-Submission Consultation:

Norfolk County requires a Pre-Consultation Meeting for all applications; however, minor applications may be exempted depending on the nature of the proposal. The purpose of a Pre-Consultation Meeting is to provide the applicant with an opportunity to present the proposed application, discuss potential issues, and for the Norfolk County and Agency staff to identify the application requirements. Application requirements, as detailed in the Pre-Consultation Meeting Comments, are valid for one year after the meeting date.

Development Application Process

Once an application has been deemed complete by a Planner, Norfolk County staff will circulate the application to adjacent landowners, public agencies, and internal departments for comment. The time involved in application processing varies depending on its complexity, acceptability to the other agencies, and statutory Planning Act decision time-frames.

Payment is required once your application is deemed complete. Pre-payments will not be accepted.

Norfolk County collects personal information submitted through this form under the Municipal Freedom of Information and Protection Act's authority. Norfolk County will use this information for the purposes indicated or implied by this form. You can direct questions about collecting personal information to Norfolk GIS Services at NorfolkGIS@norfolkcounty.ca.

Additional studies required for the complete application shall be at the applicant's sole expense. Sometimes, peer reviews may be necessary to review particular studies at the applicant's expense. In these caseds, Norfolk County staff will select the company to complete the peer review.

Norfolk County will refund the original fee if applicants withdraw their applications before circulation. If Norfolk County must recirculate your drawings, there will be an additional fee. If Norfolk County must do more than three reviews of engineering drawings due to revisions by the owner or failure to revise engineering drawings as requested, Norfolk County will charge an additional fee. Full refunds are only available before Norfolk County has circulated the application.

Notification Sign Requirements

For public notification, Norfolk County will provide you with a sign to indicate the intent and purpose of your development application. It is your responsibility to:

1. Post one sign per frontage in a conspicuous location on the subject lands.
2. Ensure one sign is posted at the front of the subject lands at least three feet above ground level and not on a tree.
3. Notify the Planner when the sign is in place.
4. Maintain the sign until the development application is finalized and, after that, remove it.

Contact Us

For additional information or assistance completing this application, please contact a Planner at 519-426-5870 or 519-875-4485 extension 1842 or planning@norfolkcounty.ca. Please submit the completed application and fees to the attention of the Planning Department at 185 Robinson Street, Suite 200, Simcoe, ON N3Y 5L6.

For Office Use Only:

File Number		Public Notice Sign	
Related File Number		Application Fee	
Pre-consultation Meeting		Conservation Authority Fee	
Application Submitted		Well & Septic Info Provided	
Complete Application		Planner	

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

Site plan application for the northern parcel recently severed under application BNPL2023254

Property Assessment Roll Number: 33605062868

A. Applicant Information

Name of Owner Verlinda Homes (C/O Tom O'Hara)

Address 26 Main St S Box 1152
Town and Postal Code Waterford, ON N0E 1Y0
Phone Number 1-866-781-7653
Cell Number 705-205-3235
Email tom@teamohara.com

Name of Applicant Same as owner
Address
Town and Postal Code
Phone Number
Cell Number
Email

Name of Agent G. Douglas Vallee Limited
Address 2 Talbot St. North
Town and Postal Code Simcoe N3Y 3W4
Phone Number 519-426-6270
Cell Number
Email johniezzi@gdvallee.ca

Unless otherwise directed, Norfolk County will forward all correspondence and notices regarding this application 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:
None

B. Location, Legal Description and Property Information

1. Legal Description (include Geographic Township, Concession Number, Lot Number, Block Number and Urban Area or Hamlet):
   Plan 37M-57 Block 61

   Municipal Civic Address: 750 Main Street South, Waterford, Ontario

   Present Official Plan Designation(s): Commercial with Special policy area 7.11.3.11

   Present Zoning: Service Commercial

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

   ☒ Yes ☐ No If yes, please specify corresponding number:
   14.1043

3. Present use of the subject lands:
   Vacant

4. Please describe **all existing** buildings or structures on the subject lands and whether they will 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 the 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:
   Vacant

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.
   NA

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:
   See attached site plan drawing provided by G. Douglas Vallee Limited

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:

9. Existing use of abutting properties:

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:
    Access easement created under application BNPL2023270

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:
   Property is under site plan control. All development requires site plan application.

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	16.5m	75.5m
Lot depth	NA	94.4m
Lot width	NA	75.5m
Lot area	495m2	7069m2
Lot coverage	35%	<17.8%
Front yard	3.0m	9.4m
Rear yard	9.0m	9.0m
Left Interior side yard		
Right Interior side yard	3.0m	11.1m
Exterior side yard (corner lot)	3.0m	12.5m
Landscaped open space	NA	NA
Entrance access width	7.3m	7.3m
Exit access width	7.3m	7.3m
Size of fencing or screening	1.8m	1.8m
Type of fencing	Privacy	Privacy

10. Building Size

Number of storeys		
Building height		
Total ground floor area		
Total gross floor area		
Total useable floor area		

11. Off Street Parking and Loading Facilities

Number of off street parking spaces	60	66
Number of visitor parking spaces		
Number of accessible parking spaces	3	4
Number of off street loading facilities	NA	1

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: _____

Number of buildings proposed: ~~3~~ 2 buildings - northern portion only

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):

Commercial/Retail - 851m2

Commercial/Restaurant, Fast Food - 410m2

_____

Seating Capacity (for assembly halls or similar): _____

Total number of fixed seats: _____

Describe the type of business(es) proposed: Commercial/Retail/Restaurant

Total number of staff proposed initially: Unknown at this time

Total number of staff proposed in five years: _____

Maximum number of staff on the largest shift: _____

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):

   _____

   _____
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:

   _____

   _____

   _____

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:
   No in WHPA

   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 60m
   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

- [x] Municipal piped water
- [ ] Individual wells
- [ ] Communal wells
- [ ] Other (describe below)

Sewage Treatment

- [x] Municipal sewers
- [ ] Septic tank and tile bed in good working order
- [ ] Communal system
- [ ] Other (describe below)

Storm Drainage

- [x] Storm sewers
- [ ] Other (describe below)
- [ ] Open ditches

2. Existing or proposed access to subject lands:

- [x] Municipal road
- [ ] Unopened road
- [ ] Provincial highway
- [ ] Other (describe below)

Name of road/street: Old Highway 24

G. Other Information

1. Does the application involve a local business? [x] 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 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 site plan approval, 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, to disclose the registration of all transfer(s) of land and/or 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.

Owner/Applicant Signature — March 8, 2024 — 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 Thomas O'Hara am/are the registered owner(s) of the lands that is the subject of this application.

I/We authorize G. Douglas Vallee Limited 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.

Owner — March 8, 2024 — Date

Owner — Date

N. Declaration

I, Thomas John O'Hara of Waterford.

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:

Simcoe, ON

In Norfolk County

This 8 day of March

A.D. 2024

Brenda Joanne Bruley, a Commissioner, etc., Province of Ontario, for the Corporation of Norfolk County. Expires September 2, 2024.

A Commissioner, etc.

Owner/Applicant Signature

Pre-Submission Consultation Meeting Notes

Date: February 1, 2023

Description of Proposal: The development of a mixed-use site including an 875m2 commercial building and a 5-storey, 44-unit residential condominium.

Property Location: 750 Old Hwy 24, Waterford

Roll Number: 33605062868

Please read all the information contained in this document, as it pertains to the requirements for future development planning applications. As a result of the information shared at the pre-consultation meeting dated February 1, 2023, the following applications and qualified professional documents / reports are required as part of a complete application. Failure to include all listed items with the application will deem the application incomplete. The County reserves the right to change, reduce or add requirements for a complete application, particularly if the submission does not match the proposal as reviewed during the pre-submission consultation meeting.

Please note that various fees are associated with each application and there are also costs for qualified professionals retained to complete various documents / reports. All requirements identified are minimum and determined as of the date of the pre-consultation meeting with the information available at that time. As the proposal proceeds and more information is made available, additional applications, studies, reports, etc. may be required.

The information contained in this document is applicable for a maximum of one (1) year from the date of meeting. If an application is not received within that time frame or any component of the proposal changes, a new pre-submission consultation meeting is required.

All applications are required to include information outlined in the Pre-submission consultation meeting notes; failure to include all items with the application submission without prior approval will necessitate a notice of incomplete application response by the County.

Before you submit your application, please contact the assigned Planner to confirm submission requirements and the applicable fee.

As part of a complete application, a signed version of these meeting notes is required.

Sign Here

Proponent / Agent Name	Signature	Date
Scott Puillandre - Agent		March 11, 2024

Attendance List

Proponent	Click here to enter text.
Community Development – Planning and Agreement	Tricia Givens, Director, Planning (Chair) Mohammad Alam, Senior Planner Annette Helmig, Agreement and Development Coordinator
Community Development – Building and Zoning	Scott Northcott, Senior Building Inspector Jonathon Weir, Building Inspector Roxanne Lambrecht, Zoning Administrator
Environment & Infrastructure Services – Development Engineering	Tim Dickhout, Project Manager, Development Stephen Gradish, Development Technologist
Community Services – Fire	Katie Ballantyne, Community Safety Officer
Community Development – Economic Development	Chris Garwood, Economic Development Supervisor
Paramedic Services	Stuart Burnett, Deputy Chief
Operations – Forestry	Adam Biddle, Supervisor of Forestry
Operations – Parks and Facilities	Todd Shoemaker, Director, Parks
Corporate Support Services – Realty Services	Lydia Harrison, Specialist, Realty Services Kelly Darbishire, Specialist, Realty Services Karen Lambrecht, Corporate Support Generalist
Corporate Support Services – Accessibility	Sam McFarlane, Manager, Accessibility and Special Projects
Haldimand Norfolk Health Unit	
Long Point Regional Conservation Authority	Leigh-Anne Mauthe, Supervisor of Planning Services Isabel Johnson, Resource Planner
Community Development – Heritage and Culture	Melissa Collver, Director Heritage and Culture
Community Development – Recreation	Nikki Slote, Director Recreation

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- Norfolk County Zoning By-Law 1-Z-2014 https://www.norfolkcounty.ca/government/planning/new-zoning-by-law/ 12

List of Application Requirements* and General Comments

Planning Department

Planning application(s) required to proceed		Required
Official Plan Amendment Application Choose an item.		
Zoning By-law Amendment Application Choose an item.		
Site Plan Application Choose an item.		X
Draft Plan of Subdivision Application		
Draft Plan of Condominium Application		
Part Lot Control Application		
Consent / Severance Application		X (TBD)
Minor Variance Application		
Removal of Holding Application		
Temporary Use By-Law Application		
Other - Click here to enter text.		
Planning requirements for a complete application The items below are to be submitted as part of the identified Planning Application(s). ** electronic/PDF copies of all plans, studies and reports are required**	**Required at OPA/ Zoning Stage (TBD)**	**Required at Site Plan Stage**
Proposed Site Plan / Drawing	X	X
Planning Impact Analysis Report / Justification Report	X	
Environmental Impact Study Choose an item.		
Neighbourhood Plan (TOR (Terms of Reference) must be approved by the County)		
Agricultural Impact Assessment Report		
Archaeological Assessment		
Heritage Impact Assessment		
Market Impact Analysis		
Dust, Noise and/or Vibration Study		
MOE D-Series Guidelines Analysis		
Landscaping Plan		
Site Section (between proposed buildings and eastern side existing residences)		X
Photometrics (Lighting) Plan		X
Odour mitigation plan (in relation to Cannabis Production and Processing Facilities)		

Add Retail

Application

Site Dwg

PJR

Shadow Analysis Report		
Record of Site Condition		
Contaminated Site Study		
Minimum Distance Separation Schedule		
Parking Assessment		
Hydrogeological Study		
Restricted Land Use Screening Form		
Topographical Survey Drawing		X
Additional Planning requirements		**Required**
Development Agreement		X
Parkland Dedication/Cash-in-lieu of Parkland		X

*The list of Planning Department requirements is based on the information submitted and as presented for this specific pre-consultation meeting. Norfolk County reserves the right to adjust requirements including identifying additional requirements or reducing requirements. Any changes to a proposal may necessitate changes to Planning Department submission requirements. Furthermore, reports and studies are subject to peer review.

Community Development fees, applications, and helpful resources can be found can be found by visiting https://www.norfolkcounty.ca/government/planning/

Planning Comments

Note: All comments are general and nature and subject to change pending modifications to the proposal and full analysis at the application submission stage.

Historical Planning Applications: historically the subject lands are farm lands, later changed to medium density apartment block and supporting service commercial zoning in 2012 for 44 apartment units and supportive commercial uses.

7-OP-2007 and 49-Z-2007: In 2007, Council passed a combined Official Plan and Zoning By-Law amendment to expand the Waterford urban boundary and change the Official Plan designation from 'Agricultural' to 'Highway Commercial' for the lands fronting Old Highway 24. The zoning amendment also changed the subject lands to 'Highway Commercial (CH).' The subject lands are included in this Official Plan and Zoning amendment.

11-OP-2007: A site-specific Official Plan amendment was executed to the subject lands fronting on Old Highway 24 that limits the commercial uses to motels, restaurants, auto service facilities, farm produce outlets and implement dealerships, building supply and lumberyard, and other commercial types primarily catering to the travelling public and neighbourhood commercial uses.

28T-2007-004: The subject lands are shown as Block 61 in the original Yin Subdivision phase-5, which was registered in 2011. The intended use of these lands was 'Highway Commercial' to facilitate the neighbouring properties, travellers, and highway activities.

4-OP-2012 and 46-Z-2012: In 2012, the Council passed an Official Plan amendment and a Zoning By-Law amendment to redesignate a portion of the 'Commercial' land to 'Urban Residential' and rezoned the land to Residential Type 5 (R5) with Holding (H). The redesignation and rezoning were intended to develop a higher-density apartment development with 44 units geared towards senior citizens. The Holding provision was to ensure that a site plan agreement was executed.

Official Plan: The subject property is partly designated as Commercial and partly Urban Residential.

1. 'Commercial' – northern portion of the lands with a site specific policy 7.11.3.11 Waterford – Yin Subdivision Site Specific Policy Area

   On land designated Commercial – Site Specific Policy Area 7.11.3.11 on Schedule "B" of the Official Plan, commercial uses shall be limited to motels, restaurants, auto service facilities, farm produce outlets and implement dealerships, building supply and lumberyard and other commercial types catering primarily to the travelling public and neighbourhood commercial uses.

2. 'Urban Residential'- southern portion of the lands for higher density development such as apartment buildings.

How does this apply to this application?

Section 8.9.3 related to Servicing Allocation states that when unallocated servicing capacity does not exist for a proposed development, the County shall defer the processing of the planning application until capacity is available, or until a servicing agreement is in place to ensure that such capacity will be available to service the development.

Zoning By-law:

R5(H): Part of the site is zoned as Urban Residential Type 5 (R5) with a Holding (H). The Holding was imposed through 46-Z-2012 to ensure an appropriate development agreement is executed. Permitted uses incude:

a. dwelling, apartment
b. home occupation
c. retirement home

There is a Special Provision 14.845 associated with this portion of land which was the result of a zoning by-law amendment 46-Z-2012. The special provision permits 44 apartment units with the following provisions:

- Minimum Front Yard: 60 metres
- Maximum Dwelling Units: 44

- Maximum number of visitor parking psaces: 11
- Parking permitted in the front yard

What about retail?

The proposed development appears to comply with the existing zoning with a Holding (H).

CS(H) Part of the site is zoned as Service Commercial (CS) with a Holding (H).

What about retail?

A zoning by-law amendment would not be required if all zoning provisions are satisfied. A detailed commercial use would be required to confirm if a Zoning by-law amendment would be required or not.

Site Plan Control:
The subject lands are under site plan control. A site plan application will be required.

Design Considerations:

- Staff recommends commercial and residential traffics are separated by applying urban design measures;
- A continuous sidewalk from commercial and residential buildings to the existing and future public sidewalks;
- Location of all garbage collection, loading area and snow storage facilities;
- A section between the residential and commercial building and adjacent residential building to the east.
- Fire Route;

Severance

Staff would support a severance application once it is confirmed that all OP policies and zoning requirements are met. If a severance is proposed, two separate site plan applications would be required. Staff recommends that the Applicant go through all requirements and documents checklist with Planning staff before a planning application is submitted.

Note: Endangered and threatened species and their habitat are protected under the provinces Endangered Species Act, 2007 (ESA), O. Reg. 242/08 & O. Reg. 830/21. The Act prohibits development or site alteration within areas of significant habitat for endangered or threatened species without demonstrating that no negative impacts will occur. The Ministry of Environment, Conservation and Parks provides the service of responding to species at risk information requests and project screenings. The proponent is responsible for discussing the proposed activity and having their project screened with MECP (Ministry of Environment, Conservation and Parks).

Assigned Planner:

Mohammad Alam
Principal Planner
Extension 1828
Mohammad.Alam@norfolkcounty.ca

Development Engineering

See separate document from DEV ENG.

Development Engineering comments have not been made available at this time. Once they become available, this document will be updated, and you will be provided with that updated document. For status updates, please contact developmentengineering@norfolkcounty.ca.

Stephen Gradish
Development Technologist
Extension 1702
Stephen.Gradish@norfolkcounty.ca

Tim Dickhout
Project Manager, Development
Extension 1700
Tim.Dickhout@norfolkcounty.ca

Agreements

A recommended condition of your planning application approval will be to enter into a development agreement with the County that will be registered on title to the subject lands, at the Owner's expense. The additional requirements for a development agreement could include, but are not limited to the following:

- Engineering drawing review
- Engineer's schedule of costs for the works
- Clearance letter and supporting documentation to support condition clearance
- User fees and performance securities
- Current property identification number (PIN printout) (can be obtained by visiting https://help.onland.ca/en/home/)
- Owner's commercial general liability insurance to be obtained and kept in force during the terms of the agreement
- Postponement of interest. If there are mortgages / charges on your property identifier, your legal representative will be required to obtain a postponement from your bank or financial institution to the terms outlined in your development agreement
- Transfers and / or transfer easements along with registered reference plan

Annette Helmig
Agreement and Development Coordinator
Extension 8053
Annette.Helmig@norfolkcounty.ca

Building

Zoning Administrator:

Zoning table on proposal was well done. The proposal meets all zoning requirements as proposed. Once the commercial unit(s) use is confirmed, please refer to section 4 of the Zoning Bylaw for parking calculations and requirements for non-residential uses. Each Unit/use in the commercial building will require its own parking calculation.
If there is potential for future severance, ensure all parking spaces are to be wholly provided on the lot occupied by the building, structure or use for which the parking spaces are required. If severance is not an option, the front lot lines on the proposal are incorrect and a new zoning review would be required to ensure compliance.
Just a reminder to keep an eye on the sight triangle. Please refer to section 3.31 of the Zoning Bylaw.

We will require a Zoning Table to be provided on the final site plan stating the required zoning provisions of the zone, what you are proposing and highlighting any deficiencies.
The table should include the total usable floor area, the lot area and coverage, height of the buildings and all setbacks from the buildings to all property lines. The zoning table should include a parking table showing the required spaces and what is being provided. The parking spaces should be labelled and dimensioned on the site plan. Please refer to section 4 of the Zoning Bylaw for parking requirements including parking aisle width requirements. Any proposed balconies or decks should be shown on the site plan with dimensions including the setbacks to the property lines.

Roxanne Lambrecht
Zoning Administrator
Extension 1839
Roxanne.Lambrecht@norfolkcounty.ca

Kacie Vandenbulck
Zoning Administrator
Extension 8097
Kacie.vandenbulck@norfolkcounty.ca

Building Inspector:

The proposed construction is considered an A2 type occupancy for the restaurant when seating is for more than 30, a D and/or E type occupancy for the commercial building and a C type occupancy for the 44 unit residential building as defined by the Ontario Building Code (OBC). You will need to retain the services of an Architect and a Professional Engineer to complete the design documentation for this application.
The Designer will need to provide an OBC matrix that represents selected elements from the detailed code analysis and presents a quick overview to the municipal building official of the key OBC factors concerning your design. The matrix will need to include

items from the OBC pertaining to occupancy loads, fires separations, building size and construction relative to occupancy, OBC Section 3.2.5. Provisions for Firefighting, safety within floors areas, exits and barrier free design.
The local fire department should be consulted prior to the design and construction of access routes.
Signs proposed due to development will require a permit as part of Norfolks Sign Bylaw and may need a Building Permit according to the OBC.

Items for Site Plan

Site plan drawings need to have enough detail, to determine compliance with the code references listed.

1. Indicate location of access route and access route design [OBC 3.2.5.4 to 3.2.5.6]
2. Revised fire water pond design and calculations. [OBC 3.2.5.7]
1. Indicate location of existing and new fire department connections. Dimensions between hydrants and building entrances is required.

[OBC 3.2.5.16]

3. Location and specifications of exterior lighting. Lighting to be included in SB-10 report – energy efficiency
4. Indicate barrier free path of travel from parking area to building entrance. Construction of curb cuts and location of tactile attention indicators is required. [OBC 3.8.1.3, & 3.8.3.2]
5. Location of revised septic system (if required)
6. Provide building elevations and cross section, showing building massing, location of proposed entrances and exits, barrier free controls, exterior lighting locations, and exterior signage. [Planning Act 41(4).2]

Items for Building Permit
"-Industrial Commercial Institutional (ICI)" "Sign Permit" & "Applicable Law Checklist" Step by Step Guide Building Permit Package has been attached to the minutes herein, this contains information on drawing requirements, designers, forms, contact information for Building Department etc.
If you have any questions on the building permit process or plans required, please contact permits@norfolkcounty.ca or 519-426-5870 ext. 6016

Jonathan Weir
Building Inspector III
Extension 1832
Jonathan.weir@norfolkcounty.ca

Corporate Support Services – Realty Services

1. If a Site Plan Agreement is required, then the County will require postponements of any charges/mortgages (if any) on title to the County's Site Plan Agreement. We recommend that you connect with your Lender(s) (if any) and/or your solicitors as early in the process as possible to avoid any delays.

2. The Owner should connect with their solicitor to obtain advice about removing the restrictive covenants registered on title as this may be a requirement if this project doesn't compy with same.

Karen Lambrecht
Corporate Services Generalist, Realty Services
Extension 8140
Karen.Lambrecht@norfolkcounty.ca

Fire Department

Norfolk County Fire has the following comments for this proposal:

- Hydrants to be provided as per OBC 3.2.5. (we realize there is one across the road, however the applicants need to ensure there is adequate water supply and that the 90m requirement is met)
- Ensure internal roadways provide a fire access route where required with adequate width for fire department apparatus
- Ensure adequate water supply is available for any required fire protection systems

Katie Ballantyne
Community Safety Officer
Extension 2423
Katie.Ballantyne@norfolkcounty.ca

Appendix A: Planning Reference Materials

Following is a summary of some land use planning reference materials. It is the requirement of the applicant to ensure compliance with applicable legislation, policies and regulations.

Provincial Policy Statement, 2020

https://www.ontario.ca/page/provincial-policy-statement-2020

Norfolk County Official Plan
https://www.norfolkcounty.ca/government/planning/official-plan/

Section 9.6.1 outlines requirements in relation to requests to amend the Official Plan.

Section 9.6.2 outlines requirements in relation to requests to amend the Zoning By-law.

It is the responsibility of the proponent to review and ensure relevant Official Plan policies are addressed in any future development application.

Norfolk County Zoning By-Law 1-Z-2014
https://www.norfolkcounty.ca/government/planning/new-zoning-by-law/

The provisions of the Norfolk County Zoning By-Law shall apply to all lands within the boundaries of Norfolk County. No land, building or structure shall be used, erected, or altered in whole or in part except in conformity with the provisions of this By-Law. No land, building or structure shall be used or occupied except for uses that are specifically identified in the By-Law as permitted uses by the relevant zoning category.

It is the responsibility of the proponent to review and ensure relevant Zoning By-law provisions are addressed in any future development application

REQUIRED INFORMATION

Name of Owner_____

Property Legal Description_____

Roll Number_____

PIN Number_____

Type and Number of Units

Single Detached_____

Semi-Detached_____

Duplex _____

Triplex _____

Four-plex_____

Street Townhouse_____

Stacked Townhouse_____

Apartment_____

Transfer Easements Block Number and Purpose_____

Transfer Block Number and Purpose_____

Geotechnical Report prepared for Lands	◯ YES	◯ NO	◯ UNKNOWN
Lands are Within the Source Water Protection Area	◯ YES	◯ NO	◯ UNKNOWN
Lands Contain any Contaminated or Impacted Soil	◯ YES	◯ NO	◯ UNKNOWN
Lands Contain any Natural Watercourse	◯ YES	◯ NO	◯ UNKNOWN
Lands Contain any Wetlands	◯ YES	◯ NO	◯ UNKNOWN
Lands Contain any Archaeological Sites	◯ YES	◯ NO	◯ UNKNOWN
Lands Contain an Existing Well and or Septic Field	◯ YES	◯ NO	◯ UNKNOWN
Species at Risk Branch MECP Screening	◯ YES	◯ NO	◯ UNKNOWN
Lands Contain any Endangered Species	◯ YES	◯ NO	◯ UNKNOWN

OWNER INFORMATION

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

AGENT INFORMATION

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

ENGINEER INFORMATION

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

LAWYER INFORMATION

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL_____

INSURANCE PROVIDER INFORMATION

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL_____

FINANCIAL INSTITUTION INFORMATION (IF APPLICABLE)

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL_____

MORTGAGEE INFORMATION (IF APPLICABLE)

NAME AND CONTACT_____

ADDRESS WITH POSTAL CODE_____

PHONE NUMBER_____

EMAIL _____

SPECIES AT RISK SCREENING

The Ontario Endangered Species Act inquiries and Species at Risk screening are now handled by the Ministry of the Environment, Conservation and Parks, specifically the "Species at Risk Branch" and the new e-mail address for handling these inquiries is now SAROntario@ontario.ca.

TRANSFERS, EASEMENTS AND POSTPONEMENT OF INTEREST

The owner acknowledges and agrees that, it is their solicitor's responsibility on behalf of the owner for the registration of all transfer(s) of land to the County, free and clear of any charges or encumbrances, and/or transfer(s) of easement in favour of the County and/or utilities at no cost to the County. In addition, 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 to the County's agreements.

INSURANCE CERTIFICATES

Prior to the execution of the development agreement, the owner shall at their expense obtain and keep in force, during the term of this development agreement, commercial general liability insurance coverage satisfactory to the County. The owner further acknowledges and agrees that he/she has authorized the County to discuss with their insurance provider the specific insurance requirements of the County for agreement purposes. In addition, the County will require any professionals hired to carry professional liability insurance to provide coverage for acts, errors and omissions arising from their professional services performed.

OWNER'S AUTHORIZATION

I/We _____ am/are the registered owner(s) of the lands that is the subject of this site plan agreement.

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

I/We authorize the Agreement Administrator to provide and receive information on my/our behalf in connection to the insurance coverage, letter of credit and agreement registration of my/our development.

I/We acknowledge that if there are any new charges or mortgage holders on the property they will be added to the development agreement and will be required to postpone their interest on the property to the County's development conformity interest.

Owner Signature Date

To start your agreement, please return the required supporting information and fees along with the first three pages of this document completed and signed. Provide your payments by the mail or courier to the address below or drop off at ServiceNorfolk customer service desk on the first floor 185 Robinson Street, Simcoe ON N3Y 5L6 Monday to Friday from 9 am to 4 pm. Please make your cheque payable to the Corporation of Norfolk County. If paying by credit card please contact ServiceNorfolk at 519 426-5870 Ext. 4636.

CONTACT FOR FURTHER INFORMATION AND QUESTIONS

Annette Helmig, Agreement and Development Coordinator
Norfolk County, Community Development Division, Planning Department, Agreement Services
185 Robinson Street Suite 200, Simcoe ON N3Y 5L6
226.777.1445
annette.helmig@norfolkcounty.ca

DOCUMENTATION AND FEES REQUIRED

- [ ] Owner's agreement authorization
- [ ] Postponement of interest from mortgagee / chargee (if applicable)
- [ ] Current parcel register (property identifier or PIN printout)
- [ ] Owner's commercial general liability certificate of insurance
- [ ] Construction estimates (100% for external works and 10% of internal works)
- [ ] Professional liability insurance for surveyor and / or engineer
- [ ] Final reference plan for any easements and lands to be conveyed
- [ ] Letter from owner requesting holding (H) symbol be removed from the subject lands
- [ ] Letter of credit or certified cheque for performance securities
- [ ] Current property taxes paid
- [ ] User fee (if time is of the essence a certified cheque is required)
  $2,780 for preparation of the site plan agreement
  $924 to remove the holding from the zoning on the property (if applicable)
  $447 for financial administration of this agreement
  $542 per tree cash-in-lieu of trees (if applicable)
  2% or 5% land appraisal cash-in-lieu of parkland as per consolidated by-law 2016-126 (if applicable)

Development Engineering – 750 Old Hwy. 24, Waterford

Development Engineering requirements to proceed The below requirements are to be submitted as part of the Formal Development Planning application.	**Required at OPA/ Zoning Stage**	**Required at Site Plan Stage**	**Potentially Required (See Notes Section)**
General Requirements			
Concept Plan		X	
Area Rough Grading Plan			X[28]
Lot Grading Plan		X[13]	
Siltation and Erosion Control Plan		X[13]	
General Plan of Services		X[13]	
Plan and Profile Drawings		X[14]	X[29]
Utility Plan		X[15]	
Geotechnical Report			X[30]
Functional Servicing Report		X[9, 10, 11]	
Form 1 Approval for Watermain extension or Alteration.			X[31]
Consolidated Linear Infrastructure approval for Sanitary and/or Storm sewer Extension or Alteration			X[32]
Water Servicing Requirements– Section 10.0 Norfolk County Design Criteria and ISMP Section 4.0			
Extension of Watermain			X[31]
Disconnection of Water Service(s) to Main		X[17]	
Water Modelling (County Consultant)		X[10]	
Backflow Preventer (RPZ)		X[18]	
Water Allocation		X[7]	
Sanitary Servicing Requirements – Section 9.0 Norfolk County Design Criteria and ISMP Section 4.0			
Sanitary Drainage Plan			X
Sanitary Design Sheet			X
Extension of Sanitary Mainline		X[19]	X[32]
Disconnection of Sanitary Service(s) to Main		X	
Sanitary Modelling (County Consultant)		X[10]	

Property Line Inspection Maintenance Hole		X[20]	
Storm Water Servicing Requirements – Section 7.0 and Section 8 Norfolk County Design Criteria and ISMP Section 4.0			
Storm Water Management Design Report (including calculations)		X[21, 26]	
Storm Water Drainage Plan		X[24]	
Storm Sewer Design Sheet			X
Establish/Confirm Legal and Adequate Outlet		X	
Anticipated Flow/Analysis to Receiving Collection System		X[25]	
Extension of Storm Water Mainline		X[23]	X[32]
Easement and/or Block Registration			
Municipal Drainage		X[22, 23]	
Property Line Inspection Maintenance Hole		X[20]	
Transportation Requirements – Section 6.0 Norfolk County Design Criteria, ISMP Section 5.0, Section 6.0 and Appendix J			
Traffic Impact Study		X[27]	
Improvements to Existing Roads & Sidewalk (urbanization, pavement structure, widening sidewalk replacement, upgrades, extension and accessibility)		X	

General Notes:

1. Securities will be required in the form of a schedule. Any works completed within the Municipal Right-of-Way (R.O.W.) is to be shown as 100% security. Any works completed within private property is to be shown as 10% security. This can be submitted at time of Site Plan.
2. All reports and plans are to be signed and stamped by a Professional Engineer (P.Eng.).
3. All reports are to be completed in reference to Norfolk County's Design Criteria and Integrated Sustainable Master Plan (ISMP).
4. Recommendations from all reports (FSR, SWM, TIS, Modelling, etc.) must be incorporated into the design and is to adhere to Norfolk County's Design Criteria. A copy of this criteria is available upon request.
5. Recommendations from all reports (FSR, SWM, TIB, Modelling, etc.) must be incorporated into the design and be constructed at the developer's expense.
6. All applicable permits and inspections to be issued by Public Works.

7. Water / Wastewater allocation was issued as part of the Zoning By-law amendment. Water Allocation will not be issued until the end of the site plan application process. The applicant is to confirm capacities at the time of Site Plan application. At the time registration of agreement\approval allocation will be provided for the development, if available.
8. During review of this proposal, Development Engineering has also reviewed an older By-law (The Regional Municipality of Haldimand-Norfolk By-law No. 60-74 A BY-LAW TO REGULATE THE LOCATION OF BUILDINGS, STRUCTURES, AND TREES ON LANDS ADJACENT TO CERTAIN REGIONAL ROADS, AND TO REPLEAL BY-LAW 48-74). In the past this By-law was considered to be current and should also be considered as current for this application.

Required at Zoning Notes:

In Development Engineering review of this submission, we considered the applicants assessment of the current zoning being adequate and consulted with Planning Department to this regard. As a result, Development Engineering have provided no comments specific to any potential Zone change. If a Zone change is ever required Development Engineering would have additional comments.

Required at Site Plan Stage Notes and/ or Severances Stage:

All Site Plan submissions are to comply with Section 16 of the Norfolk County Design Criteria in addition to the comments below.

9. The following reports/studies will be required at time of Site Plan Submission:
    - Concept Plan;
    - Functional Servicing Report (as per Norfolk County Design Criteria); NOTE: Separate FSR's are required if the property is to be severed and developed at different stages.
    - Water / Sanitary Modelling;
    - Storm Water Management Report;
    - Traffic Impact Study (as per ISMP Appendix J – TIS Guidelines);
10. Sanitary and Water modelling will be required. This is to be completed by Norfolk County's third-party consultant. The cost to complete the modelling and any recommendations from reports are to be implemented into the design at the applicant's expense. The following information will be required to receive a quote and complete the modelling;
    a. General Plan of Services
    b. Functional Servicing Report;
        i. Total Wastewater Design Flows;

ii. Total Domestic Water and Fire Flows as per Norfolk County Design Criteria Section 10.1.1

The Functional Servicing Report must include water /sanitary servicing and fire flow calculations.

Once the quote has been received, approval from the applicant will be required before proceeding.

11. The Functional Servicing Report needs to include a comprehensive assessment of the potential environmental impacts of the proposed development. The requirements of the Class EA integrated process may not apply to Site Plans. The legislation allows for an integrated approach and provides proponents with the opportunity to reduce duplication by simultaneously complying with the Planning Act and Class EA processes, including public/stakeholder notification and consultation requirements, technical reports and analyses, and land use planning and environmental protection decisions.
12. Any recommendations/upgrades from the modelling reports must be implemented at the time of Site Plan submission. Upgrades, if any, are to be completed at the Developer's expense.
13. Lot Grading Plan, Siltation and Erosion Control Plan, and General Plan of Services drawing can be shown on one engineering plan as long as it's legible for review.
14. Plan and Profile drawings will be required as per Section 16.4.03.
15. A Utility Plan is required as per Section 4.4.07 of Norfolk County Design Criteria for all utilities to be installed in the Municipal ROW. An Electrical Services Plan as per Section 16.4.05 and 16.5.05 shall also be included with the Utility Plan
16. As per Norfolk County By-Law 2013-65, only one domestic water service pipe shall be installed per property or condominium corporation. Interconnection of services will not be permitted. If the intent is to sever the existing parcel, then separate services are required. At the time of Severance, it will be a condition that all servicing must be separate.
17. In the current proposal it is unclear if the existing service off Lam Blvd is located at a location that can be used for the site. If the servicing does not align with the new proposal then please be aware that all existing servicing must be removed prior to approval of new connections in the ROW.
18. A Testable DCVA Backflow device shall be placed in a watertight chamber at property line. Approval from the Manager of Environmental Services must be obtained as per Norfolk County Design criteria. In the event of Severance then a DCVA is required for each Property.
19. In the proposal submitted it identified 2 options for Sanitary. In option 1 the sanitary connection would be made to Lam Blvd; this is acceptable to Norfolk County. In Option 2 please note that a Sanitary Main will need to be extended along the entire frontage of the property and then a service will be installed

from the new Sanitary main to property line. Long services from the intersection of Lam Blvd will not be permitted. All new Sanitary Sewers will require a complete design and approval through the Norfolk County CLI-ECA process.

20. Storm and Sanitary property Line inspection manholes are required.
21. Stormwater Management Report is to be completed as per Norfolk County Design Criteria Section 7 & Section 8 and Section 4.0 of the ISMP.
22. Most of the property identified in this proposal is currently part of the Waterford South Main Street Drain. Early consultation with Norfolk County's Drainage Department will be required. This will be necessary prior to completing the determination of the legal and adequate outlet.

    Furthermore, for those sections of the proposal where a severance application is proposed the following would be required at the time of Severance application.

    - Developer to prove capacity in existing Municipal Drain to the outlet.
    - A Drain Apportionment under Drainage Act Section 65 is required at the Cost of the Developer. This is to apportion the future maintenance assessment of Waterford South Main Street Drain.

23. If a severance is to be completed and the Waterford South Municipal Drain is to be extended along Old Hwy 24 to service, the residential property it is the opinion of Norfolk County that this becomes an addition to a Municipal drain and therefore will follow the appropriate process through the Municipal Drainage Act. As an alternative it may be possible to construct this as a storm sewer under our CLI- Storm Sewer approvals, provided that the drainage area assessment has already been included as part of the Municipal Drain. More information is provided in Comment 32 with respect to a new Storm sewer.
24. A Storm Drainage Area Plan will be required as per Norfolk County Design Criteria and must identify if any external overland flows are tributary to this site. The Plan must show the location of all major overland flows exiting the site. It is recommended by Development Engineering that like the Site Grading Plan criteria in Section 16.4.02 that contours are to be shown a minimum of 30.0m beyond the property limits to indicate the grading and drainage patterns of the adjacent lands.
25. The developer will be responsible for confirming anticipated flow to the existing Municipal Drain and ensure adequate capacity exists to accept the proposed development. It shall be the developer's responsibility to satisfy themselves that there is an adequate storm outlet to the proposed development. All associated costs of construction for upgrades to existing and new infrastructure shall be the responsibility of the owner / applicants of the development.
26. The ultimate handling of all Storm water discharge shall be identified in the Stormwater Management Report, including all overland discharges from site.

27. As per Norfolk County's Integrated Sustainable Master Plan (ISMP) – Appendix J: Traffic Impact Study (TIS) Guidelines, a traffic impact study will be required.

These guidelines are available upon request. Any existing TIS will need to be updated to match the proposed Development.

Potentially Required Notes:

28. As per Norfolk County Design Criteria, an area rough grading plan will be required if earth cuts and fills in excess of 0.5m.
29. Plan and Profile drawings will be required if any infrastructure is to be installed within the municipal R.O.W.
30. A Geotechnical Report will be required if infiltration galleries are proposed within the design. A Geotechnical report is also required for any installation of new infrastructure in the County ROW. This will recommend if current soil conditions are acceptable and the appropriate restoration.
31. If an extension of the Watermain along Old HWY 24 is required within the Municipal ROW then the Developer's engineer will be responsible to provide detailed Engineering drawings of the proposed watermain. The design must include Plan and Profile drawings. Prior to Site Plan approval all external Watermain must be approved though the County's Consolidated Linear Infrastructure approval process including completion of the Form 1.
32. If an extension of the Sanitary and/or Storm sewer is required within the Municipal ROW then the Developer's engineer will be responsible to provide detailed Engineering drawings of the proposed storm sewer. The design must include Plan and Profile drawings, Design sheets and Drainage plans. Prior to Site Plan approval all external storm sewers must be approved though the County's Consolidated Linear Infrastructure approval process

To Question 1-3 identified in the Pre con request Cover Letter, Development Engineering offers the following answer:

1. Development Engineering could support a future severance as long as each property would have independent servicing and would be serviced based on Norfolk County's servicing polices.

2. Depending on the servicing strategy any future severance would require separate services. If there is only one service, then Development Engineering would not support the severance based on current servicing policies. It is not permitted to sever a service. As noted in your submission a second service is not permitted at this time if the property is developed as a single lot.

3. Norfolk County Environmental Services does not permit interconnection of internal fire services. No servicing in an easement would be permitted.

NOTES:

1. PROPOSED SEWERS TO ADHERE TO THE FOLLOWING OPSD:

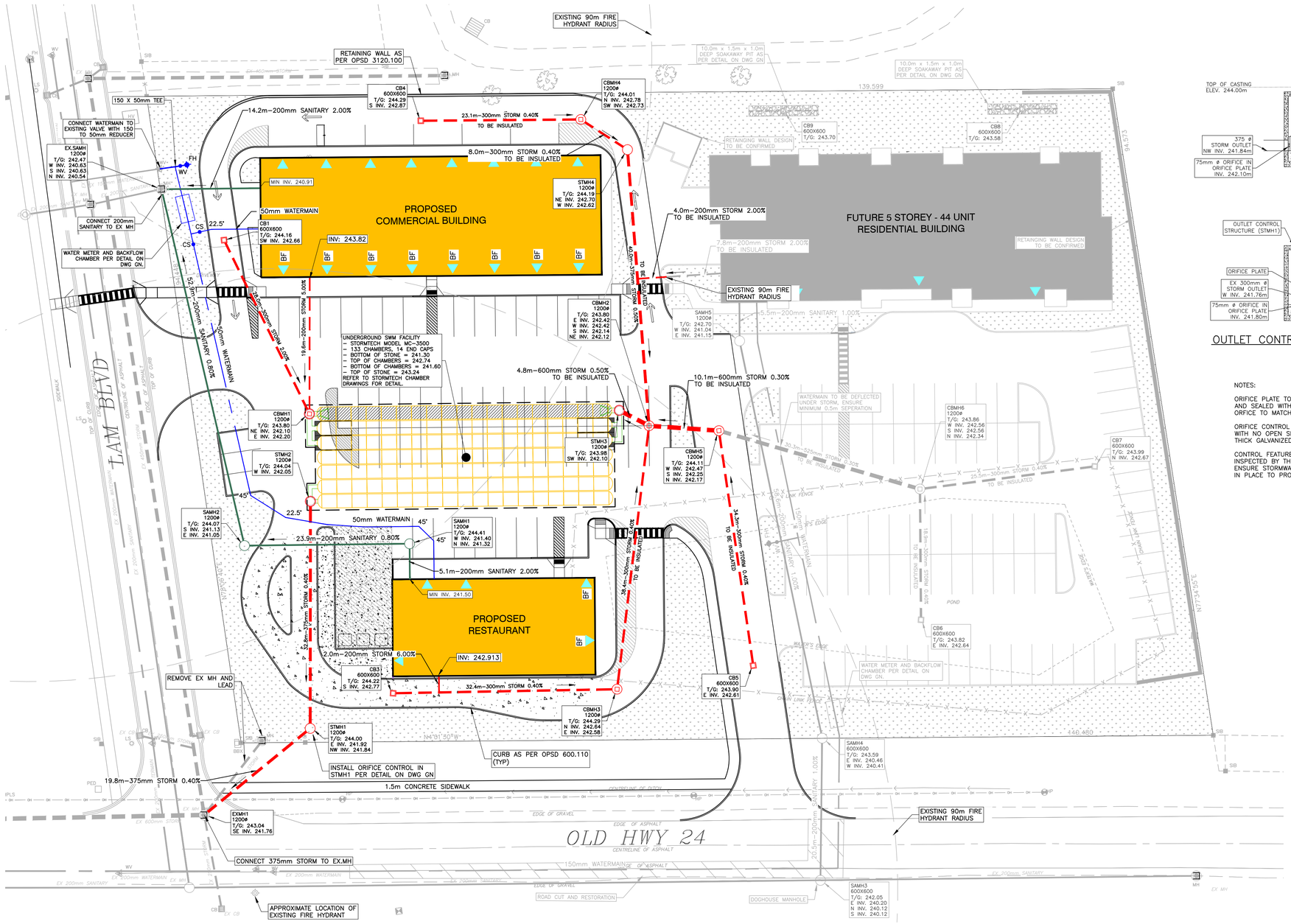
1200mm MAINTENANCE HOLE STRUCTURE	OPSD 701.010
1200mm CATCH BASIN MAINTENANCE HOLE GRATE	OPSD 400.010

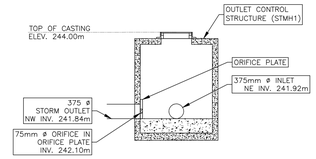
ALL COMPONENTS OF THE PROPOSED STORM SEWERS ARE TO ADHERE TO DIVISION 700 OF THE OPSD.

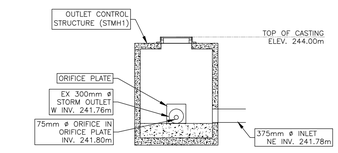
2. RESTORE EXISTING COUNTY INFRASTRUCTURE TO COUNTY STANDARDS:
   - REFER TO TRENCHING RESTORATION DETAIL ON DRAWING GN.
   - CONCRETE CURB TO MATCH EXISTING.
   - CONCRETE SIDEWALK TO MATCH EXISTING WIDTH.
   - CONSTRUCTION PER OPSS AND OPSD.
4. ALL WATERMAIN TO BE RESTRAINED AT ALL BENDS, TEES, REDUCERS, DEAD-ENDS, AND VALVES AS PER DETAILS ON DWG. GN.

LEGEND

- PROPOSED STORM MANHOLE & SEWER
- PROPOSED SANITARY MANHOLE & SEWER
- PROPOSED SANITARY SERVICE
- PROPOSED WATERMAIN
- PROPOSED WATER SERVICE
- PROPERTY LINE
- FUTURE PROPOSED STORM MANHOLE & SEWER
- FUTURE PROPOSED SANITARY MANHOLE & SEWER
- FUTURE PROPOSED SANITARY SERVICE
- FUTURE PROPOSED WATERMAIN
- FUTURE PROPOSED WATER SERVICE







OUTLET CONTROL STRUCTURE DETAIL DETAIL
N.T.S.

NOTES:

ORIFICE PLATE TO BE BOLTED TO MANHOLE FACE AND SEALED WITH NON-SHRINK GROUT. INVERT OF ORFICE TO MATCH OUTLET PIPES.

ORIFICE CONTROL TO BE UNIFORM STEEL SECTION WITH NO OPEN SEAMS. MATERIAL TO BE MIN. 3mm THICK GALVANIZED STEEL OR ALUMINUM.

CONTROL FEATURE MUST BE INSTALLED AND INSPECTED BY THE ENGINEER PRIOR TO PAVING TO ENSURE STORMWATER RUNOFF FLOW CONTROLS ARE IN PLACE TO PROTECT DOWNSTREAM SYSTEM.

REV. No.	DATE	REVISION
0	MARCH 08, 2024	ISSUED FOR SPA

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ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION
PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION
APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS
BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV. 245.91m

DRAWING LIST
G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EROSION AND SEDIMENT CONTROL PLAN
20-128-C104	SITE SECTION PLAN
20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
HORIZONTAL : 1:300 (5, 10, 15)

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
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SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

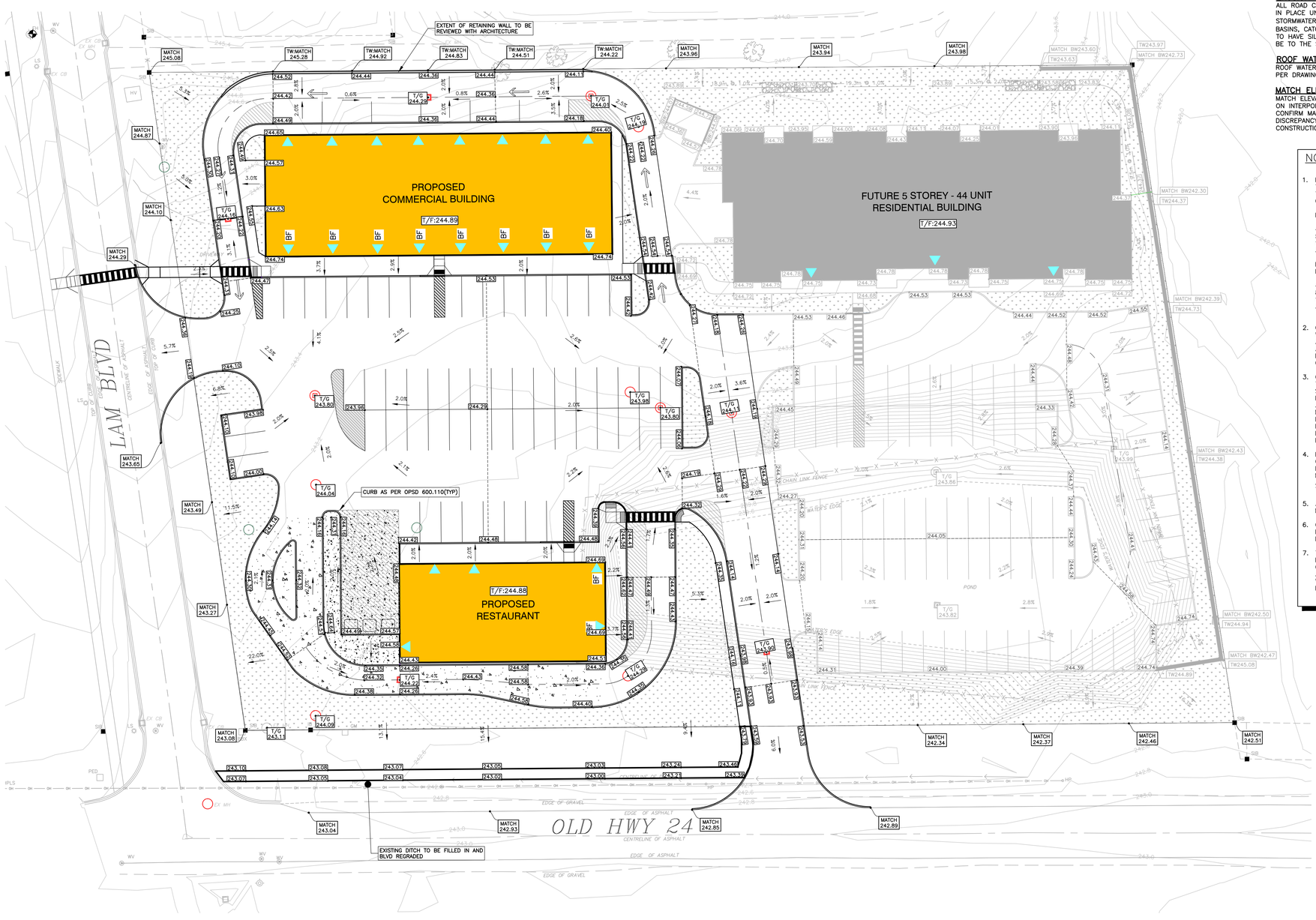
Stamp
LICENSED PROFESSIONAL ENGINEER 20-128 2024-03-08 J. T. IEZZI 100109485 PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
SERVICING PLAN

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 3/8/2024
Drawing Scale : 1:300	Drawing No. C101
Project No. 20-128	

DATE LAST PLOTTED - March 8, 2024



LEGEND

- 247.20 — PROPOSED SPOT ELEVATION
- EMERGENCY OVERLAND FLOW DIRECTION
- TOP OF SLOPE
- 246.2 — EXISTING GROUND CONTOUR
- ROPOSED GRADE BREAK
- PROPOSED SWALE

EROSION & SEDIMENT CONTROL NOTE:
ALL ROAD CATCH BASINS TO HAVE FILTER CLOTH COVER IN PLACE UNTIL BASE ASPHALT IS IN PLACE. STORMWATER INLET STRUCTURES (DITCH INLET CATCH BASINS, CATCH BASINS, CATCH BASIN MANHOLES ETC.) TO HAVE SILT PROTECTION. ALL EROSION CONTROL TO BE TO THE SATISFACTION OF ENGINEER AND L.P.R.C.A.

ROOF WATER DRAINAGE:
ROOF WATER DRAINAGE TO OUTLET TO SPLASH PADS AS PER DRAWING STM – STORM DRAINAGE AREAS.

MATCH ELEVATIONS:
MATCH ELEVATIONS AT THE PROPERTY LINE ARE BASED ON INTERPOLATED TOPOGRAPHIC DATA. CONTRACTOR TO CONFIRM MATCH ELEVATIONS AND REPORT AND DISCREPANCY TO THE ENGINEER PRIOR TO CONSTRUCTION.

NOTES:

1. PARKING AND AISLE PAVEMENT TO ADHERE TO PAVEMENT DESIGNS CONTAINED WITHIN THE GEOTECHNICAL REPORT AND NORFOLK COUNTY DESIGN CRITERIA:

   LIGHT DUTY FOR PARKING STALLS:

   40mm HL3
   50mm HL8
   150mm GRANULAR A
   300mm GRANULAR B

   HEAVY DUTY FOR DRIVE AISLES AND LANES:

   40mm HL3
   80mm HL8
   150mm GRANULAR A
   350mm GRANULAR B

2. GENERAL CONTRACTOR TO COORDINATE ALL WORK WITHIN THE SITE WITH THE COUNTY AND OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM LOCAL AUTHORITIES. EXECUTE ALL WORK AS PER NORFOLK COUNTY REQUIREMENTS.
3. GENERAL CONTRACTOR TO EXECUTE WORK TO CONSTRUCTION SITE ACCESS UNDER SUPERVISION OF THE ENGINEER. REFER TO ENTRANCE PERMIT REQUIREMENTS WHERE APPLICABLE. DRIVEWAY ENTRANCE TO BE MODIFIED OR INSTALLATION OF NEW ENTRANCE AS PER NORFOLK COUNTY REQUIREMENTS. PROVIDE NEW CONC. ENTRANCE CURBS TO MATCH EXISTING AS REQUIRED.
4. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, ALL BENCHMARKS, ELEVATIONS, DIMENSIONS AND GRADES MUST BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
5. AT LEAST TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO AT ALL TIMES.
6. COORDINATE WITH SITE GRADING PLAN FOR PROPOSED FINAL FINISH GRADE ELEVATIONS AND DRAINAGE SLOPES.
7. TRAFFIC CONTROL SHALL BE IMPLEMENTED BY THE CONTRACTOR IN ACCORDANCE WITH OTM TEMPORARY CONDITIONS BOOK 7. APPROVAL FOR THE TRAFFIC CONTROL WILL BE SOUGHT FROM THE MUNICIPALITY BY THE CONTRACTOR.

REV. No.	DATE	REVISION
0	MARCH 08, 2024	ISSUED FOR SPA

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ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #28 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
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PRELIMINARY
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SCALE:
5 10
HORIZONTAL : 1:300

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Consulting Engineers, Architects & Planners
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SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
20-128
2024-03-08
J. T. IEZZI
100109488
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
GRADING PLAN

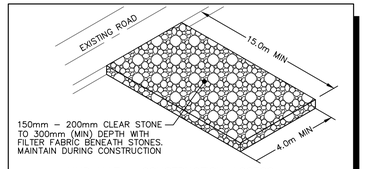
Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 3/8/2024
Drawing Scale : 1:300	Drawing No. C102
Project No. 20-128	

DATE LAST PLOTTED : March 8, 2024

EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR DESIGN AND PROVISION OF ALL SEDIMENT CONTROL MEASURES AS MAY BE REQUIRED TO PROTECT THE WORK SITE OR THE ADJACENT LANDS, REGARDLESS OF THE SOURCE OR ORIGIN OF EROSION OR SEDIMENTS. IF THE ENGINEER IS NOT SATISFIED WITH THE EXTENT OF THE MEASURES TAKEN, THE ENGINEER MAY DIRECT THAT ADDITIONAL CONTROLS BE PUT IN PLACE.

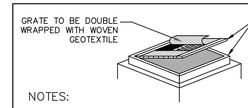
   THE ENGINEER'S REQUIREMENTS FOR SEDIMENT AND EROSION CONTROL SHALL BE CONSIDERED ABSOLUTE MINIMUMS. THE ULTIMATE RESPONSIBILITY TO ENSURE THAT THE MEASURES ARE ADEQUATE SHALL LIE SOLELY ON THE CONTRACTOR. ANY DAMAGE RESULTING FROM FAILURE OF THESE MEASURES SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
2. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION.
3. ALL EROSION CONTROL MEASURES TO BE IN PLACE UNTIL RESTORATION IS COMPLETE.
4. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION.
5. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION.
6. MINIMIZE AREA DISTURBED DURING CONSTRUCTION.
7. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN.
8. PROTECT ALL CATCH BASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE AND MAINTAIN IN FREE FLOWING STATE (TERRAFIX 270R OR APPROVED EQUIVALENT). REFER TO DETAIL THIS PAGE.
9. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION INCLUDING OIL GRIT SEPARATOR.
10. PREVENT WIND-BLOWN DUST.
11. CONTRACTOR TO PROVIDE MUD MAT AT ALL CONSTRUCTION ENTRANCES.



MUD MAT – CONSTRUCTION ACCESS
N.T.S.

LEGEND

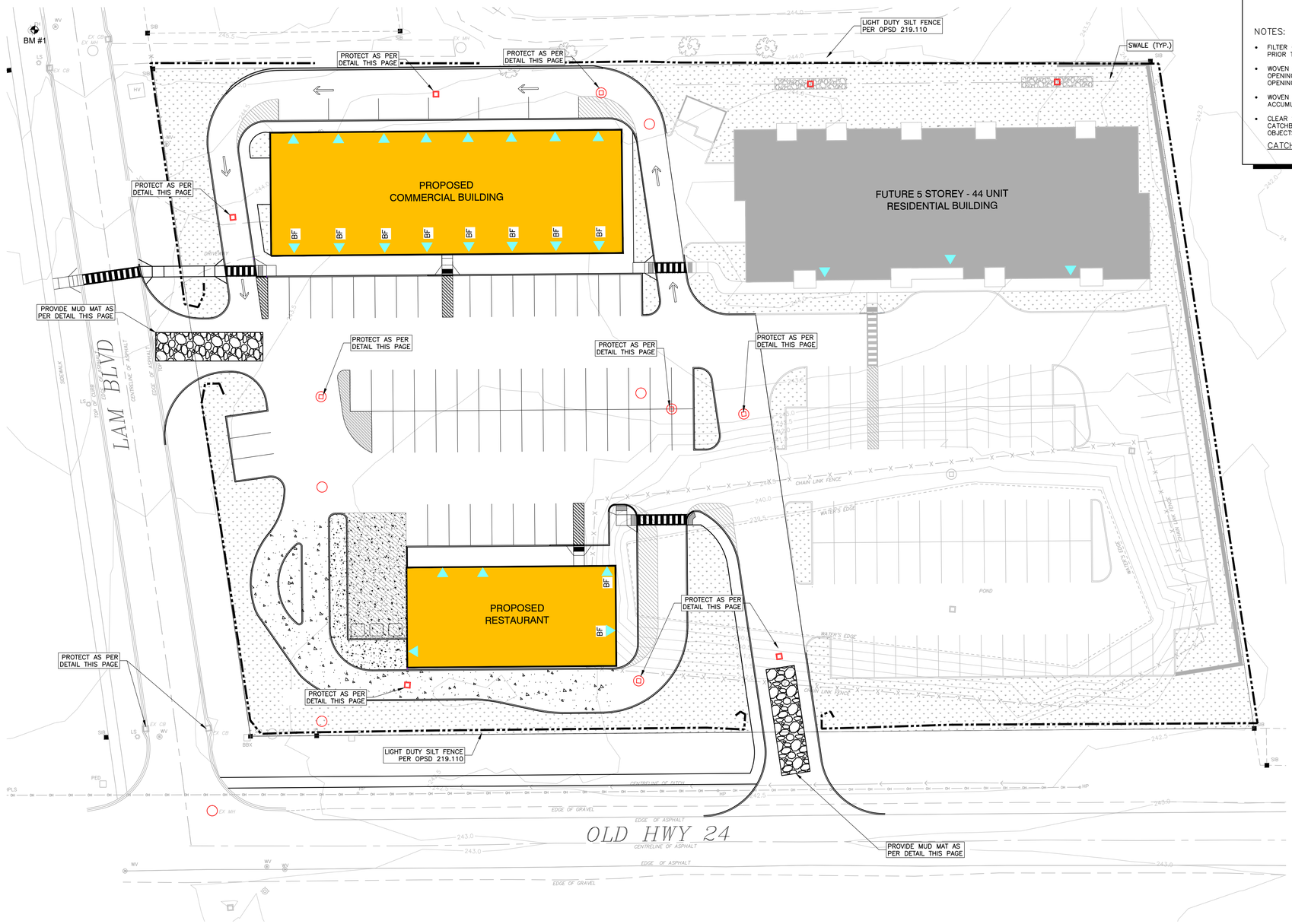
- EXISTING GROUND CONTOUR
- PROPOSED SWALE
- PROPOSED LIGHT DUTY SILT FENCE AS PER OPSD 219.110



NOTES:

- FILTER CLOTH WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
- WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
- WOVEN GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERES WITH DRAINAGE.
- CLEAR STONE TO BE PLACED ON TOP OF WRAPPED CATCHBASIN TO PROTECT GEOTEXTILE FROM LARGE OBJECTS.

CATCHBASIN SEDIMENT PROTECTION DETAIL
N.T.S.



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BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #28 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

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20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
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(519) 426-6270

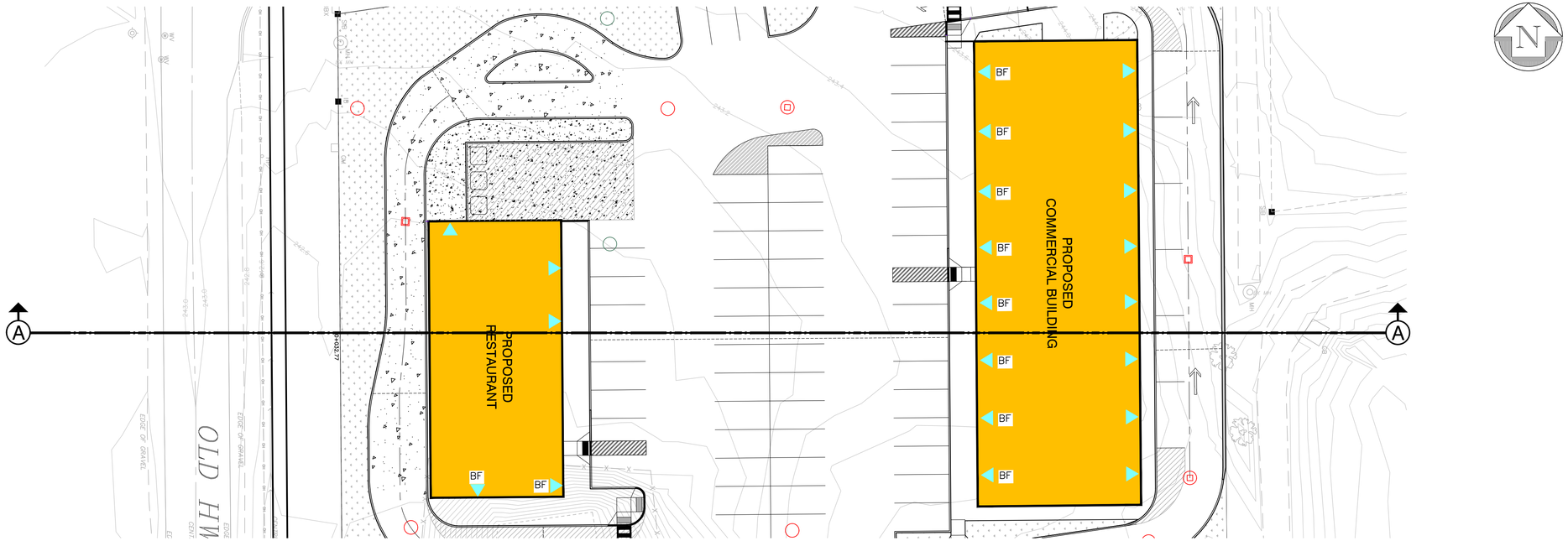
Stamp
LICENSED PROFESSIONAL ENGINEER
20-128
2024-03-08
J. T. IEZZI
100169465
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

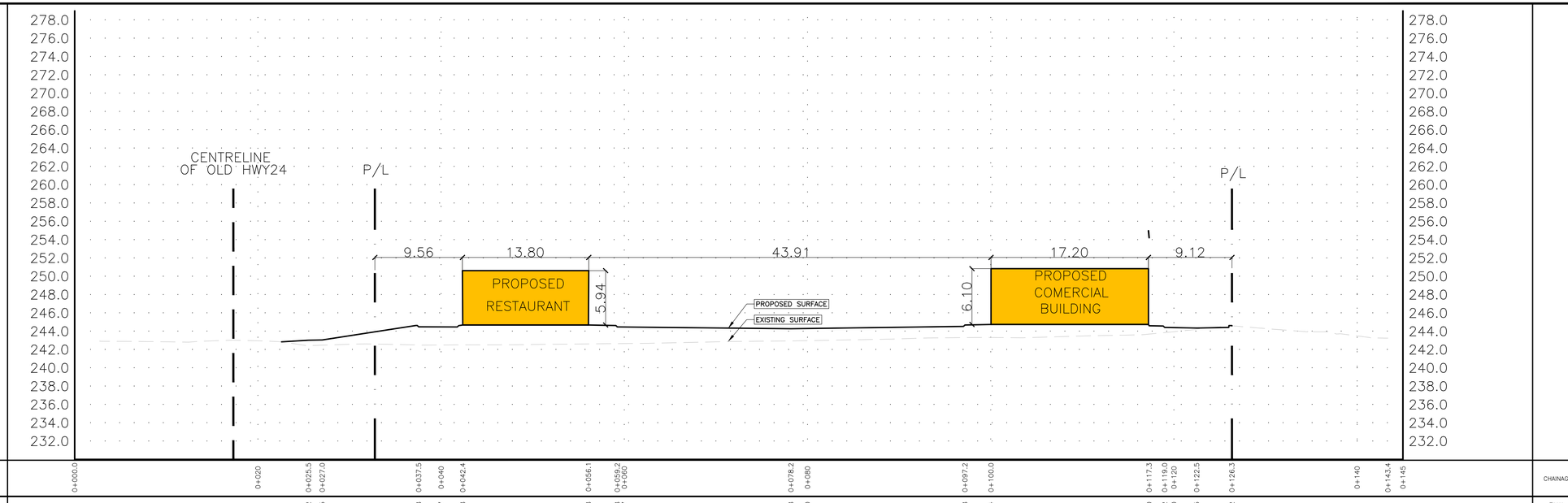
Drawing Title
EROSION AND SEDIMENT CONTROL PLAN

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 3/8/2024
Drawing Scale : 1:300	Drawing No. C103
Project No. 20-128	

DATE LAST PLOTTED : March 8, 2024



SECTION A-A



CHAINAGE	0+000.0	0+020	0+025.5	0+027.0	0+037.5	0+040	0+042.4	0+056.1	0+059.2	0+060	0+078.2	0+080	0+097.2	0+100.0	0+117.3	0+119.0	0+120	0+122.5	0+126.3	0+140	0+143.4	0+145	CHAINAGE
FINAL CENTRE LINE ROAD ELEVATIONS			243.02	243.05	244.48	244.47	244.68	244.68	244.48	244.47	244.28	244.30	244.68	244.74	244.60	244.42	244.40	244.35	244.62				FINAL CENTRE LINE ROAD ELEVATIONS

DATE LAST PLOTTED : March 8, 2024

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PRELIMINARY
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SCALE:
HORIZONTAL : 1 : 250
VERTICAL : 1 : 250

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SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
20-128
2024-03-08
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
SITE SECTION PLAN

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 3/8/2024
Drawing Scale : AS NOTED	Drawing No. C104
Project No. 20-128	

GENERAL NOTES

1. PRIOR TO CLOSING ANY STREET, THE CONTRACTOR SHALL OBTAIN CLEARANCE BY FILLING OUT THE COUNTY'S NOTICE OF ROAD CLOSURE FORM AND NOTIFY SCHOOL BUS OPERATORS OF STREETS USED FOR DETOUR AND THE DURATION OF THE DETOUR. THE CONTRACTOR MUST SUPPLY AND MAINTAIN ADEQUATE LOCAL DETOUR SIGNS AND LIGHTS. THE CONTRACTOR MUST MAINTAIN MAXIMUM ACCESS TO ALL PROPERTIES AS DIRECTED BY THE ENGINEER.
2. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY MEASURES TO CONTROL SILT ENTERING THE STORM DRAINAGE SYSTEM TO THE SPECIFICATIONS OUTLINED IN THE GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES PREPARED BY THE MINISTRY OF NATURAL RESOURCES. THESE MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCING ANY CONSTRUCTION FOR THIS STREET AND ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION HAS BEEN COMPLETED TO THE SPECIFICATIONS OF THE ENGINEER.
3. THE CONTRACTOR IS TO MEET ALL THE REQUIREMENTS OF THE OWNERS OF THE UTILITIES ON THIS PLAN, AND MUST MAKE SATISFACTORY ARRANGEMENTS WITH THE UTILITY COMPANIES FOR CROSSING THEIR INSTALLATIONS AND FOR PROVIDING ADEQUATE PROTECTION DURING CONSTRUCTION.
4. PRIOR TO COMMENCING ANY CONSTRUCTION, ALL EXISTING UNDERGROUND UTILITIES SHALL BE LOCATED AND MARKED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER AT THE CONTRACTORS EXPENSE.
5. ALL ORGANIC, SUITABLE OR UNSUITABLE MATERIALS BENEATH THE ROAD ALLOWANCES MUST BE REMOVED AND THESE AREAS BACKFILLED WITH AN APPROVED FILL MATERIAL, ALL TO THE SATISFACTION OF THE ENGINEER.
6. PRIOR TO COMMENCING ANY CONSTRUCTION, ALL EXISTING SEWER OUTLET INFORMATION, BENCHMARKS, DIMENSIONS, ELEVATIONS AND GRADES MUST BE CHECKED AND VERIFIED AND ANY DISCREPANCIES REPORTED TO THE ENGINEER IMMEDIATELY.
7. ALL CATCH BASIN LEADS FOR SINGLE CATCH BASINS SHALL BE 250mm ø PVC SDR35 WITH CLASS 'B' BEDDING. ALL CATCH BASIN LEADS FOR TWIN INLET CATCH BASINS SHALL BE 300mm ø PVC SDR35 WITH CLASS 'B' BEDDING.
8. ALL PVC WATERMAIN SHALL HAVE TWU 10 COPPER TRACING WIRE LAID ALONG ENTIRE LENGTH. WATERMAIN SHALL HAVE 1.7m TO 1.9m COVER WITH CLASS 'B' BEDDING.
9. ALL 50mm WATER SERVICE TO BE BLUE904 SDR9 PEX AND ALL 150mm WATERMAIN TO BE PVC DR18 BLUE BRUTE WITH MANUFACTURED FITTINGS.
10. WATERMAIN FITTINGS SHALL BE MECHANICAL JOINT OR PUSH-ON JOINT INSTALLED WITH APPROVED MECHANICAL THRUST RESTRAINTS.
11. ALL MECHANICAL THRUST RESTRAINTS SHALL CONFORM TO CONTRACT DOCUMENT SPECIFICATIONS.
12. WHERE A WATERMAIN OR WATER SERVICE CROSSES ABOVE A STORM OR SANITARY SEWER, A MINIMUM VERTICAL CLEARANCE OF 0.15m SHALL BE PROVIDED. WHERE THE WATERMAIN OR WATER SERVICE IS UNABLE TO CROSS ABOVE THE SEWER, IT SHALL CROSS UNDERNEATH WHILE PROVIDING A MINIMUM SEPARATION OF 0.5m BETWEEN THE SEWER INVERT AND THE CROWN OF THE WATERMAIN OR WATER SERVICE. WHERE A STORM OR SANITARY SEWER CROSSES ANOTHER STORM OR SANITARY SEWER, A MINIMUM VERTICAL CLEARANCE BETWEEN PIPE BARRELS OF 0.15m SHALL BE PROVIDED.
13. PROPOSED SEWERS TO ADHERE TO THE FOLLOWING OPSD:

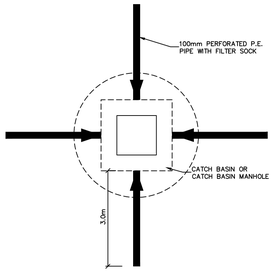
MAINTENANCE HOLE STRUCTURES	OPSD 701.01X
BENCHING	OPSD 701.021
SINGLE CATCH BASIN STRUCTURE 600mm X 600mm	OPSD 705.010
1200mm MAINTENANCE HOLE GRATE	OPSD 401.010
1200mm CATCH BASIN MAINTENANCE HOLE GRATE	OPSD 400.020
SINGLE CATCH BASIN GRATE 600mm X 600mm	OPSD 400.020

ALL COMPONENTS OF THE PROPOSED SEWERS ARE TO ADHERE TO DIVISION 700 OF THE OPSD.

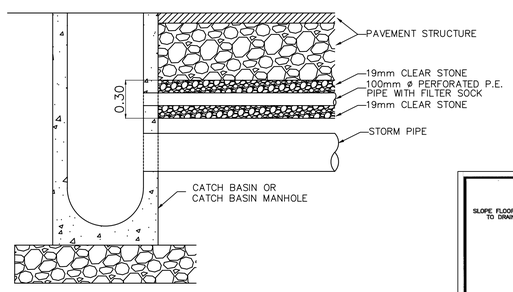
14. ALL STORM SEWERS TO BE PVC DR35 WITH CLASS B BEDDING.
15. PROPOSED SANITARY TO BE PVC DR28 WITH CLASS 'B' BEDDING.
16. FIRE HYDRANTS TO BE AWWA G509 COMPLIANT, NON-DRAINING, OPEN LEFT.
17. MUNICIPALITY WATERMAIN PROCEDURES TO BE ADHERED TO FOR INSTALLATION OF WATERMAINS OR SERVICES.
18. WATERMAINS AND WATER SERVICES SHALL MAINTAIN A MINIMUM COVER OF 1.7m.
19. PROVIDE 2.5m MINIMUM HORIZONTAL CLEARANCE BETWEEN THE PROPOSED WATERMAIN AND ANY STORM OR SANITARY SEWERS OR MAINTENANCE HOLES.

LEGEND

- EX. STORM SEWER
- PROPOSED STORM SEWER
- EX. SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- EX. MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED TWIN INLET CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- EX. CATCHBASIN
- PROPOSED WATERMAIN
- EX. WATERMAIN
- PROPOSED 3-WAY FIRE HYDRANT C/W STORZ CONNECTION
- EX. FIRE HYDRANT
- PROPOSED WATERVALVE
- EX. WATERVALVE
- EX. BURIED GAS LINE
- EX. BURIED BELL LINE
- EX. BURIED CABLE LINE
- EX. UNDERGROUND HYDRO LINE



SUBDRAIN PLAN DETAIL
N.T.S.



SUBDRAIN SECTION DETAIL
N.T.S.

GENERAL SEDIMENT CONTROL MEASURES

1. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION
2. ALL EROSION CONTROL MEASURES TO BE IN PLACE BEFORE STARTING CONSTRUCTION AND REMAIN IN PLACE UNTIL RESTORATION IS COMPLETE
3. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION
4. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION
5. MINIMIZE AREA DISTURBED DURING CONSTRUCTION
6. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN
7. PROTECT ALL CATCHBASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUIVALENT)
8. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION
9. PREVENT WIND-BLOWN DUST
10. STRAW BALES TO BE USED IN LOCALIZED AREAS AS SHOWN AND AND AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION

ROAD & BOULEVARD RESTORATION

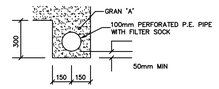
ALL DISTURBED AREAS SHALL BE RESTORED AS FOLLOWS:

i. ALL ROAD CUTS SHALL BE RESTORED WITH
- -40mm HL3 SURFACE ASPHALT (97% MARSHALL)
- -50mm HLB BASE ASPHALT (97% MARSHALL)
- -150mm GRANULAR "A" BASE (100% SPMDD)
- -300mm GRANULAR "B" TYPE 2 SUBBASE (100% SPMDD)
- GRANULAR "B" TO BE EXTENDED 0.3m BEHIND EDGE OF THE PAVEMENT

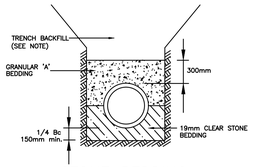
ii. BOULEVARDS SHALL BE RESTORED WITH SOD OVER 100mm TOPSOIL (min) UNLESS OTHERWISE NOTED

iii. ASPHALT DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD) WITH 50mm OF HL3A ASPHALT (97% MARSHALL)

iv. GRAVEL DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD) WITH 150mm OF CONCRETE (OPSS MIX. 30MPa MINIMUM)

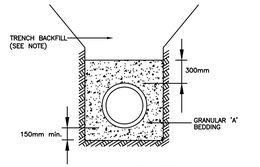


SUBDRAIN DETAIL



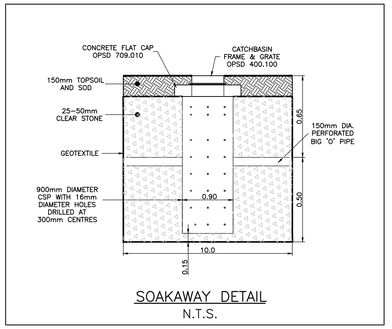
STONE BEDDING

NOTES:
1. 19mm CLEAR STONE STONE BEDDING SHALL BE USED IN PLACE OF THE STANDARD BEDDING WHERE HIGH HYDRAULIC GRADIENT CONDITIONS ARE ENCOUNTERED DURING CONSTRUCTION.

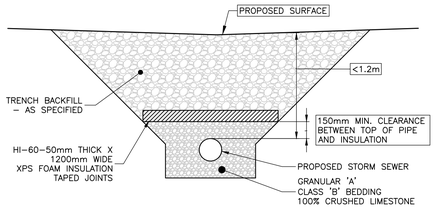


CLASS B BEDDING

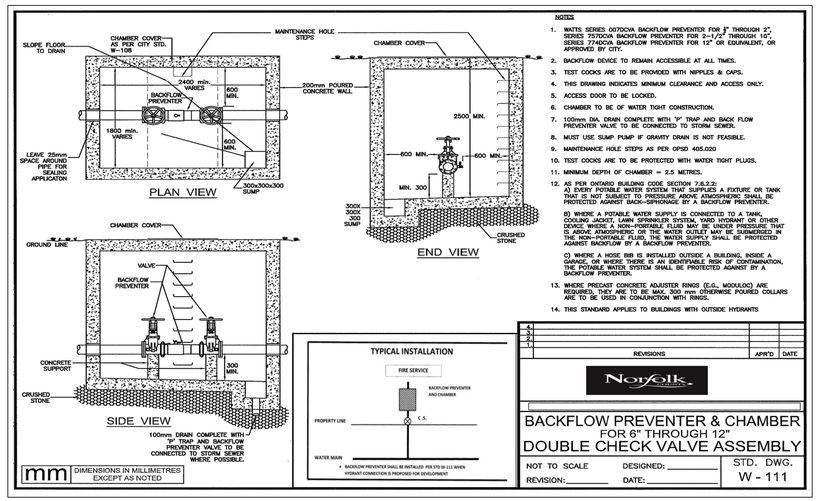
NOTES:
1. PIPE BEDDING AS SPECIFIED ON PLAN AND PROFILE DRAWINGS COMPACTED TO 95% SPMDD IN LAYERS NOT EXCEEDING 150mm, TO 300mm ABOVE TOP OF PIPE.
2. TRENCH BACKFILL FROM TOP OF PIPE BEDDING TO UNDERSIDE OF GRANULAR "B" SUBBASE SHALL CONSIST OF APPROVED NATIVE MATERIALS COMPACTED TO 95% SPMDD IN LAYERS NOT EXCEEDING 300mm.
3. PRIOR TO PLACING THE GRANULAR SUBBASE MATERIAL ALL TOPSOIL, SOFT OR OTHERWISE COMPRESSIBLE MATERIAL MUST BE REMOVED FROM THE SUBGRADE AREA AND THE SUBGRADE SHALL BE PROOF-ROLLED TO COMPACT ANY LOOSE SURFACE ZONES. ALL EXCAVATED AREAS MUST BE BACKFILLED WITH APPROVED ON-SITE NATIVE MATERIALS OR IMPORTED



SOAKAWAY DETAIL
N.T.S.



TYPICAL STORM INSULATION FOR STORM WITH <1.2m COVER
N.T.S.



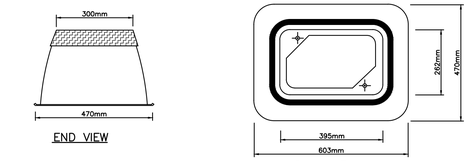
NOTES
1. WATTS SERIES 007QCVA BACKFLOW PREVENTER FOR 3/4" THROUGH 2", SERIES 757QCVA BACKFLOW PREVENTER FOR 2-1/2" THROUGH 10", SERIES 774QCVA BACKFLOW PREVENTER FOR 12" OR EQUIVALENT, OR APPROVED BY CITY.
2. BACKFLOW DEVICE TO REMAIN ACCESSIBLE AT ALL TIMES.
3. TEST COCKS ARE TO BE PROVIDED WITH NIPPLES & CAPS.
4. THIS DRAWING INDICATES MINIMUM CLEARANCE AND ACCESS ONLY.
5. ACCESS DOOR TO BE LOCKED.
6. CHAMBER TO BE OF WATER TIGHT CONSTRUCTION.
7. 100mm DIA. DRAIN COMPLETE WITH 'P' TRAP AND BACK FLOW PREVENTER VALVE TO BE CONNECTED TO STORM SEWER.
8. MUST USE SUMP PUMP IF GRAVITY DRAIN IS NOT FEASIBLE.
9. MAINTENANCE HOLE STEPS AS PER OPSD 405.020
10. TEST COCKS ARE TO BE PROTECTED WITH WATER TIGHT PLUGS.
11. MINIMUM DEPTH OF CHAMBER = 2.5 METRES.
12. AS PER ONTARIO BUILDING CODE SECTION 7.6.2.2:
A) EVERY POTABLE WATER SYSTEM THAT SUPPLIES A FIXTURE OR TANK THAT IS NOT SUBJECT TO PRESSURE ABOVE ATMOSPHERIC SHALL BE PROTECTED AGAINST BACK-SIPHONAGE BY A BACKFLOW PREVENTER.
B) WHERE A POTABLE WATER SUPPLY IS CONNECTED TO A TANK, COOLING JACKET, LAWN SPRINKLER SYSTEM, YARD HYDRANT OR OTHER FIXTURE OR EQUIPMENT FROM WHICH WATER IS USED UNDER PRESSURE THAT IS ADDED, MIXED OR CIRCULATED WITH NON-POTABLE WATER OR IMMERSED IN THE NON-POTABLE FLUID, THE WATER SUPPLY SHALL BE PROTECTED AGAINST BACKFLOW BY A BACKFLOW PREVENTER.
C) WHERE A HOSE BIB IS INSTALLED OUTSIDE A BUILDING, INSIDE A GARAGE OR A ROOM THERE IS AN IDENTIFIABLE RISK OF CONTAMINATION, THE POTABLE WATER SYSTEM SHALL BE PROTECTED AGAINST BY A BACKFLOW PREVENTER.
13. WHERE PRECAST CONCRETE ADJUSTER RINGS (E.G., MODULOC) ARE REQUIRED, THEY ARE TO BE MAX. 300 mm OTHERWISE POURED COLLARS ARE TO BE USED IN CONJUNCTION WITH RINGS.
14. THIS STANDARD APPLIES TO BUILDINGS WITH OUTSIDE HYDRANTS

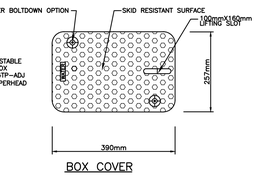
REVISIONS	APR'D	DATE
4		
3		
2		
1		

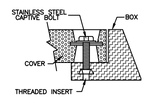
Norfolk

BACKFLOW PREVENTER & CHAMBER FOR 6" THROUGH 12" DOUBLE CHECK VALVE ASSEMBLY

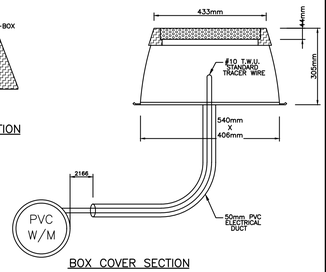
NOT TO SCALE | DESIGNED: | REVISION: | DATE: | STD. DWG. W - 111



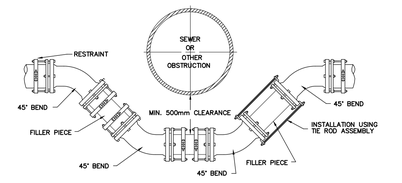




COVER BOLTDOWN OPTION



TRACER WIRE HAND HOLE DETAIL
N.T.S.



WATERMAIN DEFLECTION DETAIL

WATERMAIN RESTRAINTS TABLE						
DIAMETER (mm)	MINIMUM LENGTH TO BE RESTRAINED ON EACH SIDE OF FITTINGS (m)					
	11-1/4°	22-1/2°	45°	90° BENDS AND TEES	REDUCER (IN DIRECTION OF LARGER PIPE)	DEAD END AND VALVES
150	2			9	N/A	12

NOTES;
1. ALL JOINTS WITHIN DISTANCES SHOWN SHALL BE RESTRAINED WITH A MEG-A-LUG JOINT RESTRAINT.
2. ALL TEES SHALL HAVE A MINIMUM OF 1.0m SOLID PIPE OUT EACH SIDE OF THE MAIN RUN OF THE TEE.
3. ALL DISTANCES TO BE CONFIRMED TO THE MANUFACTURERS STANDARDS FOR ALTERNATE RESTRAINTS TO MEGALUG.

REV. No.	DATE	REVISION
0	MARCH 08, 2024	ISSUED FOR SPA

NOTE:
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ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION
PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION
APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS
BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST
G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EROSION AND SEDIMENT CONTROL PLAN
20-128-C104	SITE SECTION PLAN
20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp: LICENSED PROFESSIONAL ENGINEER 20-128 2024-03-08 J. T. JEZZI 100189485 PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
GENERAL NOTES

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 3/8/2024
Drawing Scale : AS NOTED	Drawing No. GN
Project No. 20-128	

DATE LAST PLOTTED : March 8, 2024

SANITARY SEWER DESIGN SHEET

Date: 2/29/2024
Project: 20-128 Orchard Sqaure
Town/County: Simcoe, Norfolk County

Pipe Material: PVC
N 0.013

Designed by: NLO
Checked by: JTI
Sheet: 1 of 1

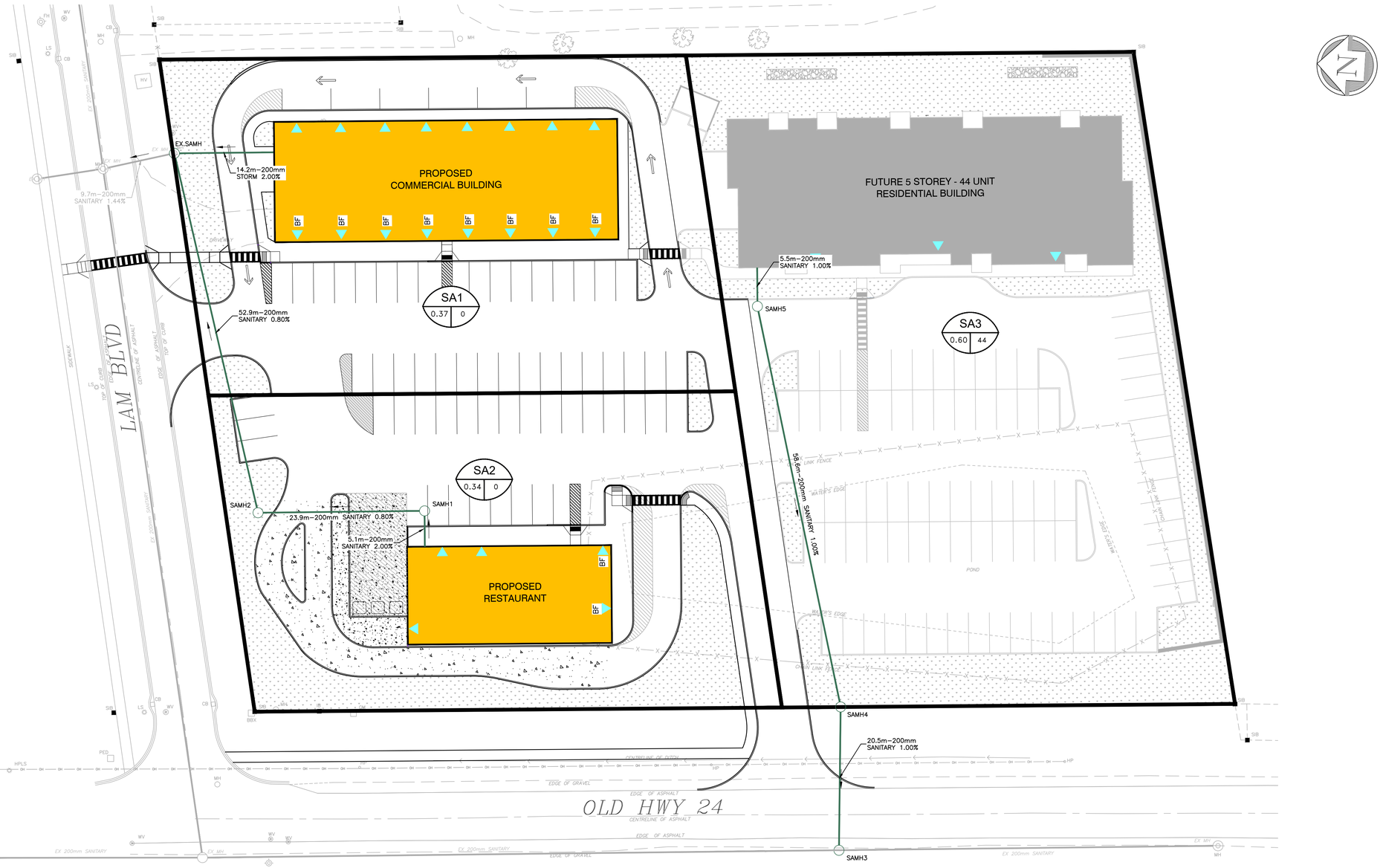
Location			Residential Area		Commercial Area		Total	Residential Services		Population			Flow			Sewer Design							
Area	From	To	Section	Cumul.	Section	Cumul.	Area	Section	Cumul.	Cumul.	KAV	M=Peak	Q(i)	Q(s)	Q(d)	Material	Size	Length	N	Slope	Cap	Q(d)/Cap	Full V
	MH	MH	Ha	Ha	Ha	Ha	Ha	Services	Services	Pop.	Factor	Factor	L/s	L/s	L/s		mm	m		%	L/s	%	m/s
SA1	COMMERICAL BUILDING	EX MH	0.00	0.00	0.37	0.37	0.370	0	0	33	0.800	3.478	0.10	0.60	0.71	PVC	200	14.2	0.013	2.00%	46.4	✔ 1.5%	1.48
SA2	RESTAURANT	SAMH1	0.00	0.00	0.34	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	5.1	0.013	0.80%	29.3	✔ 2.2%	0.93
-	SAMH1	SAMH2	0.00	0.00	0.00	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	23.9	0.013	0.80%	29.3	✔ 2.2%	0.93
-	SAMH2	EX MH	0.00	0.00	0.00	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	52.9	0.013	0.80%	29.3	✔ 2.2%	0.93
-	EX MH	EX MH	0.00	0.00	0.00	0.71	0.710	0	0	64	0.800	3.434	0.20	1.14	1.34	PVC	200	9.7	0.013	1.44%	39.4	✔ 3.4%	1.25
SA3	RESIDENTIAL BUILDING	SAMH5	0.60	0.60	0.00	0.00	0.600	44	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	5.5	0.013	1.00%	32.8	✔ 8.6%	1.04
-	SAMH5	SAMH4	0.00	0.60	0.00	0.00	0.600	0	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	58.6	0.013	1.00%	32.8	✔ 8.6%	1.04
-	SAMH4	SAMH3	0.00	0.60	0.00	0.00	0.600	0	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	20.6	0.013	1.00%	32.8	✔ 8.6%	1.04

Design Information:
Q(s) = Sewage Flow = P q M / 86.4
Q(i) = Infiltration Flow = I A
Q(d) = Peak Design Flow = Q(s) + Q(i)

Notes:
= Existring Pipes

P = Population in thousands
A = Tributary Area
Residential M = Peaking Factor = 1 + 14 / (4 + P^.5)
Commercial M = Peaking Factor = 0.8 (1 + 14 / (4 + P^.5)
Combined M = KAV (1 + 14 / (4 + P^.5)
KAV = (AR + (0.8*AC))/(AR+AC)

Residential q = Per Capita Flow=	450	L/cap/d
Commercial q = Per Capita Flow=	40000	L/ha/d
I = Peak Extraneous Flow =	0.28	L/s/ha
Residential Population Density =	2.75	persons /unit
Commercial Population Density =	90	persons /ha



LEGEND

SA1 — 0.99 | 4
- SANITARY DRAINAGE AREA NUMBER
- NUMBER OF UNITS
- AREA (ha)
- SANITARY SEWER FLOW
- SAMH5 — PROPOSED SANITARY SEWER
- SANITARY DRAINAGE BOUNDARY

REV. No.	DATE	REVISION
0	MARCH 08, 2024	ISSUED FOR SPA

NOTE:
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ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VILLAGES OF WATERFORD
TELEPHONE: 1-866-781-7653
ADDRESS: BOX 1152, 26 MAIN STREET, WATERFORD, N0E 1Y0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #28 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

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20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
HORIZONTAL : 1:300 (5, 10, 15)

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
20-128
2024-03-08
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
SANITARY DRAINAGE AREAS

Designed by : NLO	Drawn By : NLO
Checked by : JTI	Date Started : 2/29/2024
Drawing Scale : 1:300	Drawing No. SAN
Project No. 20-128	

DATE LAST PLOTTED :- March 8, 2024

STORM SEWER DESIGN SHEET

Date: 2/29/2024
Project: 20-128 Orchard Square
Town/County: Waterford, Norfolk County

Return: 100-year
A 801.041
B 1.501
C 0.657

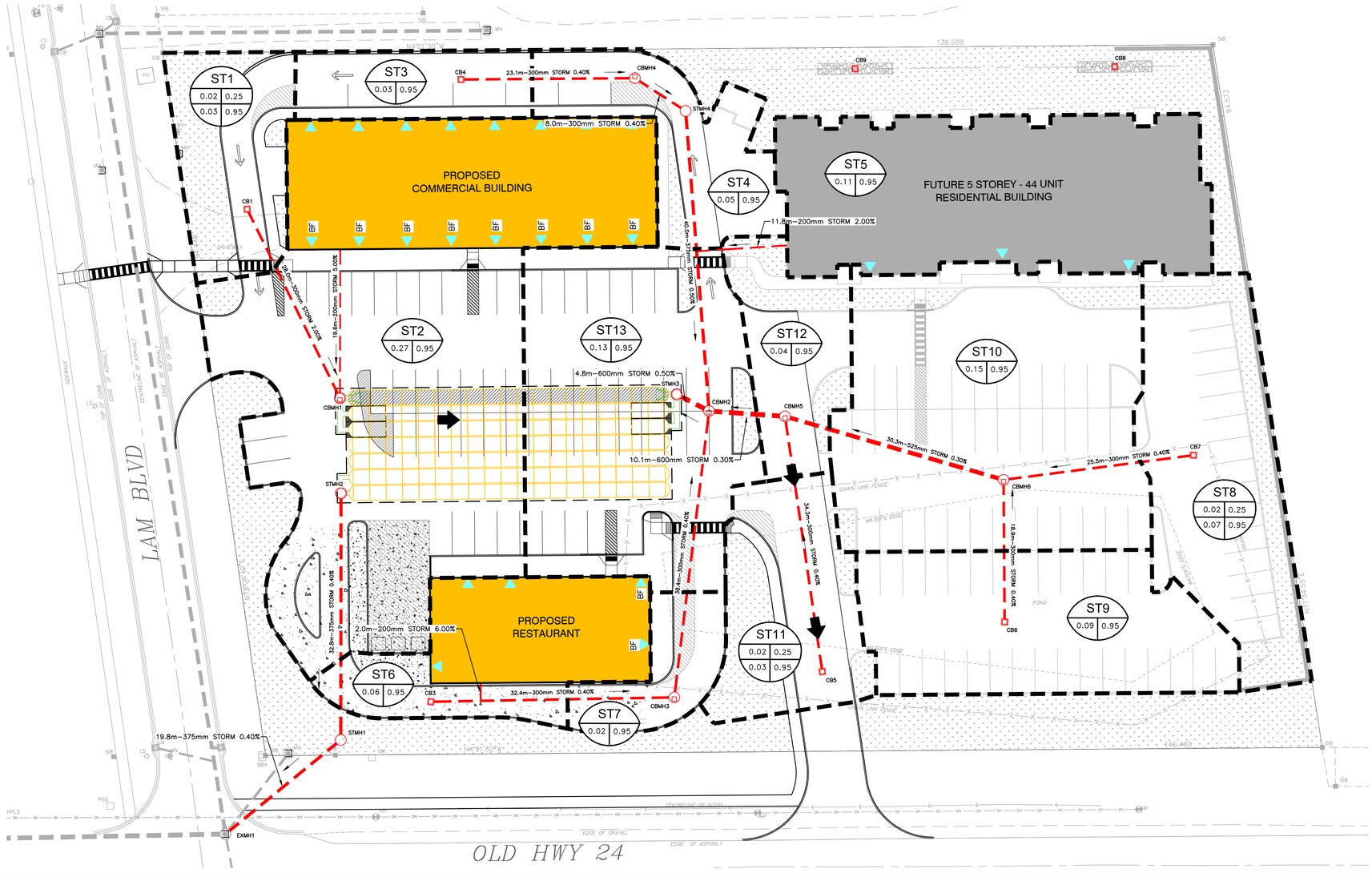
Pipe Material: PVC<=450, Concrete >450
n 0.013

Designed by: NBN/NLO
Checked by: JTI

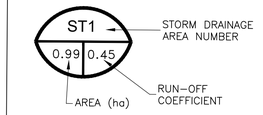
Sheet: 1 of 1

Location			Area			Total	Individual	Cumulative	Time of	Rainfall	Flow	Sewer Design						
			Ha	Ha	Ha	Area	C*A	C*A	Concentration	mm/hr	2.78*I*A*C	Size	Slope	Capacity (Full)	Vel (Full)	Length	Time	Cap
Area	From	To	0.25	0.45	0.95	Ha			min		L/s	mm	%	L/s	m/s	m	min	%
ST1	CB1	CBMH1	0.02		0.03	0.05	0.03	0.03	5.00	234.17	21.8	300	2.00%	136.8	1.93	28.0	0.24	✔ 16%
ST2	CBMH1	CHAMBERS			0.27	0.27	0.26	0.29	5.00	234.17	188.8							
ST3	CB4	CBMH4			0.030	0.03	0.03	0.03	5.00	234.17	18.6	300	0.40%	61.2	0.87	23.1	0.44	✔ 30%
ST4	CBMH4	STMH4			0.050	0.05	0.05	0.08	5.44	224.20	47.4	300	0.40%	61.2	0.87	8.0	0.15	✔ 77%
ST5	STMH4	CBMH2			0.11	0.11	0.10	0.18	5.60	220.99	110.9	375	0.50%	124.0	1.12	40.0	0.59	✔ 89%
ST6	CB3	CBMH3			0.06	0.06	0.06	0.06	5.00	234.17	37.1	300	0.40%	61.2	0.87	32.4	0.62	✔ 61%
ST7	CBMH3	CBMH2			0.02	0.02	0.02	0.02	5.62	220.48	11.6	300	0.40%	61.2	0.87	38.4	0.74	✔ 19%
ST8	CB7	CBMH6	0.02		0.07	0.09	0.07	0.07	5.00	234.17	46.5	300	0.40%	61.2	0.87	25.5	0.49	✔ 76%
ST9	CB6	CBMH6			0.09	0.09	0.09	0.09	5.00	234.17	55.7	300	0.40%	61.2	0.87	18.9	0.36	✔ 91%
ST10	CBMH6	CBMH5			0.15	0.15	0.14	0.30	5.49	223.23	185.9	525	0.30%	235.6	1.09	30.3	0.46	✔ 79%
ST11	CB5	CBMH5	0.02		0.03	0.05	0.03	0.03	5.00	234.17	21.8	300	0.40%	61.2	0.87	34.3	0.66	✔ 36%
ST12	CBMH5	STMH3			0.04	0.04	0.04	0.37	5.96	214.00	220.7	600	0.30%	336.3	1.19	10.1	0.14	✔ 66%
ST13	CBMH4	STMH3			0.13	0.13	0.12	0.69	6.36	206.63	398.6	600	0.50%	434.2	1.54	4.8	0.05	✔ 92%
-	STMH2	STMH1									15.0	375	0.40%	110.9	1.00	32.8	0.54	✔ 14%
-	STMH1	EX MH1									15.0	375	0.40%	110.9	1.00	19.8	0.33	✔ 14%

LEGEND:
15 L/s = Allowable 100-year flow from from SWM Chamber Facility



LEGEND



OVERLAND FLOW (MAJOR)
STORM SEWER FLOW (MINOR)
STMH5 PROPOSED STORM MANHOLE
PROPOSED INFILTRATION TRENCH
PROPOSED SINGLE CATCH BASIN MH
PROPOSED DOUBLE CATCH BASIN MH
STORM DRAINAGE BOUNDARY

REV. No.	DATE	REVISION
0	MARCH 08, 2024	ISSUED FOR SPA

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VILLAGES OF WATERFORD
TELEPHONE: 1-866-781-7653
ADDRESS: BOX 1152, 26 MAIN STREET, WATERFORD, N0E 1Y0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #28 LAM BOULEVARD.
ELEV. 245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EROSION AND SEDIMENT CONTROL PLAN
20-128-C104	SITE SECTION PLAN
20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
HORIZONTAL : 1:300_XREF

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
20-128
2024-03-08
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
STORM DRAINAGE AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : 3/8/2024
Drawing Scale : 1:300_XREF	Drawing No. STM
Project No. 20-128	

DATE LAST PLOTTED : March 8, 2024

DRAWING LIST SPA

ARCHITECTURAL

A100	COVER SHEET SPA
A101	SITE PLAN NOTES - ZONING
A101A	SITE PLAN NOTES
A101B	SITE PLAN
A102	SITE PLAN DETAILS
A102A	SITE PLAN DETAILS
A103	CANADA POST
A104	EARTHBIN
A104A	EARTHBIN
A105	OPSD DETAILS
A105A	OPSD DETAILS
A106	EXISTING SITE SURVEY
D100	SITE PLAN DEMO

CIVIL

C101	SERVICING PLAN
C102	GRADING PLAN
C103	EROSION & SEDIMENT CONTROL PLAN
GN	GENERAL NOTES
SAN	SANITARY DRAINAGE AREAS
STM	STORM DRAINAGE AREAS

A4.0	EXTERIOR ELEVATIONS - FOOD CONSULTANT
A2.01	ELEVATIONS - COMMERCIAL

ABBREVIATIONS & SHORT FORMS

GENERAL ABBREVIATIONS

A/F/F & AFF - ABOVE FINISHED FLOOR
AF - ABOVE FINISHED
ADJ. - ADJUSTABLE
ALT. - ALTERNATE
APP. - APPLICATION
ARCH. - ARCHITECTURAL
AODA - ACCESSIBILITY FOR ONTARIANS W/ DISABILITIES ACT
BD - BOARD
BF - BARRIER FREE
BFP - BACK FLOW PREVENTER
B/N/C & BNC - BULL NOSE CORNER
BOL - BOLLARD
BP - BEARING POCKET
BPP - BEARING PLATE POCKET
BR - BICYCLE RACK
CANT. - CANTILEVERED
CBS - CALL BUTTON STATION
CCJ - COMPARTMENT CONTROL JOINT
CHB - CHALK BOARD
CH.TBL - CHANGE TABLE
CI - CONTINUOUS INSULATION
CJ - CONTROL JOINT
CM - CONTROL MODULE
CH - COAT HOOK
CMD - CARBON MONOXIDE DETECTOR
COMP. - COMPRESSIBLE / COMPRESSOR
CONT. - CONTINUOUS
CONN. - CONNECTION
CP - CONTROL PANEL
CU - CONDENSING UNIT
CV - CONTROL VALVE
CV - CENTRAL VAC
CVP - CENTRAL VAC PORT
C/W - COMPLETE WITH
DBL. - DOUBLE
DC - DROPPED CURB
DF - DRINKING FOUNTAIN
DW - DISH WASHER
DWG. - DRAWING
DIST. - DISTANCE
DISP. - DISPLAY CASE
DSR - DESIGNATED SUBSTANCE REPORT
EA - EACH
EGS - EMERGENCY CALL SWITCH
E.F. - EACH FACE
ELEV. - ELEVATION
ENG.D - ENGINEERED
ENG - ENGINEER
EPB - EMERGENCY PUSH BUTTON
EW - EYE WASH STATION
E.W. - EACH WAY
EX. - EXISTING
EXP. - EXPOSED
FB - FIRE BLOCK
FD - FLOOR DRAIN
FDTN. - FOUNDATION
FEC - FIRE EXTINGUISHER CABINET
FE - FIRE EXTINGUISHER
FDS - FOLD DOWN GRAB BAR
FLEX. - FLEXIBLE
FLR. - FLOOR
FLRING. - FLOORING
FR - REFRIDGERATOR
FRE - FREEZER
F/R/R & FRR - FIRE RESISTANCE RATING
FS - FIRE STOP
FSS - FOLD DOWN SHOWER SEAT
FTG.'S - FOOTINGS
F/V - FIELD VERIFY
FN - FOUNDATION WALL
GALV. - GALVANIZED
GAZ. - GAZEBO
GB & GB# - GRAB BAR
GD - GARBAGE DISPOSAL
GEN. - GENERATOR
GL - GRID LINE
GM - GAS METER
HB - HOSE BIB
HD - HAND DRYER
H/D - HEAVY DUTY
HO - HOLD OPEN
HORIZ. - HORIZONTAL
HWH - HOT WATER HEATER
INSUL. - INSULATION
ICB - INTEGRAL COVE BASE
KP - KEY PAD
L - LOCK
M / MIRR. - MIRROR
MANUF. - MANUFACTURED
MAX. - MAXIMUM
MECH. - MECHANICAL
MIN. - MINIMUM
M/O/L & MOL - MINISTRY OF LABOUR
M/O/T & MOT - MINISTRY OF TRANSPORTATION
MS - MOP SINK
MTD. - MOUNTED
MW - MICROWAVE
NADS - NORFOLK ACCESSIBILITY DESIGN GUIDELINES
N/I/C & NIC - NOT IN CONTRACT
NO. - NUMBER
NTS - NOT TO SCALE
OBC - ONTARIO BUILDING CODE
O/D - OUTSIDE DIAMETER
O/H - OVERHEAD
O/W - ONE WAY
PER.'S - PERIMETER / PERIMETERS PER.('S)
PB - POWER OPERATOR PUSH BUTTON
PDC - POWER DOOR CONTROL BUTTON
PDO - POWER DOOR OPERATOR
POS - PROTEGTION OF SOFFITS
PTD/D - PAPER TOWEL DISPENSER/DISPOSAL
P/I/P & PIP - POURED IN PLACE
PRE-FIN. - PRE-FINISHED
PROF. ENG. - PROFESSIONAL ENGINEER
P/T - PRESERVATIVE TREATED
RCH - RECESSED CABINET HEATER
REQ.D - REQUIRED
RCP - REFLECTED CEILING PLAN
REIN. - REINFORCED
REINF.'G - REINFORCING
REF. - REFERENCE
REF - REFRIDGERATOR
REL. - RELOCATED
RD - ROOF DRAIN
RM. - ROOM
R/O - ROUGH OPENING
R/WL - RAIN WATER LEADER
SA - SMOKE ALARM
SC - SAN CUT
SCD - TOILET SEAT COVER DISPENSER
SCH.'S - SCHEDULES
SD - SCUPPER DRAIN
SD - SOAP DISPENSER
SH - SOAP HOLDER
SHH - SHOWER HEAD & MIXING VALVE / WAND
SHF - SHELF
SND - SANITARY NAPKIN DISPOSAL
SNV - SANITARY NAPKIN VENDING DISPENSER
S/O/G & SOG - SLAB ON GRADE
SD - SOAP DISPENSER
SP - SUMP PUMP
SPEC.D - SPECIFIED
SPMDD - STD. PROCTOR MAX. DRY DENSITY
SR - SHOWER ROD
ST. - STOVE
STRUCT. - STRUCTURAL
TB - TACK BOARD
TBD - TO BE DETERMINED
TC - TEACHER'S CABINET/CLOSET
TH. - THERMOSTAT
THERM. - THERMAL
TM - TILTED MIRROR
TOB - TOWEL BAR
TPD - TOILET PAPER DISPENSER
TWF - THRU WALL FLASHING
TYP. - TYPICAL

ULC - UNDERWRITERS LABORATORIES OF CANADA
U/C - UNDER CUT
U/S - UNDER SIDE
U/N/O - UNO - UNLESS NOTED OTHERWISE
VAP. - VAPOUR
VAR. - VARIES
VERT. - VERTICAL
W/ - WITH
WB - WHITE BOARD/MARKER BOARD
WC - WATER COOLER
WM - WATER METER
WR - WASTE RECEPTACLE
WS - WATER SOFTENER
% - PERCENT
@ - AT
O/C - ON CENTER

MATERIAL ABBREVIATIONS

AB - ARCHITECTURAL BLOCK
ACT - ACOUSTIC CEILING TILE
ASPH. - ASPHALT
AWP - ACOUSTIC WALL PANEL
AT - ACOUSTIC TILE
AL - ALUMINUM
AN - ANODIZED
AN(C) - ANODIZED COLOURED
B - BRICK
B/B - BOARD & BATTEN
BFG - BACK FTD. GLASS
CAR - CARPET
CPT - CARPET TILE
CB - CONCRETE BLOCK
CEM - CEMENT BOARD
CET / CT - CERAMIC TILE
CONC - CONCRETE
C(H) - CONC. HARDENED & SEALED
C(S) - CONC. SEALED
C(P) - CONC. HARDENED, SEALED & POLISHED
EM - EXPANDED METAL
EP - EPOXY PAINT & PRIMER
ESF - EPOXY SEALED FLOORING
ET - EPOXY TERRAZZO
F - FIRELITE GLAZING
FG - FIBREGLASS
FT - FLOCKED TILE (CARPETING)
GB / GBD. / GYP.BD. - GYPSUM BOARD
GLB - GLASS BLOCK
GLBL - GLAZED BLOCK
GL - GLAZING / GLASS
GWG - GEORGIAN WIRE GLAZING
GM - GYM MAT
GMT - GLASS MOSAIC TILE
HM - HOLLOW METAL
HARDWD. - HARDWOOD
H.D/G - HDG - HOT DIPPED GALV.
IMP - INSULATED METAL PANELS
LGC - LEAD COATED COPPER
LINO - LINOLEUM
LSG - LAMINATED SAFETY GLAZING
LVT - LUXURY VINYL TILE
LVP - LUXURY VINYL PLANK
LXG - LEXAN GLAZING
MAR - MARMOLEUM
MAS - MASONITE
MS - METAL SIDING
MTL - METAL
MW - MOVEABLE WALL SYSTEM
NAT. - NATURAL
PB - PARTICLE BOARD
PC - PRECAST CONC.
P / PTD. - PAINTED
PF / PRE.FIN. - PREFINISHED
PL - PLASTER
PLAM - PLASTIC LAMINATE
PLYWD. - PLYWOOD
PMP - PREFORMED METAL PANEL
PSP - PIERCED STEEL PLANKING
PT - PORCELAIN TILE
PQF - PARQUET FLOORING
QT - QUARRY TILE
R - RUBBER
RB - RUBBER BASE
RSF - RESILIENT SHEET FLOORING
S - STONE
SAFF - SAFETY FLOORING
SC - SPECIAL COATING
SF - SPORTS FLOORING
SG - LAMINATED SAFETY GLASS
SGL - SPANDREL GLAZING
SHV - SHEET VINYL FLOORING
S.S. - SOLID SURFACE
ST - STUCCO
ST / STL. - STEEL
S/S - STAINLESS STEEL
S#V - STAINED & VARNISHED
SWC - SOLID WOOD CORE
T - TEMPERED GLAZING / GLASS
TDG - TEMPERED DOUBLE GLAZING / GLASS
TBB - TILE BACKER BOARD
TECTUM - TECTUM ACOUSTIC PANEL
TERR - TERRAZZO
T.S. - TOP SOIL
TURF - ARTIFICIAL TURF
U - POLYURETHANE
V - VINYL
VCGB - VINYL COATED GYPSUM BOARD
VCP - VENEER CORE PLYWOOD
VCT - VINYL COMPOSITE TILE
VPF - VINYL PLANK FLOORING
VR - VENTED RUBBER BASE
VQT - VINYL QUARTZ TILE
WD. - WOOD
WP - WATER PROOFING

RM. NAMES

AL. - AIR LOCK
CL. - CLOSET
CLASSRM. - CLASSROOM
COMM. - COMMUNICATION
CONF. - CONFERENCE
CORR. - CORRIDOR
ELEC. - ELECTRICAL
ELEV. - ELEVATOR
INST. - INSTRUCTOR
LAB - LABORATORY
LAUND. - LAUNDRY
PR. - POWDER ROOM
PRINC. - PRINCIPAL
REC. - RECEPTION
RECEIV. - RECEIVING
RM. - ROOM
SHWR. - SHOWER
STOR. - STORAGE
ST. - STATION
SURL - SURGERY
VEST. - VESTIBULE
VP - VICE PRINCIPAL
WR. - WASHROOM

CONSULTANT LIST

ARCHITECTURAL / STRUCTURAL / CIVIL DESIGN

vallee
Consulting Engineers, Architects & Planners

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JULIAN STEWART, BARCH(SC.

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JOHN IEZZI, P.ENG.

ELECTRICAL

SCI Electrical Engineering
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CALEDONIA, ON N3W 1B6
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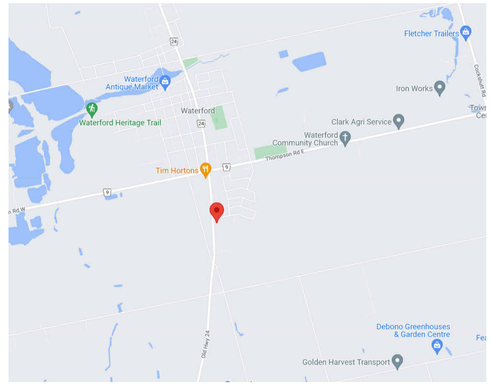
JAKUB RUDY, B.A

LANDSCAPE ARCHITECT

adesso design inc
landscape architecture
ADESSO DESIGN INC.
218 LOCKE STREET SOUTH,
HAMILTON, ON L8P 4B4
TEL.: (905) 526-8816 EXT.203

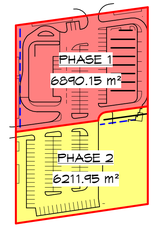
CONTACT:

SCOTT HENDERSON, OALA, CLSA

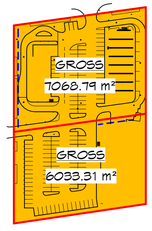


KEY MAP
SCALE 1 : 100

SITE MAP
SCALE 1 : 100



2 A100 SITE PHASING PLAN
SCALE 1 : 2000



1 A100 GROSS SITE
SCALE 1 : 2000

NO.	DATE	ISSUANCE
7	2024.03.11	SPA
6	2024.03.08	SPA REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS

NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 3360506206D
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS
ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

VERLINDA

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH.
ONTARIO ASSOCIATION OF ARCHITECTS
Melissa Stickl
MELISSA NICOLE STICKL
LICENCE 7987

STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
COVER SHEET SPA

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: A100
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-03-11 1:40:21 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128- Orchard Square_Site.rvt

SITE STATISTIC & ZONING REQ.'S - PHASE 2

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT. ROLL # 33605062869 IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

ZONING:
IN ACCORDANCE TO ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JULY-2020-CONSOLIDATION

PROVISION	LAND USE: EXISTING
5.5	URBAN RESIDENTIAL TYPE 5 ZONE (R5)
5.5.1	PERMITTED USES in an R5 *Zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) dwelling, apartment b) home occupation c) retirement home.
14.845 SPECIAL PROVISION	In lieu of the corresponding provisions in the R5 *Zone*, the following shall apply: a) minimum *front yard* – 60 metre; b) maximum number of *dwelling units* – forty four (44). In lieu of the corresponding provisions of Section 4.0, the following shall apply: a) minimum number of visitor *parking spaces* – eleven (11); b) *parking spaces* shall be *permitted* in the *front yard*.

PROVISION	SETBACKS (m - METERS):	REQUIRED (m)	PROVIDED (m)
5.5.2a)	MIN. LOT FRONTAGE:	30	64.4
5.5.2b)	MIN. FRONT YARD:	3 / 60	TBD >60
5.5.2c)	MIN. EXTERIOR SIDE YARD:	3	N/A
5.5.2d)	MIN. INTERIOR SIDE YARD	3	TBD >3
5.5.2e)	MIN. REAR YARD:	9	TBD >9
5.5.2f)	MAX. BLDG. HEIGHT	5 STOREYS	5 STOREYS
5.6.2g)	MAX. FLOOR AREA RATIO: i) 4 STOREY BLDG. ii) 5 STOREY BLDG.	0.72 0.79	N/A TBD <0.79
	"FLOOR AREA RATIO" shall mean the ratio of the *usable floor area* to the lot, determined by the calculation of: *floor area ratio = usable floor area / lot area.*		

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

SITE STATISTIC & ZONING REQ.'S - PHASE 1

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT. ROLL # 33605062869 IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

ZONING:
IN ACCORDANCE TO ZONING BY-LAW 1-Z-2014 NORFOLK COUNTY - JULY-2020-CONSOLIDATION

PROVISION	LAND USE: EXISTING
6.3	SERVICE COMMERCIAL ZONE (CS)
6.3.1	PERMITTED USES *Permitted* Uses in a CS *Zone*, no land, *building* or *structure* shall be used except in accordance with the following uses: a) ambulance service b) animal hospital, provided the entire operation is carried on within an enclosed *building* c) any non-residential use *permitted* in the Neighbourhood Institutional *Zone* (IN), subject to the provisions of that *Zone* d) auction centre e) automobile gas station f) automobile service and repair station g) *automobile washing establishment* h) automotive parts shop i) bar or night club j) clinic or doctors' offices k) commercial greenhouse, tree and plant nursery l) community centre m) contractor shop n) contractor supply and service shop o) convenience store p) day care nursery q) *dry cleaning distribution station* r) dry cleaning establishment s) *dwelling, single detached* or *dwelling unit* in a non-residential *building* - maximum one (1) *(S-Z-2020)* t) equipment rental establishment u) farm implement sales and service establishment v) financial institution w) fire hall x) florist shop y) fruit and vegetable outlet z) funeral home aa) garden supply centre bb) home occupation cc) hotel dd) laundromat ee) *lumber yard and building supply establishment* ff) manufacturing and retail sale of monuments gg) merchandise service shop hh) miniature golf, golf driving range and baseball pitch ii) *outdoor storage* accessory to *permitted* uses jj) *parking lot or structure* kk) personal service shop ll) place of assembly mm) place of sports and recreation nn) *place of worship* oo) police station pp) private club qq) *restaurant* rr) *restaurant, fast-food* ss) *restaurant, take-out* tt) sheet metal, plumbing, heating, electrical or woodworking shop or any similar activity uu) swimming pool sales and service establishment vv) training and rehabilitation centre uu) *vehicle sales or rental establishment* xx) video store yy) wholesale outlets. to permit a retail use of 810m² of useable floor area within the service commercial (CS) zone.
14.1043 SPECIAL PROVISION	

PROVISION	SETBACKS (m - METERS):	REQUIRED (m)	PROVIDED (m)
6.3.2a)	MIN. LOT AREA: i) INTERIOR LOT ii) CORNER LOT	450m² 495m²	PROPOSED 7069m²
6.3.2b)	MIN. LOT FRONTAGE: i) INTERIOR LOT ii) CORNER LOT	15 16.5	PROPOSED 75.5
6.3.2c)	MIN. FRONT YARD:	3	9.4
6.3.2d)	MIN. EXTERIOR SIDE YARD:	3	12.6
6.3.2e)	MIN. INTERIOR SIDE YARD	3	11.1
6.3.2f)	MIN. REAR YARD:	9	9
6.3.2g)	MIN. USABLE FLOOR AREA: FOR A DWELLING UNIT IN A NON-RESIDENTIAL BLDG.	40m²	N/A
6.3.2h)	MAX. BLDG. HEIGHT	11	-9.14 RESTAURANT -8.25 COMMERCIAL
6.3.2i)	MAX. LOT COVERAGE	35%	~17.5
6.3.2j)	MAX. USABLE FLOOR AREA: OF A FRUIT AND VEGETABLE OUTLET	200m²	N/A
6.3.2k)	OUTDOOR STORAGE	PROHIBITED IN A FRONT YARD & WITHIN 3m OF ANY LOT LINE ADJOINS A RESIDENTIAL ZONE	PROHIBITED IN A FRONT YARD & WITHIN 3m OF ANY LOT LINE ADJOINS A RESIDENTIAL ZONE
6.3.3	Outdoor Display of Goods Outdoor display of vehicles on paved areas shall be *permitted* in the *front yard* subject to Subsection 6.3.5. Outdoor display of other non-vehicular items shall be *permitted* within a *front yard* provided such display is located on a grassed or landscaped area without surrounding fences and subject to Subsection 6.3.5.		
6.3.4	Landscaped Strip All *buildings*, *parking lots* and *parking spaces* and display areas shall be *setback* 3 metres from the *front lot line*. This area shall be landscaped which may include patio pavers.		
6.3.5	Zone Provision for *Convenience Store* The *usable floor area* of a *convenience store* shall not exceed 280 square metres.		
6.3.6	Zone Provisions for *Dwellings* Notwithstanding the provisions in Subsection 6.3.2, all *single detached dwellings* shall conform to the Urban Residential Type 3 (R3) *Zone* provisions in Subsection 5.3. (S-Z-2020) (27-Z-2020)		

COORD. W/ ZONING BY-LAW FOR ALL OTHER ZONING REQ.'S

2.0 DEFINITIONS

2.170 "USABLE FLOOR AREA" shall mean the total area of all floors of a *building*, *outdoor patio* or *cafe*, or *dwelling unit* including:
a) a hallway, aisle, stairway and corridor within a suite or unit;
b) an internal wall and partition within a suite or unit;
c) a storage room and storage area within a suite or unit;
d) a boatslip in the case of a *boathouse*;
e) a habitable room or area in the *basement* of a *dwelling*.
But excluding:
a) an area occupied by a common area in a multi-tenant *building* including but not limited to a public stairwell, public or shared corridor and lobby;
b) a mechanical shaft;
c) an entry vestibule not within a *dwelling unit*;
d) a garage attached to a *building*.
e) an unfinished *basement* in a *dwelling* used for storage or laundry.

The *usable floor area* for a *dwelling* is measured from the outside face of exterior walls or to the centre-line of party or *common walls*.
The *usable floor area* for all other *buildings* shall be measured from the inside face of exterior walls, interior *common walls* and firewalls.

2.81 "LANDSCAPE AREA" shall mean an area of land comprised of trees, shrubs, flowers, grass or other horticultural elements. Landscaping may include pervious paths, patios, walkways, or elements designed to enhance the visual amenity of a property but does not include open storage display areas, parking or loading areas, or areas covered by *driveways*. (S-Z-2018)

3.0 GENERAL PROVISIONS

3.8. Exemptions from Height Provisions
The height provisions of this By-Law shall not apply to the following uses:
a) belfry, steeple, spire, clock or bell tower, dome, cupola, or flag pole;
b) chimney or stack;
c) radio, television or telecommunication antennae;
d) aids to navigation;
e) electrical transmission tower or pylon;
f) water storage *structure*;
g) barn, silo, drying elevator or tower, fire training tower, kiln, windmill, grain elevator;
h) elevator enclosure or mechanical penthouse occupying not more than 10 percent of the area of the roof of a *building* on which it is located;
i) machinery for the moving of industrial and extractive materials and housing frames and *structures* for such machinery;
j) hospital.

3.10. Exemptions from *Yard* Provisions.
Except as otherwise provided *herein*, every part of any *required yard* shall be open and unobstructed by any *building*, *structure*, fuel-storage tanks, heating or air conditioner units, and generators except:
a) sills, belt courses, cornices, chimneys, bay windows, pilasters, hydro meters or gas meters may project into any *required yard* or *setback* area a distance of not more than 0.65 metres;
b) eaves or gutters may project into any *required yard* or *setback* area a distance of not more than 0.65 metres;
c) canopies or awnings may project into any *required rear yard*, *required front yard* or *required exterior side yard* area a distance of not more than 1.5 metres;
d) balconies may project into any *required rear yard*, *required front yard* or *required exterior side yard* area a distance of not more than 1.5 metres provided they are no closer than 3 metres from an *interior lot line* and 6 metres from a *rear lot line*;
e) barrier-free access ramps may project into any *required rear yard*, *required front yard* or *required exterior side yard* area a distance of 3 metres;
f) steps may project into any *required rear yard*, *required front yard* or *required exterior side yard* area a distance or not more than 1.5 metres; and steps may project into any *required interior side yard* area a distance of 1 metre.
g) Public utilities may project into any *required rear yard*, *required front yard*, *required interior side yard* area or *required exterior side yard* area. *(66-Z-2018)*
h) Air conditioner units, provided the encroachment is no closer than 0.6 metres to the *side lot line*. (27-Z-2020)

3.11. Frontage on a *Street*
3.11.1 No *building* or *structure* shall be *erected*, *altered* or enlarged on any land which does not have the minimum *required lot frontage* on an open, constructed and year-round, *improved street*.
3.11.2 For the purposes of this Subsection, a private condominium road servicing a condominium development shall be deemed to be an open, constructed and year-round *improved street*.

PARKING REQ.'D: RESIDENTIAL

PROVISION	NUMBER OF PARKING SPACES	REQUIRED	PROVIDED
4.9b)	APARTMENT DWELLING (S-Z-2017): 1.5 SPACES / DWELLING UNIT 1.5 SPACES x 44 DWELLING UNITS = 66	66 SPACE(S)	66 SPACE(S)

PARKING REQ.'D RESIDENTIAL - VISITOR:

4.9f)	VISITOR PARKING: 1 SPACE / 3 DWELLING UNITS 1 SPACE x (44 / 3) = 15	15 SPACE(S)	15 SPACE(S)

PARKING REQ.'D TOTAL:

	TOTAL	81 SPACE(S)	81 SPACE(S)

PARKING REQ.'D - BARRIER FREE: (PART OF REQ.'D VISITOR PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 1-25 (VISITOR) PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE *Where an uneven number of accessible *parking spaces* are required the extra type B space may be changed to a type A space.	1 SPACE(S) 1 SPACE(S)	1 SPACE(S) 1 SPACE(S)

PARKING REQ.'D: NON-RESIDENTIAL

4.9kk.)	RESTAURANT, FAST FOOD WITH DRIVE THROUGH: 1 SPACE / 10m² 1 SPACE x (364 / 10m²) = 36.4	37 SPACE(S)	41 SPACE(S)
4.9uu)	OTHER NON-RESIDENTIAL USES: (COMMERCIAL) 1 SPACE / 35m² 1 SPACE x (811.5 / 35m²) = 23.2	24 SPACE(S)	25 SPACE(S)

PARKING REQ.'D TOTAL:

	TOTAL	61 SPACE(S)	66 SPACE(S)

PARKING REQ.'D - BARRIER FREE: (PART OF REQ.'D PARKING)

4.3.3	BARRIER FREE PARKING REQ.'D: 51-75 PARKING SPACES =		
	TYPE 'A' (3.4m WIDE) PLUS 1.5m AISLE TYPE 'B' (2.4m WIDE) PLUS 1.5m AISLE	1 SPACE(S) 1 SPACE(S)	1 SPACE(S) 1 SPACE(S)

4.0 OFF STREET PARKING

PARKING SPACE DIMENSIONS

4.1 4.1.3a)	PARKING SPACE DIMENSIONS WIDTH OF PARKING SPACE: FOR VEHICLES PARKED SIDE BY SIDE FOR VEHICLES PARKED WITH WALL OR FENCE ADJ.	3 MIN. 3.3 MIN.	3 3.3
4.1.3b)	DEPTH OF PARKING SPACE: FOR 90 DEGREE PARKING FOR PARALLEL PARKING	5.8 MIN. 7 MIN.	5.8 7
4.1.4 4.1.4b)	PARKING AISLE REQ.'S: TWO-WAY TRAFFIC	7.3 MIN.	7.3 MIN.

4.2 LOCATION OF PARKING ON A LOT

4.2.1	All *parking spaces* shall be wholly provided on the *lot* occupied by the *building*, *structure* or use for which the *parking spaces* are *required* except where a *lot* has both residential and non-residential *Zones* in which case any *parking spaces* for non-residential use shall not be *permitted* on any portion of the *lot Zoned* residential.
4.2.2	No parking area shall be located in any *sight triangle*.
4.2.4 14.845 SPECIAL PROVISION	4.2.4 Other Provisions a) For tri-plex dwellings, duplex dwellings, four-plex dwellings, street townhouses, stacked townhouses, and boarding or lodging houses, required parking spaces shall be prohibited within the required front yard or required exterior side yard; except where a dwelling unit has a private garage in which case the driveway leading to the private garage may be used as a parking space subject to the size requirements herein. b) for group townhouses and apartment dwellings, no *parking lot* shall be located closer than 3 metres from any *dwelling* on the *lot* or of any *interior lot line* abutting another residential *Zone*; c) for group townhouses and apartment dwellings, no parking lot or *parking space* shall be located between a dwelling and the street line, except for individual or tandem *parking spaces* leading directly to each townhouse *dwelling unit*; d) for commercial or industrial properties, no *parking lot* shall be located closer than 4.5 metres from any *interior lot line* abutting a residential *Zone*; e) for *accessory residential dwelling units*, notwithstanding the foregoing, one (1) *parking space* dedicated for the use of the *accessory residential dwelling unit*, may be *permitted* in the *front yard* provided a minimum of 50 percent of the *required front yard* shall be maintained as landscaped open space notwithstanding such dedicated *parking space*.
4.6	4.6 Parking for Multiple Uses When a *building*, *structure* or *lot* accommodates more than one (1) type of use, the *parking space* requirement for such *building*, *structure* or *lot* shall be the sum of the requirements for the separate uses thereof.

PARKING REQ.'D - LOADING SPACES

4.7	LOADING SPACES: 3m WIDTH x 10m DEPTH	N/A	1

PARKING NOT REQ.'D - PICK UP PULL FORWARD SPACES (DRIVE THRU):

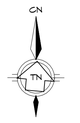
	PICK UP PULL FORWARD SPACES:	N/A	2

NO.	DATE	ISSUANCE
7	2024.03.11	SPA
6	2024.03.08	SPA REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS

NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT. ROLL # 33605062869
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235



DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DWG.'S ARE TO BE READ IN COLOUR

ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

VERLINDA

vallee
Consulting Engineers, Architects & Planners

G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH.: ONTARIO ASSOCIATION OF ARCHITECTS — Melissa Stickl — MELISSA NICOLE STICKL — LICENCE 7887 — Mar 11, 2024

STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN NOTES - ZONING

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: 1 : 100	DRAWING NO.: A101
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-03-11 1:40:22 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt

EASMENTS - FILE NUMBER: BNPL2023270

BLDG. HEIGHT - NORFOLK COUNTY:
shall mean the vertical distance between the average *finished grade* of the ground at the front wall of a *building* and:
a) in the case of a flat roof or a mansard roof, the highest point of the roof surface;
b) in the case of any other roof, the highest point of the ridge.*[0-Z-2017]*

DISCLAIMER:
ALL EXISTING SITE INFORMATION WAS PROVIDED BY JEWITT & DIXON LTD. ONTARIO LAND SURVEYORS IN THE FORM OF AN ELECTRONIC FILE PLAN FILE No. 21-3143-TOPO DATED 2021.10.18 CONSISTING OF THE LEGAL SURVEY PLAN & TOPOGRAPHY
(GOORD. W/ A106 DWG.)

REFERENCE NOTE:
FOR OTHER SITE CONDITIONS, EXISTING TO REMAIN OR NEW TO BE PROVIDED, THIS DWG. IS TO BE READ IN CONJUNCTION W/ ALL OTHER DWG.'S LISTED ON A100 DWG. LIST

LIGHTING NOTE:
LIGHTING MUST BE DIRECTED ON SITE AND MUST NOT SPILL OVER TO / ONTO ADJACENT PROPERTIES OR STREETS. PROVIDE 'HOUSE SHEILDS' WHERE NEEDED, TO COMPLETELY ELIMINATE SPILL / GLARE TO ADJACENT PROPERTIES. DARK SKY COMPLIANT
(GOORD. W/ ELEC. PHOTOMETRIC SITE PLAN)

BEFORE STARTING WORK

- THE *AUTHORITY HAVING JURISDICTION* IS NORFOLK COUNTY
- THE CONTRACTOR SHALL NOTIFY THE *AUTHORITY HAVING JURISDICTION*, ARCHITECT & CONSULTANTS AT LEAST 48 HOURS PRIOR TO COMMENCING ANY CONST. OR DEMOLITION.
- THE POSITION OF THE POLE LINES, CONDUITS, WATER MAINS, SEWERS, & OTHER UTILITIES & STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DWG.'S. WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES & STRUCTURES IS NOT GUARANTEED & ARE TO BE VERFIED ON SITE.
- ALL POSITIONS OF THE EX. UNDERGROUND UTILITIES WITHIN THE LIMITS OF CONST. SHALL BE LOCATED, MARKED & PROTECTED BY THE CONTRACTOR. ANY UTILITIES DAMAGED OR DISTURBED DURING CONST. SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER, AT THE CONTRACTOR'S EXPENSE.
- PRIOR TO THE COMMENCEMENT OF CONST., ALL BENCHMARKS, ELEVATIONS, DIMENSIONS, & GRADES MUST BE CHECKED BY THE CONTRACTOR & ANY DISCREPANCIES REPORTED TO THE ENGINEER / ARCHITECT

BENCHMARKS
TWO DIFFERENT BENCHMARKS MUST BE REFERRED TO @ ALL TIMES; ELEVATIONS ARE REFERRED TO GEODETIC BENCHMARKS
BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD, HAVING AN ELEVATION = 245.91m (GEODETIC DATUM)

SITE PLAN NOTES

- ALL WORK INVOLVED IN THE CONST., RELOCATION, REPAIR OF MUNICIPAL SERVICES FOR THE PROJECT SHALL BE TO THE SATISFACTION OF THE *AUTHORITY HAVING JURISDICTION*
- FIRE ROUTE SIGNS & 3-WAY FIRE HYDRANTS SHALL BE ESTABLISHED TO THE SATISFACTION OF THE LOCAL FIRE DEPARTMENT & AT THE EXPENSE OF THE OWNER.
- ALL DRIVEWAYS FROM PROPERTY LINES FOR THE FIRST 7.5m SHALL BE WITHIN 5% MAX. GRADE, THEREAFTER, ALL DRIVEWAYS SHALL BE WITHIN 10% MAX. GRADES.
- OBC 3.2.5.6.(d) - ALL DRIVEWAYS FROM PROPERTY LINES SHALL HAVE A CHANGE OF GRADIENT NOT MORE THAN 1 IN 12.5 (8%) OVER A MINIMUM DISTANCE OF 15m
- THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE CONTRACTOR FROM THE REQ.'S TO OBTAIN THE VARIOUS PERMITS/APPROVALS AS MAY BE REQUIRED, SUCH AS, BUT NOT LIMITED TO:

- BUILDING PERMIT
- SANITARY / STORM & WATER PERMITS
- ROAD CUT PERMITS
- RELOCATION OF SERVICES
- APPROACH APPROVAL PERMITS
- ENCROACHMENT AGREEMENTS (IF REQ.'D)
- COMMITTEE OF ADJUSTMENT
- ROAD OCCUPANCY PERMIT
- SITE ALTERATION

- ABANDONED ACCESSES MUST BE REMOVED & THE CURB & BOULEVARD RESTORED W/ SOD AT THE OWNER'S EXPENSE TO THE SATISFACTION OF THE TRAFFIC ENGINEERING SECTION & PUBLIC WORKS DEPARTMENT.

GENERAL NOTES:

- FIRE ACCESS ROUTE TO BE POSTED & DESIGNATED UNDER MUNICIPAL BY-LAW (FIRE ACCESS ROUTE TO BE MIN. 6 m WIDE W/ A MIN. 12 m CENTER LINE TURNING RADIUS & MAX. 6% SLOPE)
- COORD. W/ MECH. & ELEC. SITE PLANS FOR ALL EX. & NEW LOCATIONS OF SERVICES & ENTRY OF SERVICES INTO THE BLDG. ENVELOPE. (ALL MECH. & ELEC. INFORMATION INDICATED ON ARCH. SITE DWG. A101 IS FOR GENERAL REFERENCE & COORD. ONLY)
- COORD. W/ SITE GRADING PLAN FOR PROPOSED FINAL FINISH GRADE ELEV.'S & DRAINAGE SLOPES
- COORD. W/ LANDSCAPE SITE PLAN FOR LOCATIONS OF SEEDING, SODDING, PLANTING & PAVING & OTHER HARD SURFACING. COORD. W/ ARCH. SITE PLAN
- TYP. DRIVEWAY & PARKING LOT CONC. CURBS AS INDICATED ON DRAWING. COORD. W/ OPSD DETAILS & SPEC'S. FOR TYPICAL CURB TYPES
- THE SUB-GRADE SOILS EXPOSED AFTER EXCAVATION SHALL BE INSPECTED & CERTIFIED BY A QUALIFIED REGISTERED PROFESSIONAL SOILS ENGINEER & A COPY OF THE REPORT SHALL BE FORWARDED TO THE *AUTHORITY HAVING JURISDICTION*, BUILDING DIVISION. WHERE THE FOOTING WILL BE SITUATED ON FILL MATERIAL, THE FOOTINGS SHALL BE DESIGNED & APPROVED BY QUALIFIED REGISTERED PROFESSIONAL ENGINEER
- ALL FILL PLACED ON THE SITE SHALL BE COMPACTED TO A MIN.OF 98% STANDARD PROCTOR DENSITY. A SUFFICIENT NUMBER OF TESTS SHALL BE TAKEN AT VARIOUS LEVELS SATISFACTORY TO THE ENGINEER. TEST RESULTS SHALL BE SENT TO THE *AUTHORITY HAVING JURISDICTION* W/ A LETTER, SIGNED & STAMPED BY THE SOILS ENGINEER, STATING THAT A SUFFICIENT NUMBER OF TESTS HAVE BEEN TAKEN & THE MIN. COMPACTION HAS BEEN REACHED
- APPROVAL OF THIS DWG. IS FOR MATERIAL ACCEPTABILITY & COMPLIANCE W/ MUNICIPAL & PROVINCIAL SPEC.'S & STANDARDS ONLY. APPROVAL & INSPECTION BY THE MUNICIPALITY OF THE WORKS DOES NOT CERTIFY THE LINE & GRADE OF THE WORKS & IT IS THE OWNER'S RESPONSIBILITY TO HAVE THEIR ENGINEER CERTIFY THIS ACCORDINGLY
- SILTATION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO WORKS COMMENCING ON THE SITE & SHALL BE MAINTAINED FOR THE DURATION OF CONST., TO THE SATISFACTION OF THE *AUTHORITY HAVING JURISDICTION*.
(COORD. W/ OPSD 219.11, 219.130, 219.191.)
(SUBMIT SHOP DWG.'S FOR LOCATIONS & EXTENTS)
- PROVIDE CONST. GATES / FENCES / BOUNDARIES AS SHOWN / REQ.'D TO THE *AUTHORITY HAVING JURISDICTION*, REQ.'S.
(SUBMIT SHOP DWG.'S FOR LOCATIONS & EXTENTS).
A 1.2m HIGH CHAIN LINK FENCE (ALTERNATE MODU-LOC OR SIMILAR CONSTRUCTION FENCING) C/W SUPPORTS AS REQ.'D, @ WORK BOUNDARIES TO BE ERECTED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF THE DEMOLITION PROCESS & SHALL REMAIN & BE MAINTAINED IN POSITION INDEFINITELY UNTIL COMPLETION OF NEW CONST. WORK
- PROVIDE HEAVY DUTY (H/D) ASPHALT @ ALL DRIVEWAYS AS NOTED PROVIDE MEDIUM DUTY (M/D) ASPHALT @ ALL PARKING SPACES AS NOTED. PROVIDE LIGHT DUTY (L/D) ASPHALT @ ALL PLAYGROUND & WALKWAY AREAS ONLY (UNO)
- CONTRACTOR IS RESPONSIBLE FOR PLANTINGS, SOD, WATERING & MAINTENANCE UNTIL SUBSTANTIAL PERFORMANCE IS ACHIEVED. THE WARRANTY PERIOD WILL COMMENCE UPON SUBSTANTIAL PERFORMANCE OF THIS WORK

GENERAL NOTES:

(A) GENERAL CONTRACTOR TO COORDINATE ALL WORK WITHIN THE BOULEVARD W/ THE *AUTHORITY HAVING JURISDICTION* & OBTAIN ALL NECESSARY PERMITS & APPROVALS FROM LOCAL AUTHORITIES. EXECUTE ALL WORK AS PER THE MUNICIPAL REQUIREMENTS.

(B) GENERAL CONTRACTOR TO EXECUTE WORK TO DRIVEWAY ENTRANCE UNDER SUPERVISION OF THE *AUTHORITY HAVING JURISDICTION*. REFER TO ENTRANCE PERMIT REQUIREMENTS WHERE EXIST. DRIVEWAY ENTRANCE TO BE MODIFIED OR INSTALLATION OF NEW ENTRANCE AS PER MUNICIPAL REQUIREMENTS. PROVIDE NEW CONC. ENTRANCE CURBS TO MATCH EXISTING WHERE INDICATED.

(L) PLANTING BEDS, TREE PLANTINGS, LANDSCAPE FEATURES & SODDED AREAS

(BR) BIKE RACK
1. Model No. EP 9360, Equiparc Tango Bike Rack, manufactured by Equiparc. (ADDESSO) - to review an get product data and complete
1. Capacity: Rated at 2 bikes single side each unit.
2.Materials: Aluminum
3.Mounting: Surface mounting, with anchor assembly for flush mount to concrete surface.
4.Finish: Painted - Meteor Gray Semi-gloss (FINISH TO MATCH COMMERCIAL BLDS. ALUM. COMP. PANEL CLADDING TYP. - TO BE CONFIRMED)
5.Location to be confirmed on site with Owner and Architect. Coordinate with Architectural Site Plan.

(BE) BENCH
1. Model Name – Backed Bench model EP 1630-IPE/MOA/JAT-A with backrest and armrests – Collection Plaza by Equiparc. (NO. FINISH TO MATCH COMMERCIAL BLDG. NO. GRAIN ALUM. CLADDING TYP. - TO BE CONFIRMED)
1. Length: 1505mm x 559 depth x 851 height
2.Mounting: Surface mounting. QAV drop in anchors with stainless steel theft proof bolts. Coordinate with manufacturer's installation instructions.
3.Colour: - BLK.
4.Location to be confirmed on site with Owner and Architect. Coordinate with Architectural Site Plan.

(SA) SLOPED SITE ACCESS
(COORD. W/ *OPSD-350.010*)

(CC) CONCRETE CURB
(COORD. W/ *OPSD-600.110*)

(SW) CONCRETE SIDEWALK
(COORD. W/ *OPSD-310.010, 310.020, 310.033, 310.034, 310.040 & CONC. CURBS*)

(DC) CONCRETE SIDEWALK DROP CURB
(COORD. W/ *OPSD-310.010, 310.020, 310.033, 310.034, 310.040 & CONC. CURBS*)

(GE) GARBAGE & RECYCLE ENCLOSURES
(COORD. W/ EARTHBIN A103A & 103B)

(MM) MUD MATT
PROVIDE MUD-MATT ENT. TO *AUTHORITY HAVING JURISDICTION* REQ.'S
(COORD. W/ 9/A102)

(EC) ELECTRIC VEHICLE CHARGING STATION
(CONDUIT TO BE INSTALLED FOR FUTURE CHARGING STATION)

(SP1) SIGN PYLON 1
(COORD. W/ 11.2/A102A)
(INSTALL CONDUIT FROM BLDG.#2)

(SP2) SIGN PYLON 2
(COORD. W/ 3.14/A102A)
(INSTALL CONDUIT FROM BLDG.#3)

(SP3) SIGN PYLON (ENTRANCE)
(COORD. W/ FOOD CONSULTANT FOR ACTUAL SIGN)
(INSTALL CONDUIT FROM BLDG.#1)

(SP4) SIGN PYLON (ENTRANCE)
(COORD. W/ FOOD CONSULTANT FOR ACTUAL SIGN)
(INSTALL CONDUIT FROM BLDG.#1)

(SP5) DIGITAL PRE-SELL BOARDS
(COORD. W/ FOOD CONSULTANT FOR ACTUAL SIGN)
(INSTALL CONDUIT FROM BLDG.#1)

(SP6) DIGITAL MENU BOARDS W/ COD & DETECTOR LOOP
(COORD. W/ FOOD CONSULTANT FOR ACTUAL SIGN)
(INSTALL CONDUIT FROM BLDG.#1)

(CP) CANADA POST
(COORD. W/ *A1.23*)

SIGN LEGEND

(A) STOP SIGN

(B) ONE WAY - DO NOT ENTER

(F) NO PARKING - FIRE ROUTE

(L) NO PARKING, BY PERMIT ONLY, BARRIER-FREE PARKING, VAN ACCESSIBLE- TYPE 'A'
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP FOR FOOD CONSULTANT)

(M) NO PARKING, BY PERMIT ONLY, BARRIER-FREE PARKING - TYPE 'B'
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP FOR FOOD CONSULTANT)

(O) VISITOR PARKING ONLY

(P) ELECTRIC VEHICLE PARKING

(Y) MOBILE ORDER (BY FOOD CONSULTANT)
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP)

(Z) PULL FORWARD SIGN (BY FOOD CONSULTANT)
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP)

(AA) THANK YOU / DO NOT ENTER SIGN (BY FOOD CONSULTANT)
(SUPPLIED & INSTALLED BY PATTISON SIGN GROUP)

(BB) ANY LANE ANY TIME (BY FOOD CONSULTANT)

NOTE:
CONFIRM LOCATIONS & CONTENT OF ALL SIGNAGE W/ THE OWNER & *AUTHORITY HAVING JURISDICTION*, PRIOR TO FABRICATION & ERECTION. PROPOSED SITE SIGNAGE TO COMPLY W/ SIGNAGE BY-LAWS

NOTE:
ALL SIGNS TO BE CENTERED ON POSTS TYP.

NO.	DATE	ISSUANCE
7	2024.03.11	SPA
6	2024.03.08	SPA REVIEW
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4	2024.03.05	PROGRESS
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2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062060
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

GN
TN

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS

ALL DWG.'S ARE TO BE READ IN COLOUR

ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

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Consulting Engineers, Architects & Planners

G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH.
ONTARIO ASSOCIATION OF ARCHITECTS
MELISSA NICOLE STICKL
LICENCE 7687

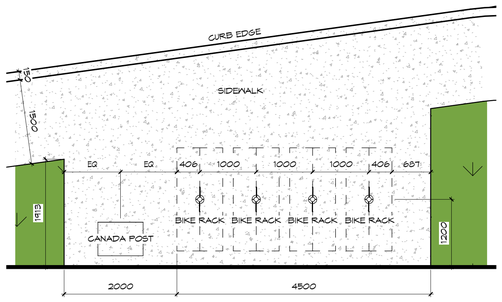
STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN NOTES

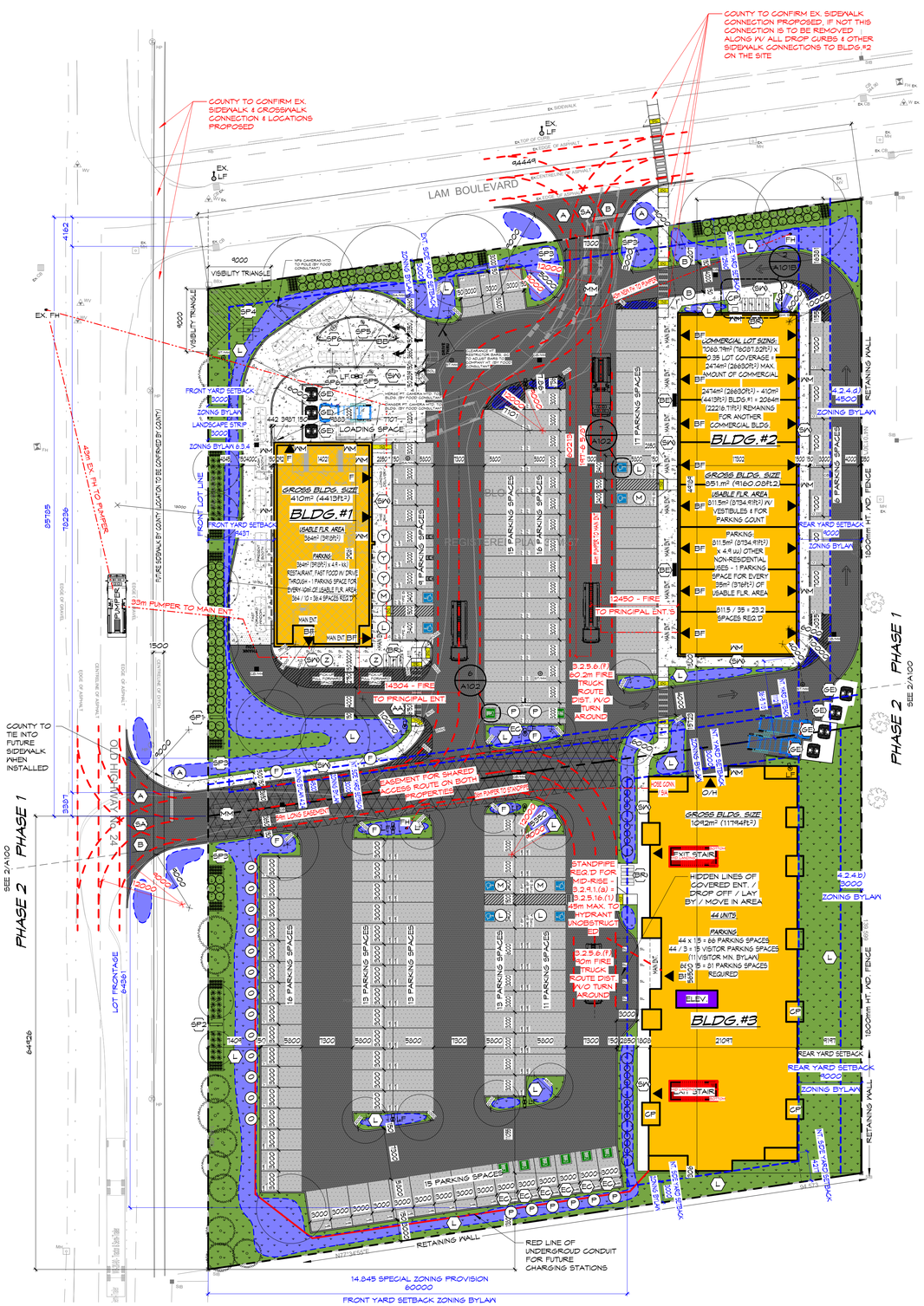
CHECKED BY: MS
DRAWN BY: JS
DRAWING SCALE: 1 : 100
DRAWING NO.: A101A
PROJECT NO.: 20-128

DATE PLOTTED: 2024-03-11 1:40:23 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128- Orchard Square_Site.rvt



2 A101B SITE PLAN - CANADA POST & BICYCLE RACKS

SCALE 1 : 50


COUNTY TO CONFIRM EX. SIDEWALK & CROSSWALK CONNECTION & LOCATIONS PROPOSED
COUNTY TO CONFIRM EX. SIDEWALK CONNECTION PROPOSED. IF NOT THIS CONNECTION IS TO BE REMOVED ALONG W/ ALL DROP CURBS & OTHER SIDEWALK CONNECTIONS TO BLDG.#2 ON THE SITE
LAM BOULEVARD
EX. LF
94449
EX. SIDEWALK
EX. TOP OF CURB
EX. EDGE OF ASPHALT
MONTEREY RD.
EX. FH
EX. CB
EX. W
EX. SAN
EX. SAN MH
EX. CB/MH
EX. W MH
EX. ST MH
EX. GAS
EX. HYDRO
EX. BELL
EX. ROGERS
EX. TREE
EX. SIGN
EX. MAILBOX
EX. BUS SHELTER
EX. HYDRO POLE
EX. GUY WIRE
EX. LF
EX. TRANSFORMER
EX. HYDRO MH
EX. BELL MH
EX. ROGERS MH
EX. GAS VALVE
EX. GAS METER
EX. BOLLARD
EX. TRAFFIC LIGHT
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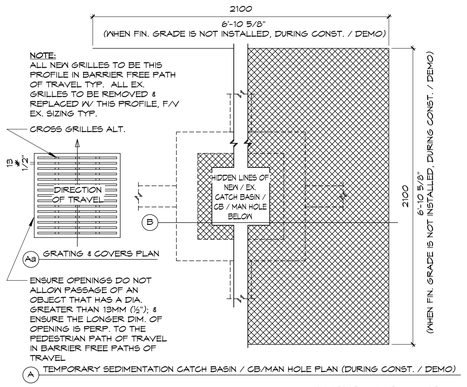
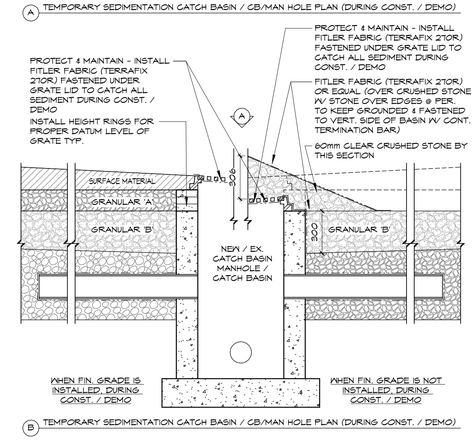
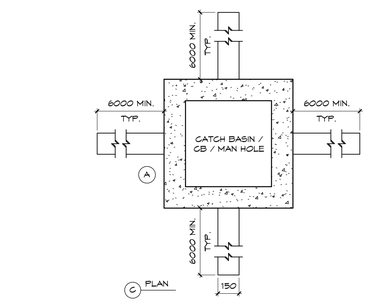


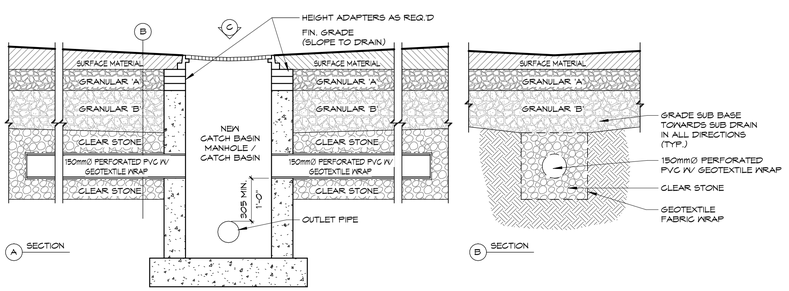
A TEMPORARY SEDIMENTATION CATCH BASIN / CB/MAN HOLE PLAN (DURING CONST. / DEMO)



B TEMPORARY SEDIMENTATION CATCH BASIN / CB/MAN HOLE PLAN (DURING CONST. / DEMO)

1 A102 CB COVER
SCALE 1 : 20

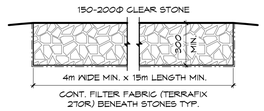




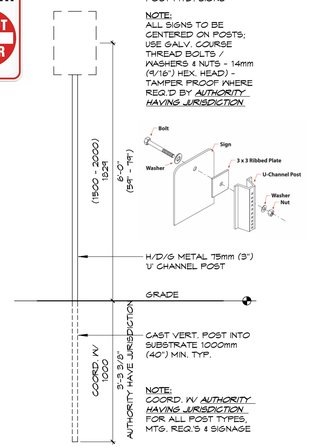
2 A102 CATCH BASIN
SCALE 1 : 20

3 A102 SIGNS
SCALE 1 : 50

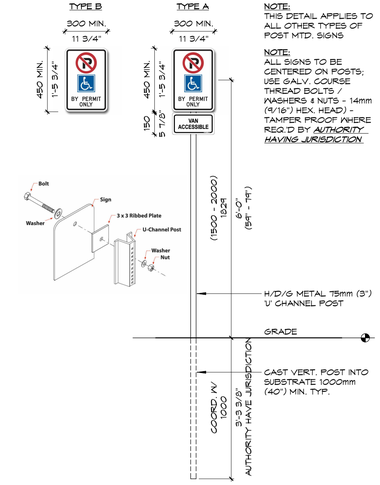
DESIGNATED ACCESS FOR ALL CONSTRUCTION TRAFFIC
INSTALL MUD MAT AS PER DETAIL BELOW, PRIOR TO ANY OTHER CONSTRUCTION. MAT TO BE MAINTAINED IN GOOD WORKING ORDER UNTIL GRADING WORKS ARE COMPLETED & GRANULAR "A" & "B" HAVE BEEN PLACED



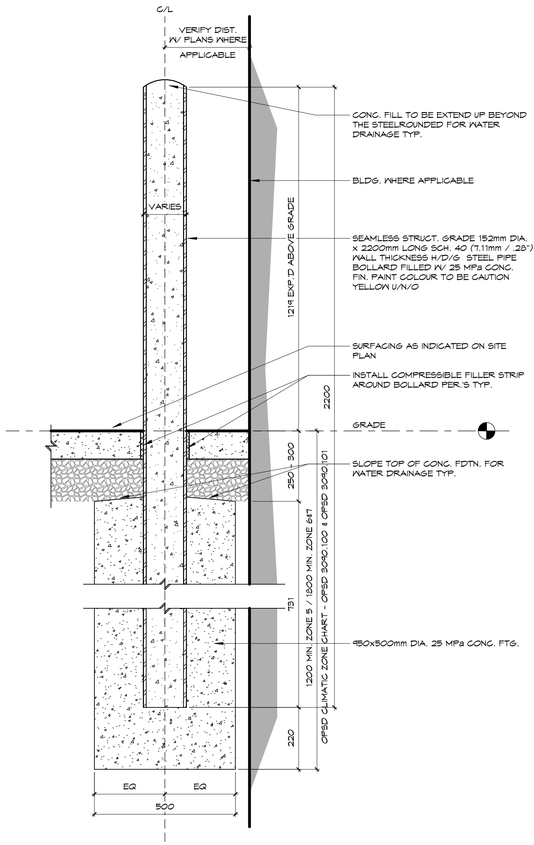
9 A102 MUD MAT
SCALE 1 : 20



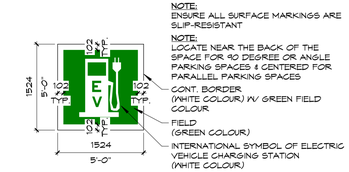
4 A102 VERT. SIGNAGE
SCALE 1 : 20



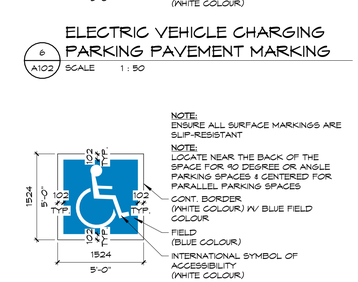
5 A102 ACCESSIBLE PARKING VERT. SIGNAGE - NORFOLK
SCALE 1 : 20



11 A102 BOLLARD
SCALE 1 : 10



6 A102 ELECTRIC VEHICLE CHARGING PARKING PAVEMENT MARKING
SCALE 1 : 50



7 A102 ACCESSIBLE PARKING PAVEMENT MARKING
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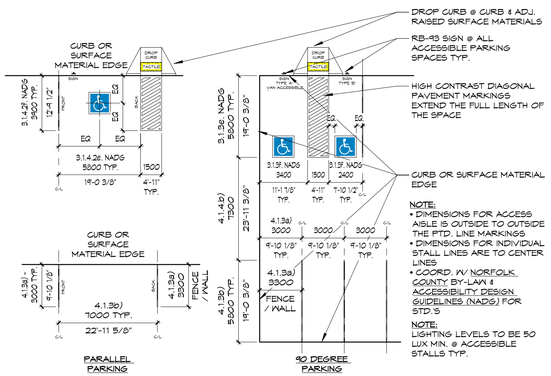

8 A102 PARKING STALL GUIDELINES - NORFOLK COUNTY
SCALE 1 : 200

NO.	DATE	ISSUANCE
7	2024.03.11	SPA
6	2024.03.08	SPA REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062060
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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G. DOUGLAS VALLEE LIMITED
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SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH.
ONTARIO ASSOCIATION OF ARCHITECTS
MELISSA NICOLE STICKL
LICENCE 7987
MAR. 11, 2024

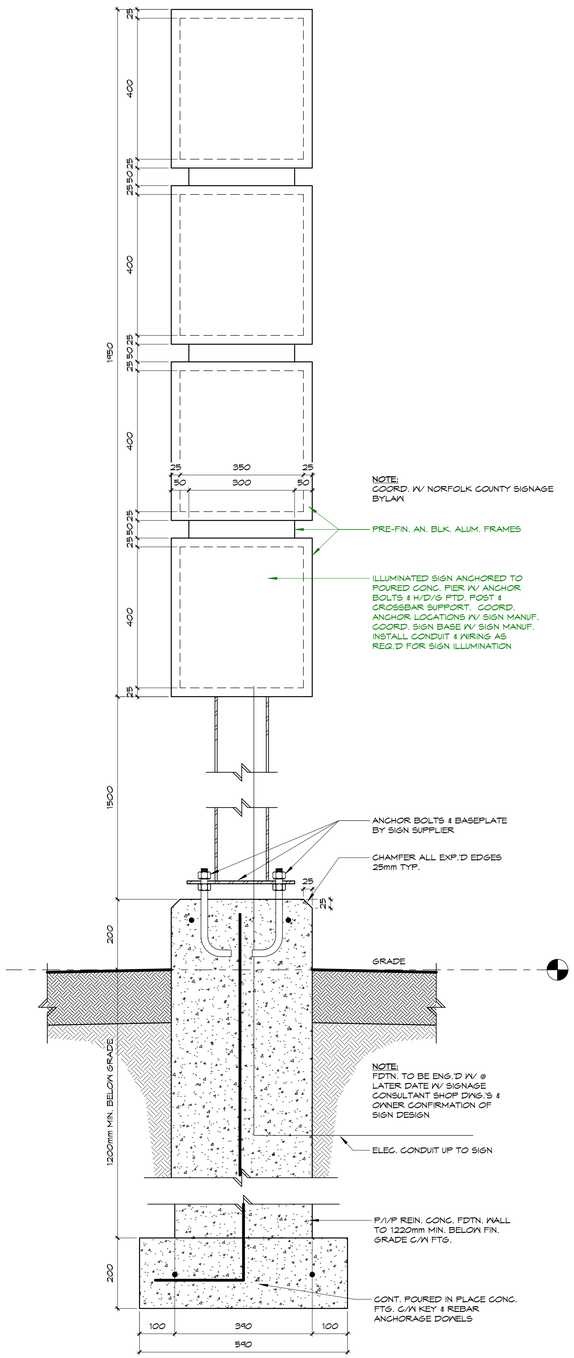
STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

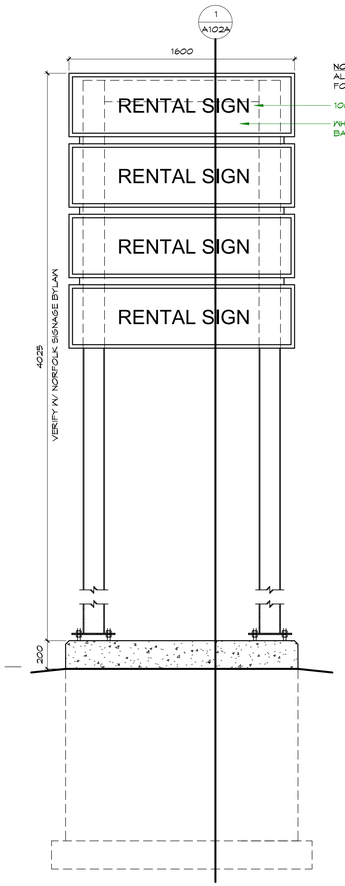
DRAWING TITLE:
SITE PLAN DETAILS

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: A102
PROJECT NO.: 20-128	

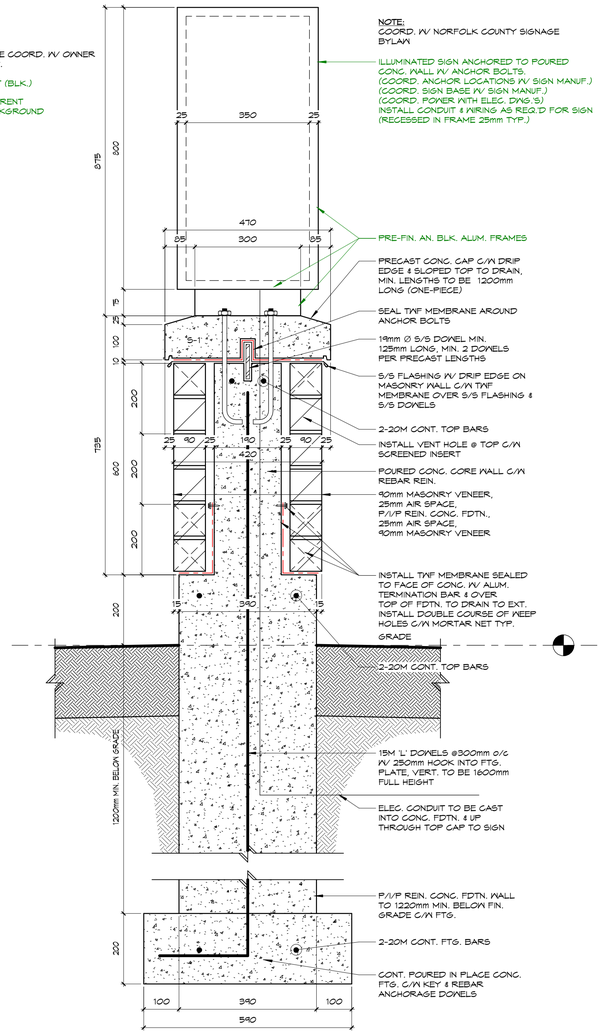
DATE PLOTTED: 2024-03-11 1:40:32 PM FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE



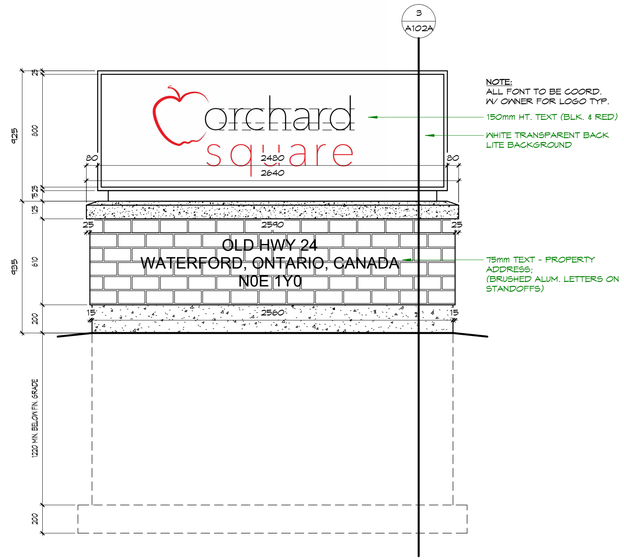
1 A102A SIGN PYLON 1 - POST - SECTION
SCALE 1 : 5



2 A102A SIGN PYLON 1 - POST - ELEV.
SCALE 1 : 20



3 A102A SIGN PYLON 2 - GROUND - SECTION
SCALE 1 : 5



4 A102A SIGN PYLON 2 - GROUND - ELEV.
SCALE 1 : 20

NO.	DATE	ISSUANCE
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(519) 426-6270

STAMP ARCH.: ONTARIO ASSOCIATION OF ARCHITECTS — Melissa Stickl — MELISSA NICOLE STICKL — LICENCE 7887 — MAR. 11, 2024
STAMP STRUCT.:

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN DETAILS

CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: A102A
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-03-11 1:40:33 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.vwt

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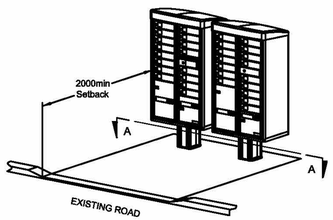
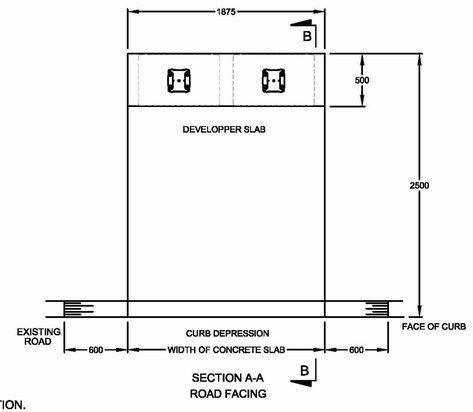
NOTES:

1. THIS DRAWING IS ONLY TO BE USED ON ROADS WITH POSTED LIMITS OF 60 KM/H OR LESS AND LOW TRAFFIC VOLUME (<750 ADT AS PER TRANSPORTATION ASSOCIATION OF CANADA'S GEOMETRIC DESIGN FOR CANADIAN ROADS- (CHAPTER 7- ROADSIDE DESIGN).
2. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE. ABIDE BY LOCAL MUNICIPAL BY-LAWS AND REGULATORY AGENCIES THAT MAY AFFECT THE WORK.
3. THE CONTRACTOR SHALL REVIEW THE SITE CONDITIONS AND ASSUME RESPONSIBILITY FOR EXISTING SERVICES (WATER; POWER; SEWAGE; GAS ETC.) THAT EXIST AT THE SITE.
4. CONCRETE SLAB TO HAVE A MINIMUM THICKNESS OF 150 mm.
5. CONCRETE SLAB SHALL BE PLACED ON 150 mm MINIMUM THICK BASE OF GRANULAR MATERIAL (OPSS GRANULAR 'A' OR EQUIVALENT) COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
6. GRANULAR BASE SHALL BE PLACED ON SOIL CAPABLE OF SAFELY SUSTAINING A BEARING PRESSURE OF NOT LESS THAN 30 kPa.
7. CONCRETE CONSTRUCTION SHALL CONFORM TO CSA A23.1.
8. CONCRETE TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH CSA A23.1 AND CSA 23.2.
9. CSA A23.1 CONCRETE EXPOSURE CLASSIFICATION TO BE C-1 WITH THE FOLLOWING PROPERTIES:
   - -MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS: 35 MPA
   - -MINIMUM WATER TO CEMENTING MATERIALS RATIO: 0.40
   - -MAXIMUM COARSE AGGREGATE SIZE: 20 mm
   - -MAXIMUM SLUMP: 90 mm
   - -AIR CONTENT: 5% TO 8%
10. SURFACE OF SLAB TO BE SLOPED 2% -0/+4% TO THE NEAREST PLUVIAL DRAIN.
11. TOP OF SLAB TO HAVE A TEXTURED BROOM FINISH TO CSA A23.1. EDGES OF SLAB TO HAVE A SMOOTH TOOLED FINISH.
12. SLAB REINFORCEMENT TO BE 152mm X 152mm, MW 25.8 X MW 25.8 WELDED WIRE FABRIC CONFORMING TO ASTM 1064M. REINFORCEMENT TO BE PLACED AT MID-DEPTH OF SLAB OR APPROVED EQUIVALENT.
13. APPLY PIGMENTED CURING COMPOUND TO SURFACE OR REBAR OF SLAB IN ACCORDANCE WITH ASTM C309 TYPE 2 (WHITE COLOUR), CLASS B (RESIN).
14. PROVIDE A MINIMUM SETBACK DISTANCE OF 2000 mm FROM ANY EDGE OF MAILBOX TO NEAREST EDGE OF TRAVELLED ROADWAY.
15. ALL SITE LOCATIONS REQUIRE CPC AND MUNICIPAL APPROVAL.
16. IF SITE CONDITIONS LIMIT PLACEMENT, CONTACT CPC FOR ASSISTANCE.
17. ADDITIONAL CURB CUTTING NOT REQUIRED WHEN ADDING MODULE TO SITE WHERE CURB DEPRESSION IS ALREADY EXISTING.

* EQUIPEMENT FLOORPRINT SHOWN FOR REFERENCE ONLY.

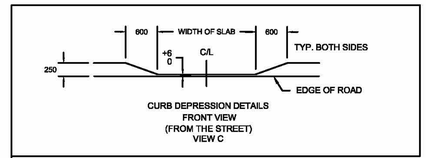
1 OR 2 MODULES



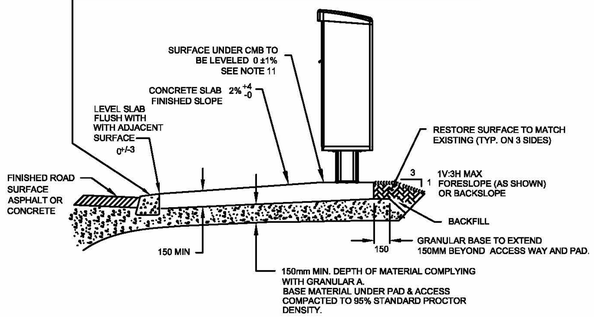


SECTION A-A
ROAD FACING

COMMUNITY MAILBOX SHOWN WITH PEDESTAL INSTALLATION.
PRECAST CONCRETE BALLASTED BASE COULD ALSO BE USED.

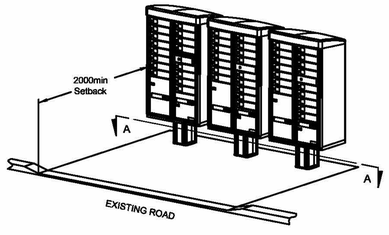


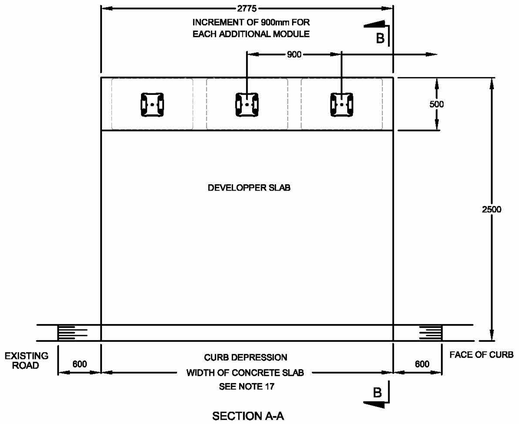
CURB DEPRESSION DETAILS
FRONT VIEW
(FROM THE STREET)
VIEW C



SECTION B-B

3 MODULES





SECTION A-A
ROAD FACING

TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MILLIMETERS.
SAUF SI SPÉCIFICATIONS CONTRAIRE DIMENSIONS SONT EN MILLIMÈTRES
DEC. X ±1 XX ±.3 XXX ±.15
ANGLES ± 1°
CONFORMS TO/ CONFORME À CSA B78.2

REV # / # RÉV	DATE	BY / PAR	CHKD / VÉR	EA / RG	DCC / CCD
	DESCRIPTION				

ENGINEERING SERVICES / SERVICES D'INGÉNERIE		DATE DD-MM-YYYY / JJ-MM-AAAA
CREATED BY / CRÉÉ PAR	M. ALLARD	29-03-2019
CHECKED BY / VÉRIFIÉ PAR	N. MOROZOVA	29-03-2019
ENGINEERING AUTH. RESP. DU GÉNIE	K. CHAMPOUX	29-03-2019

PROJECT / PROJET
CPC ID: E201-ENG-06
TITLE / TITRE: DEVELOPER PROVIDED CONCRETE PAD SPECIFICATIONS - ROAD FACING INSTALLATION
SCALE / ÉCHELLE: NTS | SHEET / FEUILLE 1 OF / DE 1 | REV: 00

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APPLICANT: TOM O'HARA
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TELEPHONE NO.: 1.705.205.3235

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WATERFORD, ONTARIO, CANADA, N0E 1Y0

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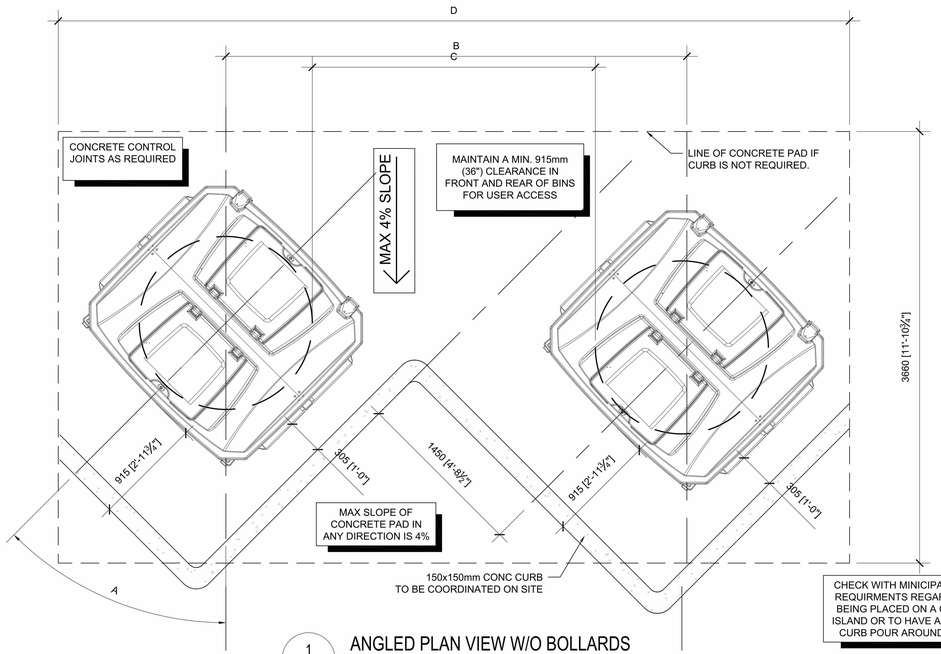
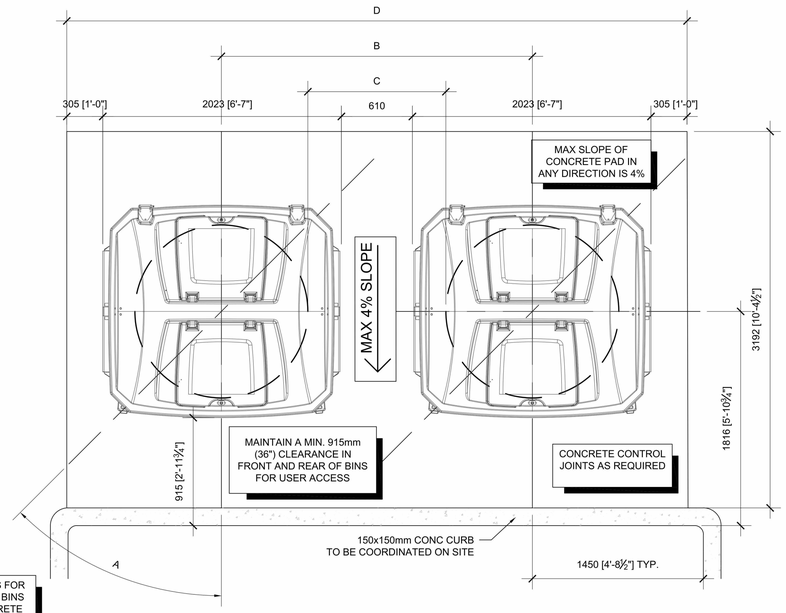


1 / A1 ANGLED PLAN VIEW W/O BOLLARDS

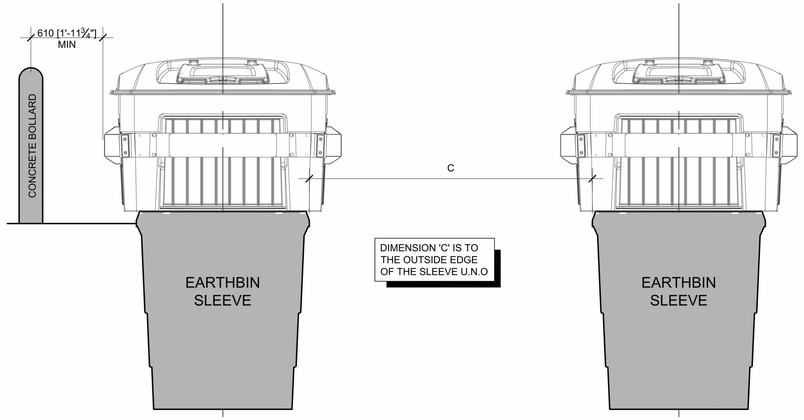
1:20

CHECK WITH MINICIPALITIES FOR REQUIRMENTS REGARDING BINS BEING PLACED ON A CONCRETE ISLAND OR TO HAVE A CONCRETE CURB POUR AROUND THE PAD.



3 / A1 TYPICAL PLAN VIEW W/O BOLLARDS

1:20

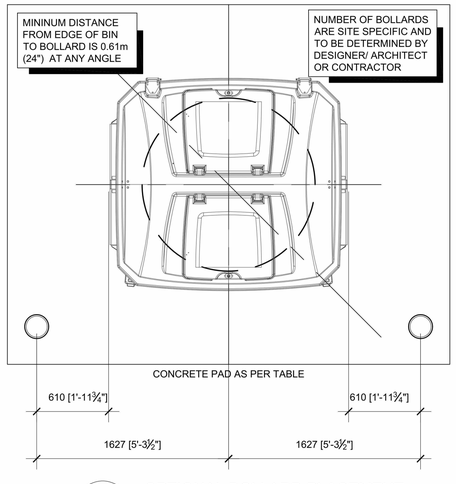


2 / A1 ELEVATION VIEW OF BINS

1:20

MINIMUM DIMENSIONS BETWEEN BINS

A	B	C	D
0°	2640 [104"]	1170 [46"]	5485 [216"]
15°	2745 [108"]	1270 [50"]	5790 [228"]
30°	3050 [120"]	1575 [62"]	6170 [243"]
45°	3860 [152"]	2390 [94"]	6425 [253"]



4 / A1 OPTIONAL BOLLARD PLACEMENT

1:20

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APPLICANT: TOM O'HARA
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TELEPHONE NO.: 1.705.205.3235

1. ISSUED FOR CLIENT REVIEW ON 2016 / 10 / 06
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- The designer's liability is limited to the correction of the working drawings only

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SCALE: AS NOTED
DESIGN BY: EARTHBIN PRODUCTS
DRAWN BY: STUDIO WOLF DESIGNS

INSTALLATION DRAWINGS

REVISION#9 | A1

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
EARTHBIN

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MS	JS
DRAWING SCALE:	DRAWING NO.:
PROJECT NO.: 20-128	A104

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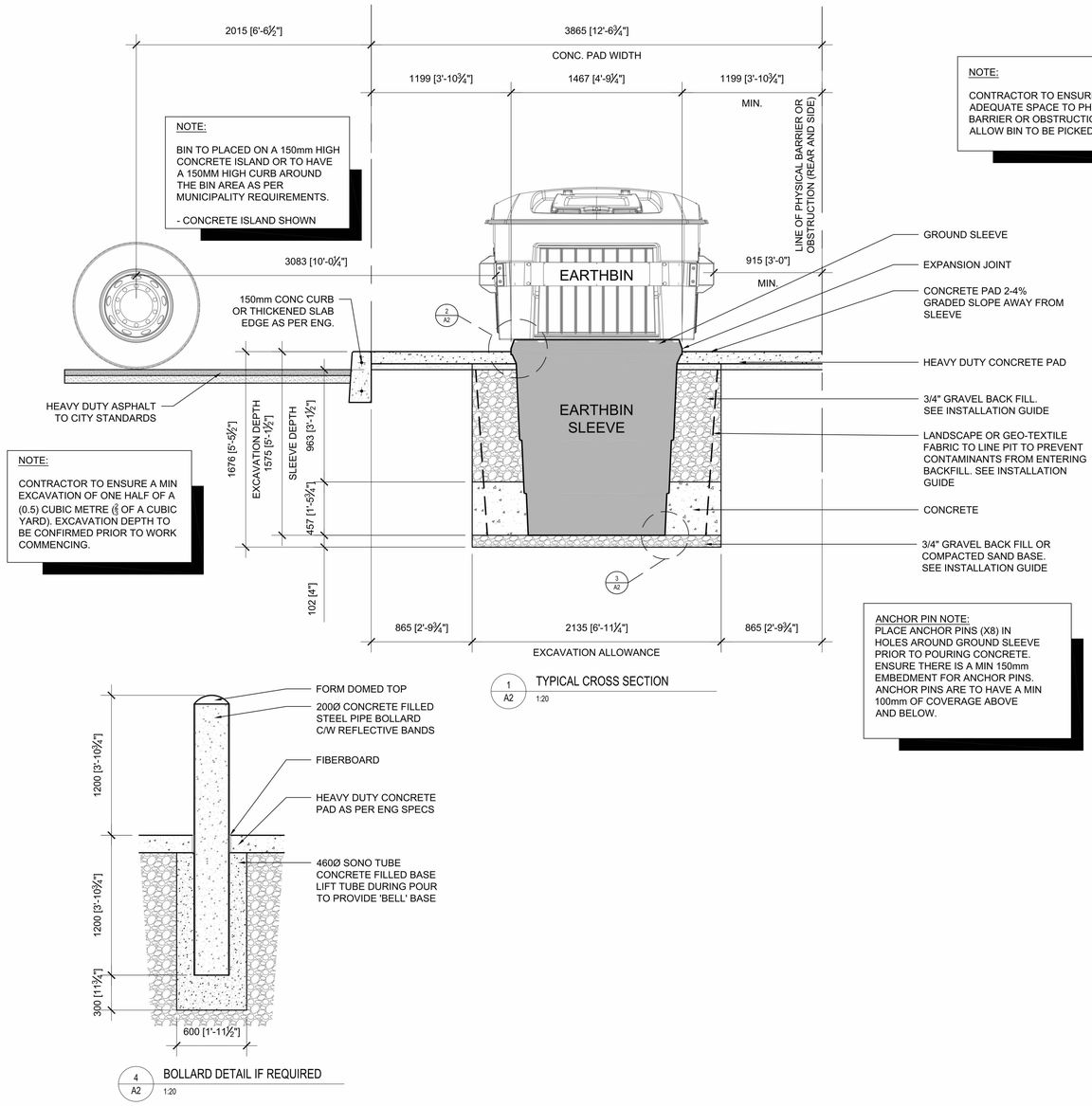

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SCALE: AS NOTED
DESIGN BY: EARTHBIN PRODUCTS
DRAWN BY: STUDIO WOLF DESIGNS

INSTALLATION DRAWINGS

REVISION#8 | A2

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
EARTHBIN

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MS	JS
DRAWING SCALE:	DRAWING NO.:
	A104A
PROJECT NO.:	
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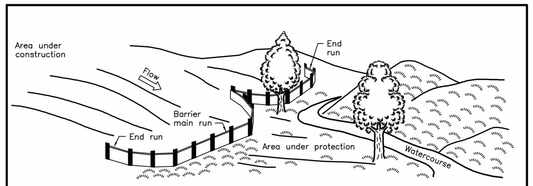
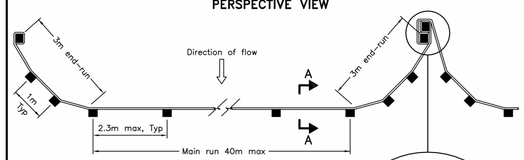
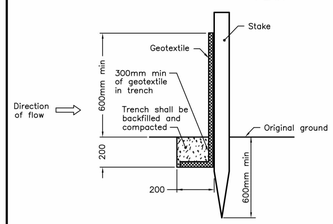


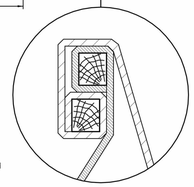
PERSPECTIVE VIEW



PLAN



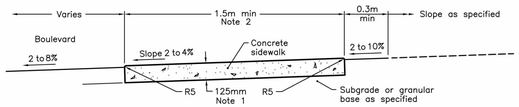
SECTION A-A



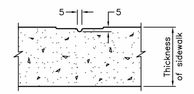
JOINT DETAIL

NOTE:
A All dimensions are in millimetres unless otherwise shown.

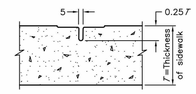
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		OPSD 219.110



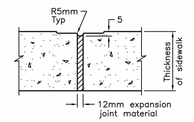
TYPICAL SECTION



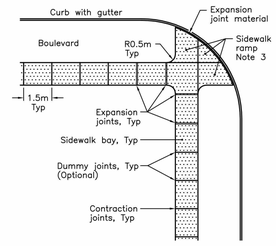
DUMMY JOINT (OPTIONAL)



CONTRACTION JOINT (Note 4)



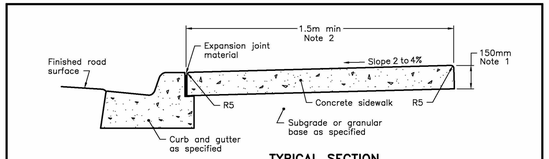
EXPANSION JOINT



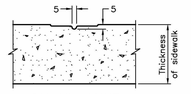
JOINT LAYOUT

NOTES:
1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.033, and 310.039.
4 Contraction joint may be tooled or sawcut.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 3
CONCRETE SIDEWALK		OPSD 310.010



TYPICAL SECTION



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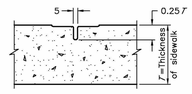
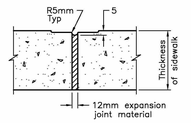
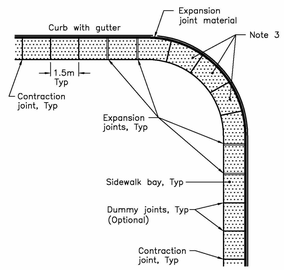


CONTRACTION JOINT



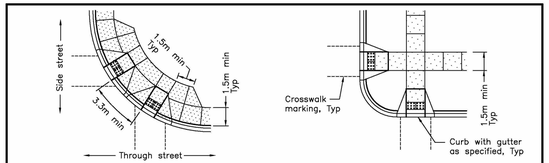
EXPANSION JOINT



JOINT LAYOUT

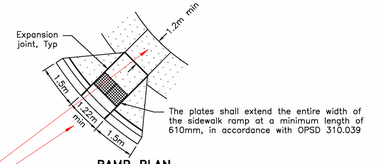
NOTES:
1 At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.033, and 310.039.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 3
CONCRETE SIDEWALK ADJACENT TO CURB WITH GUTTER		OPSD 310.020

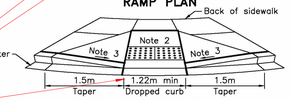


DOUBLE RAMP WITHOUT BOULEVARD

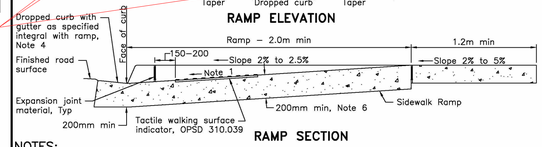
RAMPS WITH BOULEVARD



RAMP PLAN



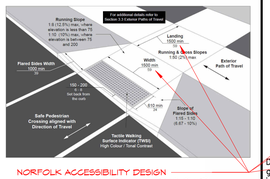
RAMP ELEVATION



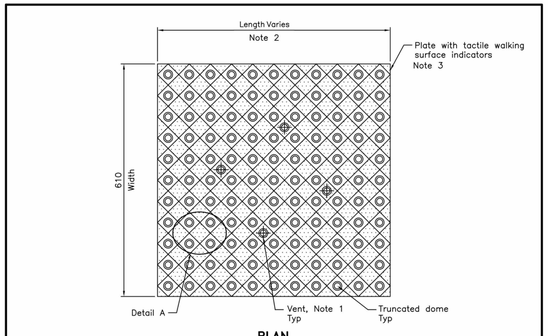
RAMP SECTION

NOTES:
1 Slope of ramp shall not exceed 8%.
2 Cross slope of ramp shall not exceed 2% in either direction.
3 Cross slope of flared side of ramp shall not exceed 8%.
4 Dropped curb at ramp shall be modified to eliminate 30 mm step at gutter line.
5 Minimum thickness of ramp is 200mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 150mm.
A All dimensions are in millimetres unless otherwise shown.

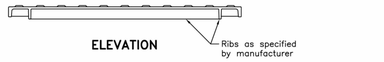
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 1
CONCRETE SIDEWALK RAMPS AT UNSIGNALIZED INTERSECTIONS		OPSD 310.033



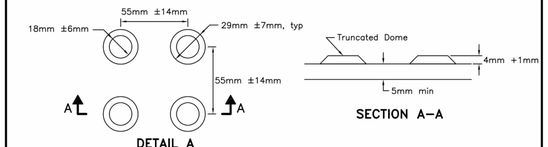
NORFOLK ACCESSIBILITY DESIGN GUIDELINES OVERRIDES / GOVERNS OVER OPSD FOR WIDTH OF DROPPED CURB & TOP LANDING TYP.



PLAN



ELEVATION

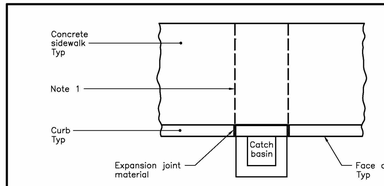


DETAIL A
TRUNCATED DOMES PLAN

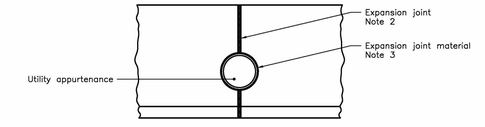
SECTION A–A

NOTES:
1 Vents shall be as specified by the manufacturer.
2 Length of plate may be increased to suit the curb depression width.
3 Material of plate shall be as specified in Contract Documents.
A Adjacent cast iron plates shall be permanently connected using a locking mechanism and any hardware shall be hot dipped galvanized.
B All dimensions are in millimetres unless otherwise shown.

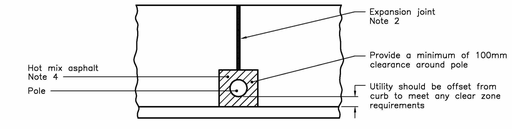
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 1
CONCRETE SIDEWALK RAMPS TACTILE WALKING SURFACE INDICATORS COMPONENT		OPSD 310.039



CATCH BASIN



UTILITY APPURTENANCE



UTILITY POLE

NOTES:
1 Expansion joint through sidewalk is required when curb and gutter is poured integral with sidewalk.
2 Adjust joints to coincide with centre of utility, with minimum slab length of 1m.
3 Expansion joint material shall be placed around Utility appurtenance flush with concrete surface.
4 For concrete alternative use expansion joint material around boxout.
A For expansion joint detail, see OPSD 310.010.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 3
UTILITY ISOLATION IN CONCRETE SIDEWALKS		OPSD 310.040

NO.	DATE	ISSUANCE
7	2024.03.11	SPA
6	2024.03.08	SPA REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 3360506206B
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS
ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

VERLINDA

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

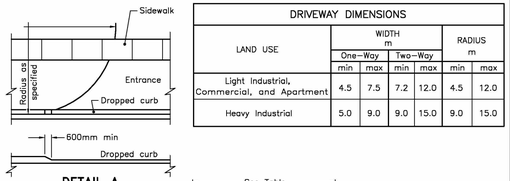
STAMP ARCH.	STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
OPSD DETAILS

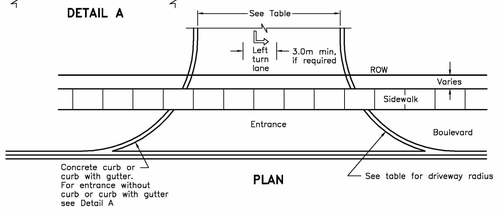
CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE:	DRAWING NO.: A105
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-03-11 1:43:05 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt

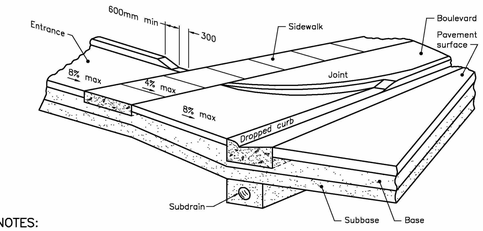


DETAIL A

DRIVEWAY DIMENSIONS						
LAND USE	WIDTH m				RADIUS m	
	One-Way		Two-Way			
	min	max	min	max	min	max
Light Industrial, Commercial, and Apartment	4.5	7.5	7.2	12.0	4.5	12.0
Heavy Industrial	5.0	9.0	9.0	15.0	9.0	15.0

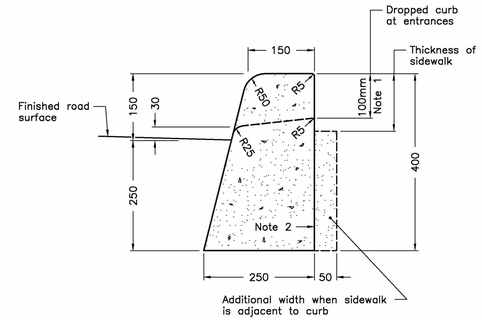


PLAN



NOTES:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2009	Rev 1
URBAN INDUSTRIAL, COMMERCIAL, AND APARTMENT ENTRANCES		OPSD 350.010



NOTES:
1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
CONCRETE BARRIER CURB		OPSD 600.110

NO.	DATE	ISSUANCE
7	2024.03.11	SPA
6	2024.03.08	SPA REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
3	2024.02.29	PROGRESS
2	2022.03.17	PROGRESS
1	2022.02.14	PROGRESS

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 33605062060
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

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VERLINDA

vallee
Consulting Engineers, Architects & Planners

G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

STAMP ARCH.

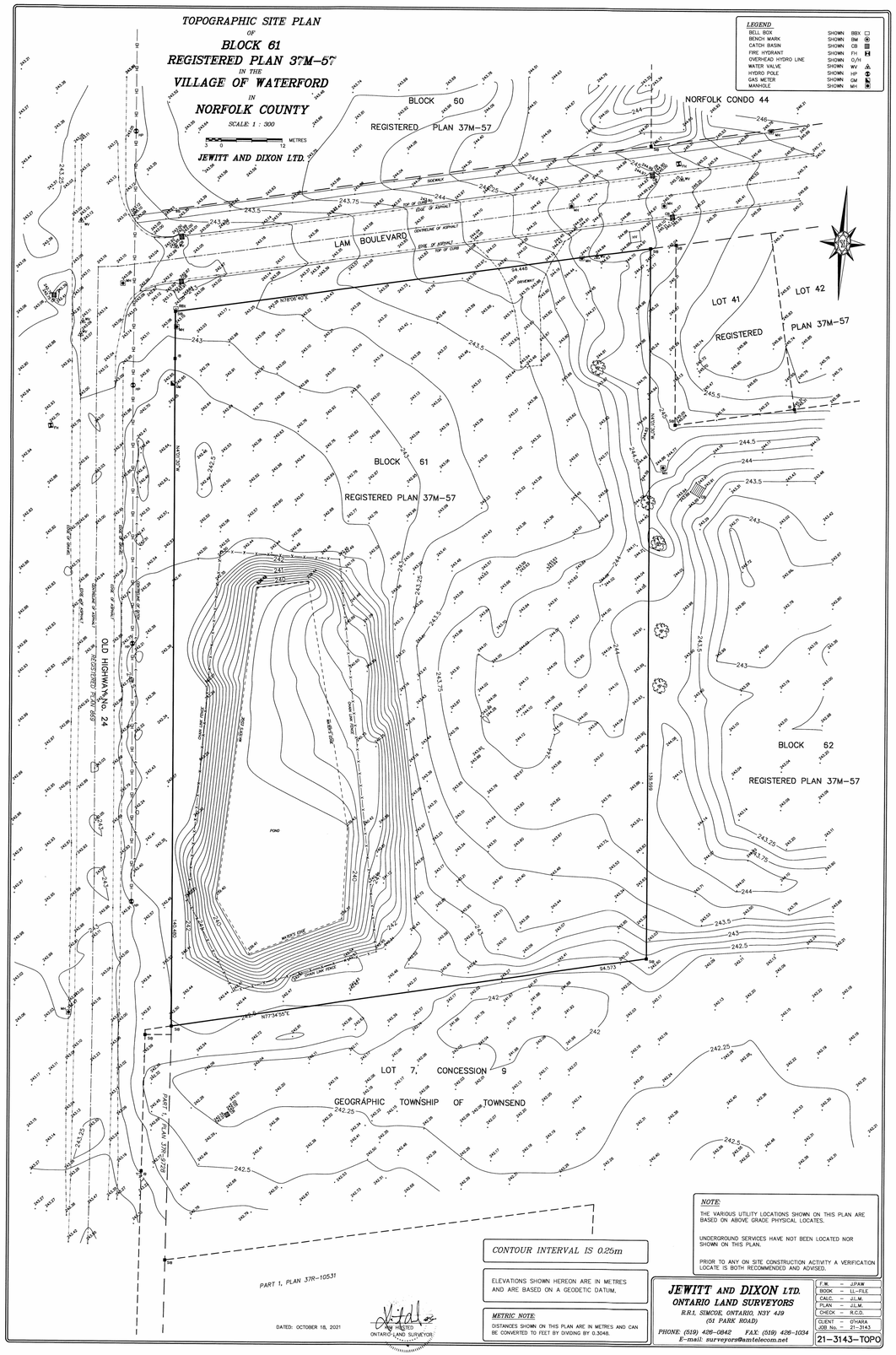
STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
OPSD DETAILS

CHECKED BY: MS
DRAWN BY: JS
DRAWING SCALE:
DRAWING NO.: A105A
PROJECT NO.: 20-128

DATE PLOTTED: 2024-03-11 1:42:51 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_S



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STAMP ARCH.
STAMP STRUCT.

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
EXISTING SITE SURVEY

CHECKED BY: MS
DRAWN BY: JS
DRAWING SCALE:
DRAWING NO.: A106
PROJECT NO.: 20-128

PLEASE NOTE THE SCALE OF THE INSERTED / ATTACHED DWG. HAS BEEN ALTERED / SCALED TO FIT THIS TITLEBLOCK / SHEET - DO NOT SCALE DWG.

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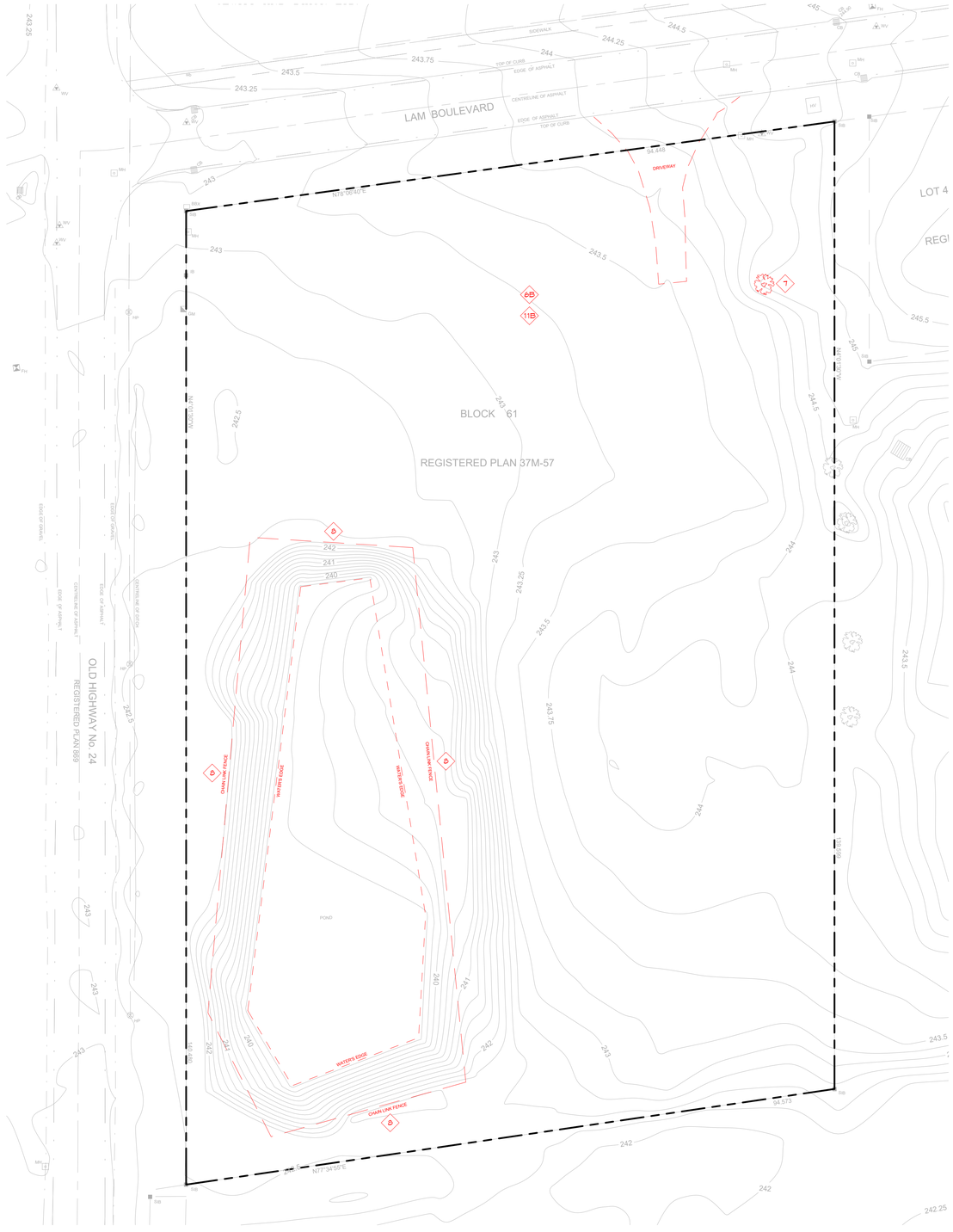


1 / D100 SITE PLAN DEMOLITION
SCALE 1 : 350

SITE SPECIFIC

GENERAL NOTES:

VERIFY CONDITIONS:

- CONTRACTOR TO VERIFY ALL CONDITIONS ON SITE TO DETERMINE COMPLETE SCOPE OF WORK (COORD. W/ EX. SITE SURVEY & ALL OTHER DWG.'S)
- CONTRACTOR TO VERIFY EXISTENCE & OBTAIN LOCATES FOR ALL EX. UNDERGROUND & O/H SERVICES ON BOTH EXT. & INT. OF PROPERTY / BOUNDARY / SCOPE OF WORK LINES PRIOR TO COMMENCEMENT OF WORK / ANY DIGGING / EXCAVATION (COORD. W/ SITE SERVICE & EX. SITE SURVEY DWG.'S)

ACCESS / CONST. FENCE / SECURE SITE:

- CONTRACTOR TO SECURE THE WORK SITE DURING DEMO & CONST. & HOARD OFF THE WORK AREA TO PREVENT ACCESS FOR ANYONE NOT ENGAGED IN THE WORK OF THIS DEMOLITION / CONST. SCOPE
- PROVIDE CONST. GATES / FENCES / BOUNDARIES AS SHOWN / REQ.'D TO THE *AUTHORITY HAVING JURISDICTION* REQ.'S. (SUBMIT SHOP DWG.'S FOR LOCATIONS & EXTENTS). A 1.8m HIGH CHAIN LINK FENCE (ALTERNATE MODU-LOC OR SIMILAR CONSTRUCTION FENCING) C/W SUPPORTS AS REQ.'D, @ WORK BOUNDARIES TO BE ERECTED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF THE DEMOLITION PROCESS & SHALL REMAIN & BE MAINTAINED IN POSITION INDEFINITELY UNTIL COMPLETION OF NEW CONST. WORK
- MAINTAIN SAFE EMPLOYEE / SAFE PUBLIC ACCESS TO THE BLDG. DURING OPERATING HOURS & MAINTAIN FULL EMERGENCY ACCESS & EXITING @ ALL TIMES TO & FROM THE BLDG. THROUGH OUT CONST. & DEMO. PROVIDE PROTECTION TO ALL PERSONEL FROM FALLING DEBRIS & CONST. TRAFFIC, POST SIGNAGE & CONSTRUCT HOARDING / PROTECTED PEDESTRIAN WALKWAYS AS REQ.'D.

SILTATION / MUD MATT:

- SILTATION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO WORKS COMMENCING ON THE SITE FOR DEMOLITION / CONST. SCOPE AND SHALL BE MAINTAINED IN POSITION UNTIL COMPLETION OF DEMO WORK / UNTIL COMPLETION OF NEW CONST. WORK, TO THE SATISFACTION OF THE *AUTHORITY HAVING JURISDICTION* BY THE DEMO CONTRACTOR (COORD. W/ OPSD 219.11, 219.130)
- PROVIDE SILTATION GEOTECH FABRIC CONTROL ON EX. CATCH BASINS, MAN HOLES, ETC. ON ADJ. COUNTY ROADWAYS TYP.
- PROVIDE MUD-MATT ENT. TO CITY/TOWN HAVING JURISDICTION REQ.'S (COORD. W/ 9/A102)

PROTECTION:

- DO NOT DISTURB ANY ITEMS BEYOND THIS BOUNDARY OR ONTO MUNICIPAL PROPERTY OR THAT ARE NOT INDICATED (REPAIR & MAKE GOOD WHERE REQ.'D, PROVIDE CLEAN TRANSITIONS TYP.)
- PROTECT ALL SIGNIFICANT AREAS / ELEMENTS DURING DEMOLITION TYP.
- CONTRACTOR TO PROTECT ALL EXPOSED PORTIONS OF THE EX. BLDG. TO REMAIN. MAKE GOOD ALL DISTURBED SURFACES & ADJACENT SYSTEMS / REPLACE & REPAIR ANY DAMAGE CAUSED BY INSUFFICIENT PROTECTION OF SURFACES / MATERIALS THAT ARE TO REMAIN, PROVIDE CLEAN TRANSITIONS TYP.

REMOVAL / DISPOSAL:

- CONTRACTOR TO INCLUDE REMOVAL AND TERMINATION OF ANY EX. SERVICES CONNECTED TO THE EXISTING BUILDING / LOCATED IN SCOPE OF WORK TO BE DEMOLISHED / OR RELOCATED INCLUDING ANY NECESSARY PERMITS OR UTILITY FEES.
- CONTRACTOR IS RESPONSIBLE FOR REMOVAL & DISPOSAL OF ALL MATERIALS THAT ARE DEMOLISHED & THAT ARE NOT INDICATED FOR RE-USE / RECLAIMING / SALVAGING OR AS OTHERWISE INDICATED BY THE OWNER. ALL COSTS ARE PART OF BASE BID SUBMISSION IN ACCORDANCE W/ BEST CONSTRUCTION PRACTICE, OBC, MUNICIPAL & PROVINCIAL LEGISLATURE REGARDING DEMOLITION & DISPOSAL METHODS (RECYCLE ALL MATERIALS WHERE ABLE).

RUBBLE:

- NO RUBBLE OF ANY NATURE TO BE LEFT IN PLACE OR BE USED AS BACKFILL. THIS INCLUDES ALL REBAR, STEEL, SCRAP METAL, WOOD & OTHER DEBOTAGE MATERIALS RESULTING FROM ABATEMENT AND DEMOLITION PROCESSES.
- ALL DISTURBED AREAS & HOLES CREATED BY EXCAVATION DURING DEMOLITION TO BE BACKFILLED TO FINISHED GRADE W/ GRANULAR 'B' & COMPACTED TO 100% STANDARD PROCTOR (@ HARD SURFACE AREAS, SOFT AREAS USE EXCAVATED / NATIVE DIRT MATERIALS). ALL BACK SLOPES TO BLEND INTO EX. TO A MAX. SLOPE OF 1:2 TO PREVENT PONDING. INSTALL 150mm MIN. TOPSOIL AT ALL VEGETATION AREAS, ANY AREAS OF BARE TOPSOIL TO BE GRADED LEVEL & COVERED W/ SOD

MAKE GOOD:

- MAKE GOOD ALL EXISTING SURFACES / SUBSTRATES / OPENINGS TO RECEIVE NEW FINISHES. INFILL AFTER DEMOLITION IS COMPLETE, ENSURE VOIDS ARE CLEAN & FREE FROM OBSTRUCTIONS SO NEW WORK IS NOT ADVERSELY AFFECTED.

SALVAGING:

- ALL SALVAGED / REUSED MATERIALS ARE TO BE REMOVED W/ GREAT CARE, KEPT IN DRY PLACE, PLACED ON SKIDS, COVERED & PROTECTED FROM DAMAGE FOR FUTURE USE & IMPLEMENTATION. TAG / NOTE WHERE MATERIALS ARE ORIG. FROM IN THE BLDG. ALL PLANTINGS TO BE PLANTED IN LARGE POTS & WATERED THROUGHOUT DURATIONS OF PROJECT. LOCATION TO BE DETERMINED ON SITE W/ OWNER. TYP.

DISCLAIMER:

ALL EXISTING SITE INFORMATION WAS PROVIDED BY JENITT & DIXON LTD, ONTARIO LAND SURVEYORS IN THE FORM OF AN ELECTRONIC FILE PLAN FILE No. 21-3145-TOPO DATED 2021.10.18 CONSISTING OF THE LEGAL SURVEY PLAN & TOPOGRAPHY (COORD. W/ A106 DWG.)

SPECIFIC SITE DEMO. NOTES:

SURFACES:

6B — REMOVE EX. TOPSOIL @ NEW LANDWAY / BLDG. / CONST. LOCATIONS WHERE APPLICABLE - STOCK PILE WHERE AVAILABLE ON SITE W/ LOCATION AS COORD.'D W/ CIVIL & DIRECTED BY OWNER - EXTENTS TO BE VERIFIED BY CONTRACTOR

GENERAL NOTE:

CUT & REMOVE EX. SURFACES & SUB-BASES AS REQ.'D TO REMOVE ANY EX. WORK OR INSTALL ANY NEW WORK FOR ANY TRADE - COORD. DEMO WORK FOR NEW CONST. AS REQ.'D IN THE SURFACES TO FINISH THE WORK. INSTALL NEW SURFACES TO MATCH EX. MATERIALS, PROVIDE CLEAN TRANSITIONS, MAKE GOOD WHERE DAMAGED / DISTURBED TYP.

LANDSCAPE:

7 — REMOVE ALL EX. SITE LANDSCAPE ELEMENTS INCLUDING BUT NOT LIMITED TO TREES / SHRUBS / BUSHES / ROOTS / VEGETATION / PLANTING BOXES / GARDENS / RAISED GARDEN BEDS / URNS / ROCKS / VEGETATION IN CONFLICT W/ NEW PROPOSED LAYOUTS / DEMOLITION AREA / AS NOTED (NOTE: REMOVE ONLY THAT PORTION OF TREE ROOT SYSTEMS WHICH ARE FOUND WITHIN THE PROPERTY LIMITS - DO NOT UNDERCUT PERIMETER FENCING / HOARDING)

FENCING:

5 — REMOVE FENCING & GATES W/ ASSOCIATED FTG.'S OR PIER SYSTEMS. SALVAGE WHAT IS GOOD; BOTH FULL HEIGHT AND HALF HEIGHT. RE-INSTALL AS TEMPORARY DEMOLITION PER. FENCE OR RE-INSTALL FOR PERMANENT NEW PER. FENCE IF REQ.'D.

UTILITIES:

11B — COORD. W/ CIVIL FOR ANY ASSOCIATED DEMO / REMOVAL / CAPPING / TERMINATIONS / ETC. & CONST. TYP.

GENERAL NOTE:

COORD. W/ CIVIL FOR ANY ASSOCIATED DEMO / REMOVAL / CAPPING / TERMINATIONS / ETC. & CONST. TYP.

NO.	DATE	ISSUANCE
7	2024.03.11	SPA
6	2024.03.08	SPA REVIEW
5	2024.03.07	PROGRESS
4	2024.03.05	PROGRESS
NO.	DATE	ISSUANCE

PROPERTY LEGAL DESCRIPTION:
PLAN 37M-57, BLK 61 PT, ROLL # 3360506286B
IN THE TOWN OF WATERFORD, IN THE DISTRICT OF NORFOLK COUNTY

APPLICANT:
COMPANY: VERLINDA HOMES LTD.
APPLICANT: TOM O'HARA
ADDRESS: 26 MAIN STREET S. BOX 1152 WATERFORD, ON., N0E 1Y0
TELEPHONE NO.: 1.705.205.3235

DO NOT SCALE DRAWINGS, CALL FOR ANY CLARIFICATIONS THAT ARE REQUIRED, FIELD VERIFY AT ALL BUILT CONDITIONS
ALL DWG.'S ARE TO BE READ IN COLOUR
ORIGINAL PAGE SIZE ARCH 'D' - 24" x 36"

VERLINDA

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE ONTARIO N3Y 3W4
(519) 426-6270

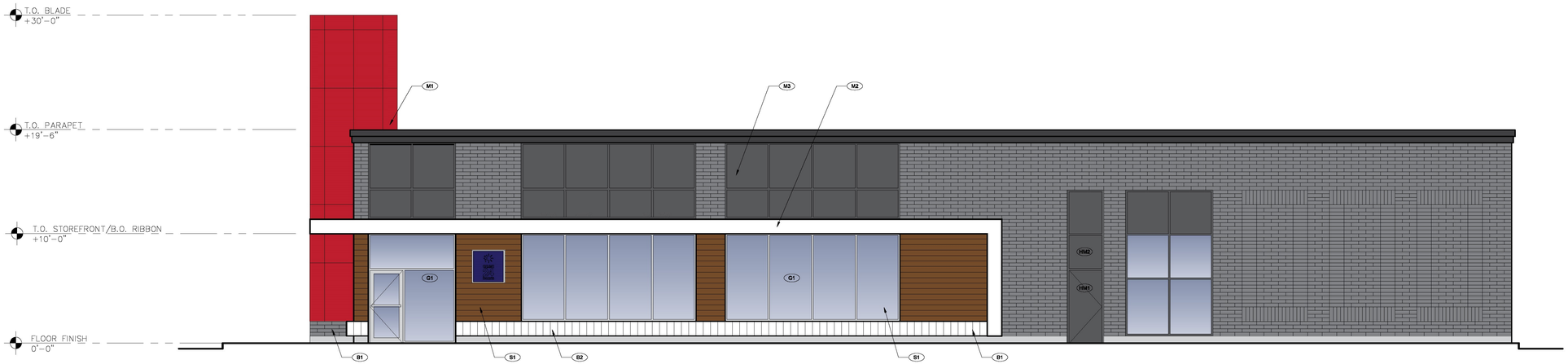
STAMP ARCH.: ONTARIO ASSOCIATION OF ARCHITECTS — MELISSA NICOLE STICKL — LICENCE 7887
STAMP STRUCT.:

PROJECT TITLE:
ORCHARD SQUARE
OLD HWY 24 / NORFOLK COUNTY RD. 24 & LAM BLVD.
WATERFORD, ONTARIO, CANADA, N0E 1Y0

DRAWING TITLE:
SITE PLAN DEMO

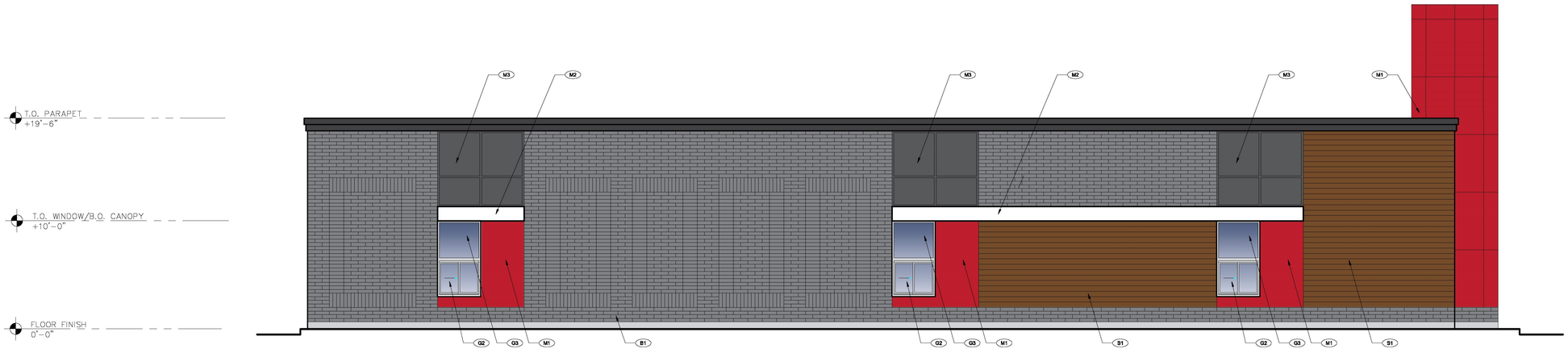
CHECKED BY:	DRAWN BY:
MS	JS
DRAWING SCALE: As indicated	DRAWING NO.: D100
PROJECT NO.: 20-128	

DATE PLOTTED: 2024-03-11 1:40:45 PM PROJECT NUMBER & NAME: 20-128 ORCHARD SQUARE FILE PATH: H:\Projects\2020\20-128 Orchard Square\Drawings\Arch\20-128 - Orchard Square_Site.rvt



1 A4.0 EAST ELEVATION (+/- 80 SEATS)
3/16" = 1'-0"

MATERIAL SCHEDULE		
#	DESCRIPTION	COLOUR
M1	MITSUBISHI 4mm ALPOLIC METAL CLADDING	RON RED
M2	MITSUBISHI 4mm ALPOLIC METAL CLADDING	BONE WHITE
M3	ACM METAL PANEL	CHARCOAL GREY
B1	RICHVALE YORK CAMBRIDGE SERIES CONCRETE BLOCK	ONYX
B2	RICHVALE YORK CAMBRIDGE SERIES CONCRETE BLOCK	ARCTIC WHITE
S1	LONGBOARD TONGUE & GROOVE PLANK	LIGHT WALNUT
G1	STOREFRONT GLAZING SYSTEM	CLEAR ANODIZED
G2	QUIK-SERV DRIVE THRU WINDOW	CLEAR ANODIZED
G3	SPANDREL PANEL	SOLAR GREY
HM1	HOLLOW METAL DOORS	CHARCOAL GREY
HM2	HOLLOW METAL PANEL	CHARCOAL GREY



2 A4.0 WEST ELEVATION (+/- 80 SEATS)
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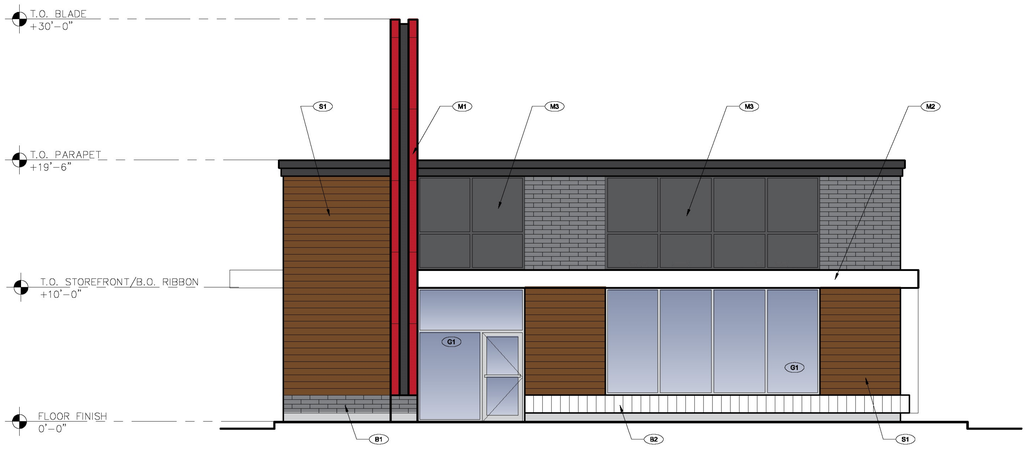

3 A4.0 SOUTH ELEVATION (+/- 80 SEATS)
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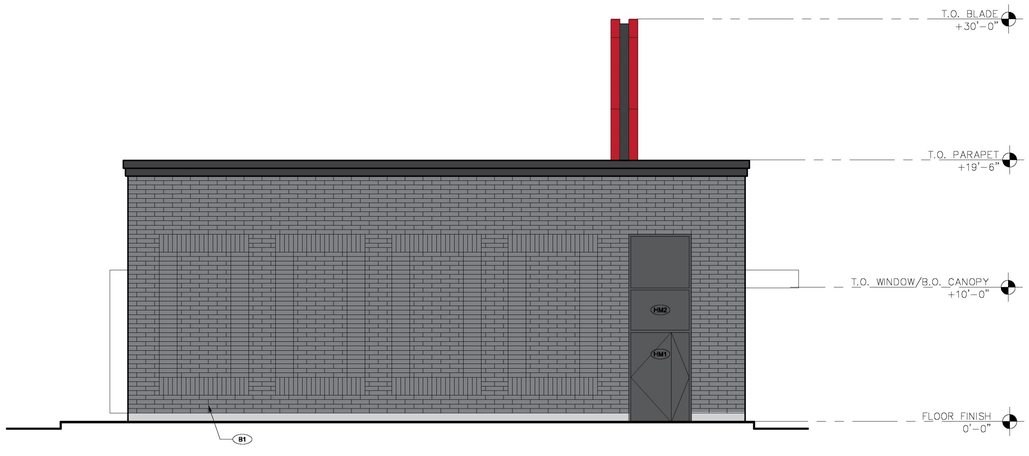


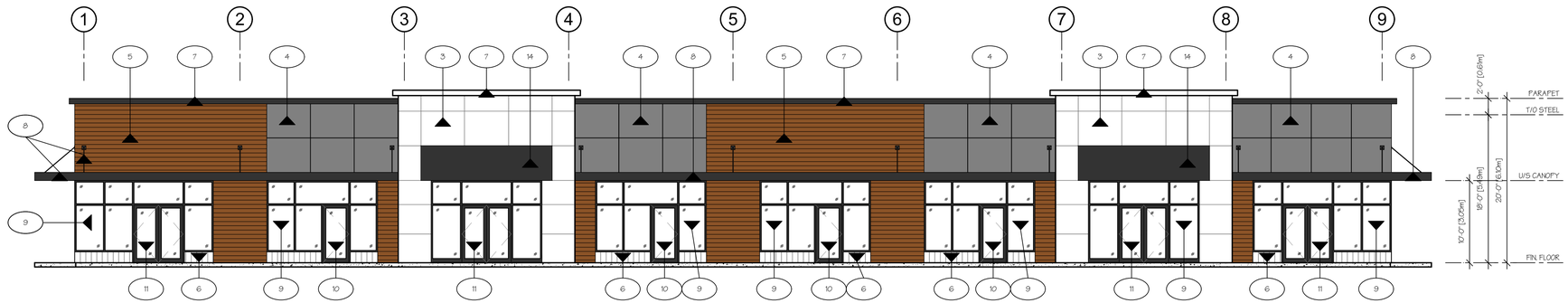
4 A4.0 NORTH ELEVATION (+/- 80 SEATS)
3/16" = 1'-0"

BY	DESCRIPTION	DATE	REV

DRAWING TITLE: EXTERIOR ELEVATIONS
STORE NAME:
STORE NUMBER: 41344
PHASE: #
OLD HWY 24 & LAW BLVD
WATERFORD, ON

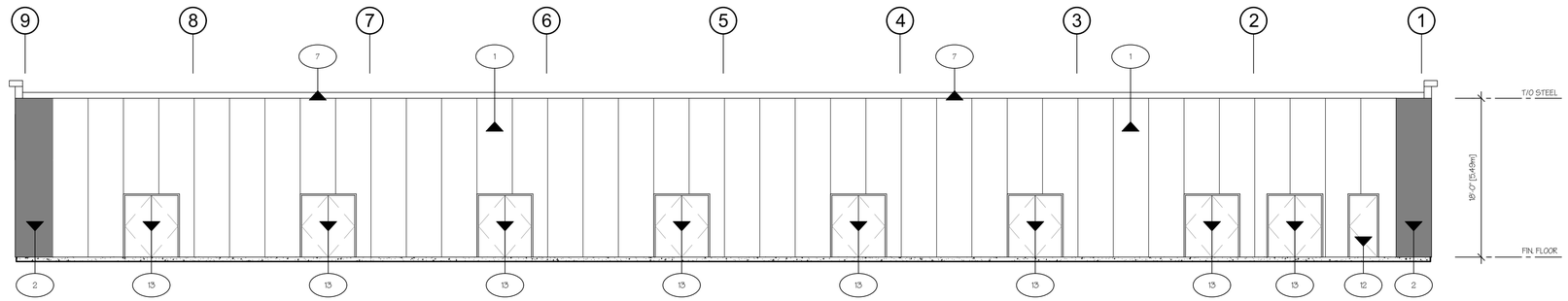
A4.0

PLOT SCALE: 1"=1"



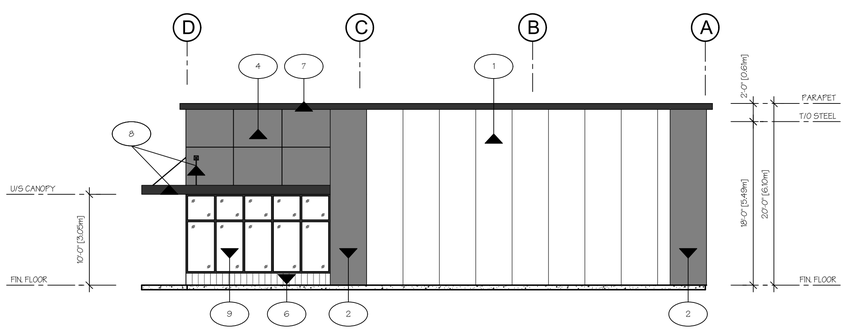
1 A2.01 FRONT ELEVATION

SCALE: 1/8" = 1'-0"



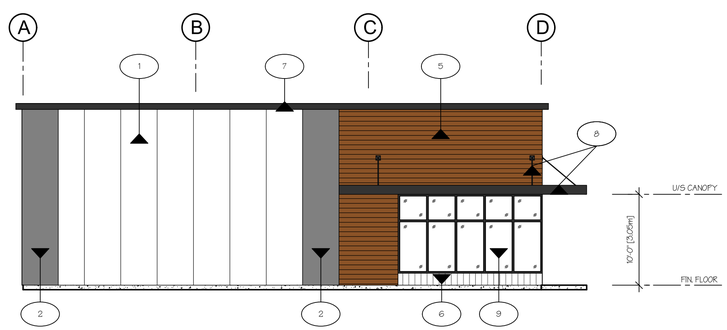
2 A2.01 REAR ELEVATION

SCALE: 1/8" = 1'-0"



3 A2.01 SIDE ELEVATION

SCALE: 1/8" = 1'-0"



4 A2.01 SIDE ELEVATION

SCALE: 1/8" = 1'-0"

1 INSULATED METAL PANEL BY METL SPAN OR EQUIVALENT - CF LIGHT MESA IN WHITE

2 INSULATED METAL PANEL BY METL SPAN OR EQUIVALENT - CF LIGHT MESA IN GREY

3 ALUMINUM COMPOSITE PANEL IN WHITE

4 ALUMINUM COMPOSITE PANEL IN GREY

5 LONGBOARD TONGUE AND GROOVE PLANK IN LIGHT CHESTNUT

6 DECORATIVE CONCRETE BLOCK PAINTED WHITE

7 PRE-PAINTED METAL CAP FLASHING IN CORRESPONDING COLOUR AS SHOWN

8 SUSPENDED CANOPY w/ ROD IRON HANGERS OR SIMILAR IN BLACK

9 CLEAR ANODIZED ALUMINUM CURTAIN WALL w/ BLACK CAPPING

10 3'-2" x 7'-0" CLEAR ANODIZED ALUMINUM MAN DOOR PAINTED BLACK

11 6'-0" x 7'-0" CLEAR ANODIZED ALUMINUM DOUBLE MAN DOOR PAINTED BLACK

12 3'-2" x 7'-0" H.M. MAN DOOR

13 6'-0" x 7'-0" H.M. DOUBLE MAN DOOR

14 DECORATIVE CANOPY IN BLACK

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GENERAL NOTES:

NO.	REVISION	BY	DATE
2	REVISED FACADE	CS	01.24.2024
1	PROPOSAL	CS	11.01.2023

ABCOTT CONSTRUCTION LTD.

GENERAL CONTRACTORS AND DESIGN BUILDERS

124 Garden Avenue,
Brantford, Ontario N3S 7W4
Tel (519) 756-4350 Fax (519) 756-8721
www.abcott.com

CLIENT
WATERFORD RETAIL PLAZA
LAM BOULEVARD, WATERFORD, ONTARIO

PROJECT
PROPOSED PRE-ENG BUILDING

DWG. TITLE
ELEVATIONS

DATE:	JOB NO.	DRAWING NO.
NOV. 1, 2023	23-189	A2.01
SCALE: AS NOTED	DRAWN BY: CS	

vallee

Consulting Engineers,
Architects & Planners

March 1, 2024

Verlinda Homes
26 Main Street South PO Box 1152
Waterford, ON
N0E 1Y0

Attention: **Mr. Tom O'Hara**

Reference: **Functional Servicing Report**
Orchard Square Development
Waterford, Norfolk County
Our Project # 20-128

Introduction

This functional servicing report has been prepared on behalf of Verlinda Homes, in support of the site plan application for the proposed Orchard Square Development located at municipal address 750 Old Highway 24, on the southeast corner of Old Hwy 24 and Lam Boulevard in Waterford - Norfolk County. The proposed development site has been severed into two properties, and will be constructed in two phases, with Phase 1 including a four-unit commercial building, and a fast-food restaurant and Phase 2 includes a 5-storey, 44-unit residential mid-rise building. This report presents the functional servicing for the proposed development, including sanitary, storm and domestic and fire water servicing.

The 1.31 ha development site is vacant land which features open grassed area and an irrigation pond. The sites are bound by Lam Boulevard to the north, old Highway 24 to the west, an existing subdivision and stormwater management pond to the east and agricultural land to the south. Refer to Figure 1 below.

Figure 1 – Site Location

Land Use and Design Assumptions

The development site currently features an open landscaped area and a pond and is zoned as Hamlet Residential Type 5 – R5(H) and Hamlet Service Commercial – CS(H). The proposed development will consist of the following construction:

Phase 1:

- 1 – 4-unit commercial building
- 1 – fast food restaurant
- Parking lot
- Storm, sanitary and watermain infrastructure to support the proposed construction, including a stormwater management facility
- Curbs, sidewalks and other miscellaneous items to support the proposed construction

Phase 2:

- 1 – 5-storey residential mid-rise building with 44 dwelling units
- Parking lot
- Storm, sanitary and watermain infrastructure to support the proposed construction
- Curbs, sidewalks and other miscellaneous items to support the proposed construction

The following table outlines the mix of land use and calculates the anticipated population based on a residential dwelling density of 2.75 people per unit (ppu) and a commercial density of 90 people per hectare as utilized in the Norfolk County Design Criteria.

Table 1
Subject Lands – Estimate of Population

Phase	Land Use	Area	Number of Units	Density	Population
Phase 1	Commercial Area	0.71 ha	-	0.71 ha @ 90 pph	64 people
Phase 2	44 Apartment Units	0.60 ha	44	44 units @ 2.75 ppu	121 people
				Total	185 people

Sanitary Servicing

Norfolk County record drawings from Vallee Project No. 10-034 – Yin Subdivision Phase 5 indicate a 200mm diameter PVC sanitary sewer along Lam Boulevard, and a 200mm diameter AC sanitary sewer along Old Highway 24. As part of this project, a sanitary manhole was installed at the northeast corner of the subject site for future development. Sanitary flows from Phase 1 of the proposed development will be conveyed to this existing sanitary manhole and ultimately the Lam Boulevard sanitary sewer; and sanitary flows from Phase 2 of the proposed development will be conveyed to the existing sanitary sewer along Old Highway 24 via 2 via two separate internal sanitary sewer networks. Refer to drawing 20-128 C100 – Servicing Plan.

Sanitary design flows for the proposed development were calculated using the Norfolk County Design Criteria. Table 2 presents the flow information associated with each of the proposed development zones. In summary, the proposed development is anticipated to generate an additional sanitary flow of approximately 1.33 L/s to the existing sanitary sewer on Lam Boulevard after the construction of Phase 1, and an additional sanitary flow of approximately 2.83 L/s to the existing sanitary sewer on Old Highway 24 after the construction of Phase 2. Ultimately, an additional sanitary flow of approximately 4.15 L/s is anticipated at the intersection of Lam Boulevard and Old Highway 24. Refer to detailed calculations in Appendix A.

Table 2
Sanitary Design Flows

	Phase 1 Commercial	Phase 2 Residential
Development Area (ha)	0.71 ha	0.60 ha
Population	64	121
Per Capita Flow	40000 L/ha/day	450 L/person/day
Peak Extraneous Flow	0.28 L/sec/ha	
Infiltration Flow	0.20 L/s	0.17 L/s
Sewage Flow	0.33 L/s	0.63 L/s
Peaking Factor	3.43	4.22
Peak Design Flow	1.33 L/s	2.83 L/s
Total Peak Design Flow	4.15 L/s	

As part of the Yin Subdivision Phase 5 Project (Vallee Project No. 10-034), a sanitary drainage area plan and design sheet were created for the sanitary sewer system which discharges to the sanitary main along Lam Boulevard and Old Hwy 24, as shown in Appendix A. The subject site was included in the drainage area plan, and a total estimated sanitary flow of 3.16 L/s was calculated. As calculated above, the total sanitary flow of 4.15 L/s from the proposed development is only a minor increase from the estimated flow from the Yin Subdivision Phase 5 Project. Therefore, the existing sanitary sewers along Lam Boulevard and Old Highway 24 are anticipated to have adequate capacity to support the proposed development.

In July 2023, a request was made to Norfolk County to have the previous development layout and anticipated sanitary flow reviewed by the County's external sanitary modelling consultant. At this time, no sanitary modelling report has been received. Consequently, to confirm the calculations presented, Vallee requests that Norfolk County's consultant review the updated sanitary flow calculations from this report and update their sanitary hydraulic modelling to determine if the existing County infrastructure provides adequate capacity to accommodate the estimated sanitary design flows from the proposed development.

Water Servicing

As-constructed drawings and the Norfolk County ISMP indicate an existing 200mm diameter watermain along Lam Boulevard and at the intersection of Lam Boulevard and Old Highway 24. As part of the Yin Subdivision Phase 5 Project (Vallee Project No. 10-034), a 150mm diameter water service was installed at the northeast corner of the subject site, which will be used to service Phase 1 of the proposed development. As there is currently no watermain along the western frontage of Phase 2, a 150mm diameter watermain extension from the intersection of Lam Boulevard and Old Highway 24 will be installed the watermain along Old Highway 24 to service Phase 2. Refer to drawing 20-128 C100 – Servicing Plan.

Norfolk County's design criteria stipulates the following requirements for system pressures, and the system shall be designed to meet the greater of either of the following requirements;

- Fire flow conditions– not less than 140 kPa
- Normal operating conditions – not less than 280 kPa

Domestic Water Demand

Table 3 presents the domestic water flow information for the proposed development:

Table 3
Domestic Water Demands

	Phase 1 Commercial	Phase 2 Residential
Population	64	121
Average Daily Demand	450 L/person/day	
Maximum Day Demand Factor	2.25	
Maximum Day Demand	0.75 L/s	1.42 L/s
Peak Hourly Demand Factor	2	4
Peak Hourly Demand	0.67 L/s	2.52 L/s

In summary, the proposed development is anticipated to have a total maximum daily demand of 2.08 L/s and a maximum hourly demand of 3.19 L/s. Refer to Appendix B for detailed calculations.

Fire Water Service

According to the County GIS online mapping, there are two existing fire hydrants located in proximity to the proposed development. One is on the west side of Old Hwy 24, at the intersection of Old Hwy 24 and Lam Boulevard, and the second is located on the north side of Lam Boulevard, at the northeast corner of the subject property. The existing hydrants provide sufficient coverage for Phase 1 of development, however, they do not provide sufficient coverage for Phase 2, therefore, one fire hydrant will be installed during Phase 2 of construction.

Typically, available fire flow during the maximum day demand is the critical criterion when evaluating a watermain distribution system's ability to service a residential subdivision. The estimated fire flow requirement for the development has been determined using the Fire Underwriters Survey – 2020 (FUS). Using the FUS recommendations, the minimum required fire flow was determined to be 83 L/s for Phase 1 and 117 L/s for Phase 2, under the assumption that both buildings in Phase 1, and the mid-rise residential building in Phase 2 will feature fully automatic sprinkler systems. Supporting calculations are detailed in Appendix B.

Information obtained from Norfolk County ISMP indicates that the estimated available fire flow in the existing watermain on Lam Boulevard and at the intersection of Lam Boulevard and Old Highway 24 ranges from 83 L/s to 159 L/s, as displayed in Appendix B. In addition, Norfolk County has indicated that the fire flow during the maximum day demand is preliminarily estimated to be 129 L/s. Therefore, the available municipal watermain is anticipated to provide sufficient flow to service both Phase 1 and Phase 2 of the development.

In July 2023, a request was made to Norfolk County to have the previous development layout and anticipated water demands reviewed by the County's external water modelling consultant. At this time, no water modelling report has been received. Consequently, to confirm the calculations presented, Vallee requests that Norfolk County's consultant review the updated domestic and fire flow calculations from this report and update their water modelling to determine if the existing County infrastructure has adequate system flows and pressure to support the proposed development.

It should be noted that the FUS method is generally conservative. Norfolk County is currently revising their fire flow criteria to a hybrid approach between the FUS and OBC methods. As such, the required flow will be re-evaluated when the updated approach is confirmed.

Stormwater Management

Under pre-development conditions, the subject property is vacant land which features an open grassed area and an irrigation pond. Stormwater runoff from the subject property drains uncontrolled, overland in a southwesterly direction towards Old Highway 24. As part of the Yin's Subdivision - Phase 5 Project (Vallee Project No. 10-034), a peak flow allowance of 0.015 m^3/s was allocated for the subject site as part of the storm sewer design along Old Highway 24.

The overall stormwater management (SWM) strategy is to utilize site grading and an internal storm sewer system to convey flows from the 2-year through the 100-year storm events from Phase 1 and Phase 2 to a shared underground stormwater management chamber facility located in Phase 1 of the development. Ultimately, runoff from the SWM facility will be released to the existing storm sewer on Old Highway 24. Given the subject site has been severed into two properties, storm easements will be made across the two properties to allow both properties to share the proposed stormwater detention system. The proposed SWM system will have two primary functions:

1. Reduce and/or control all post-development peak flow rates from the site to levels that do not exceed the 0.015 m^3/s flow allowance, for all storm events up to and including the 100-year storm event.
2. Treat stormwater to a Normal Protection Level as defined in the Ministry of the Environment's *Stormwater Management Practices Planning and Design Manual* (March 2003).

Complete details of the SWM design are provided in the Orchard Square Development Stormwater Management Report dated March 1, 2024.

Conclusions and Recommendations

The functional servicing design for the proposed development can be summarized as follows:

- A peak sanitary design flow of approximately 4.15 L/s is anticipated from Phase 1 and Phase 2 of the proposed development.
- Sanitary modelling from Norfolk County's consultant has been requested to determine if existing County infrastructure provides adequate capacity to accommodate the estimated sanitary design flow.
- The domestic maximum day demand and peak hourly demand for Phase 1 and 2 of the proposed development were found to be 2.08 L/s and 3.19 L/s, respectively.
- Using the FUS criteria, the required fire flow demand for Phase 1 and Phase 2 of the proposed development were found to be 83 L/s and 117 L/s, respectively.
- Water modelling from Norfolk County's consultant has been requested to determine the water servicing capacity and constraints on the existing water system to ensure adequate system flows and pressure for the aforementioned domestic and fire demands.
- The fire flow capacity will be re-evaluated when the revised fire flow requirements are confirmed by Norfolk County.
- Overland flow and internal storm sewers will convey stormwater to the proposed underground SWM facility, which will ultimately be released to the existing storm sewer on Old Highway 24.
- Under all storm events, peak flows associated with the post-development site are controlled to less than or equal to the allowable flow rate of 0.015 m^3/s under all storm events.
- Stormwater will be treated to a normal level of water quality protection.

It is recommended that this report be provided to Norfolk County and the Long Point Region Conservation Authority in support of the site plan application proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us.

Respectfully submitted,

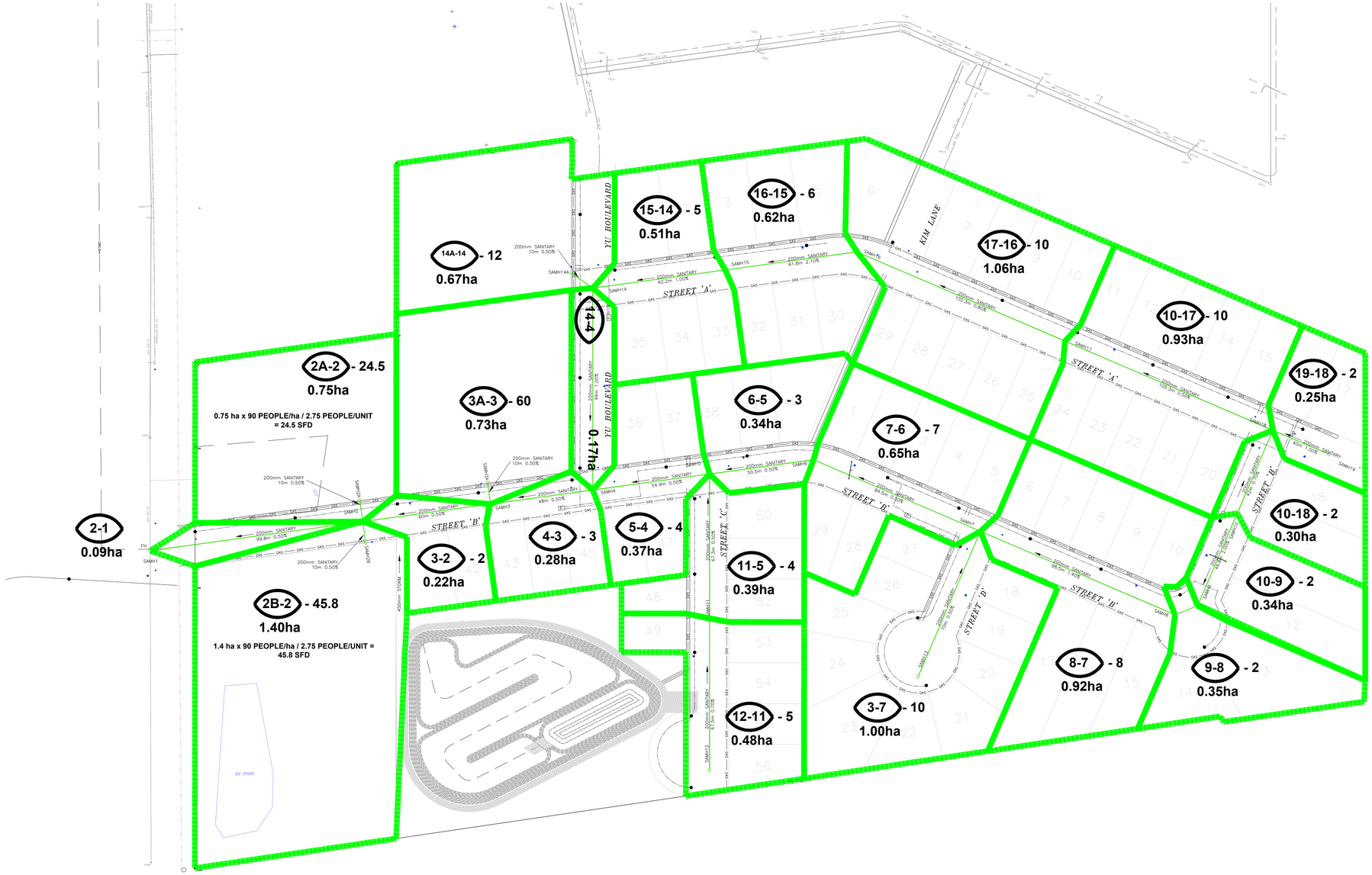
Natalie Ongena, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

Appendix A
– DWG 10-034 SA1 – Sanitary Sewer Drainage Areas
– 10-034 Sanitary Design Sheet
– 20-128 Sanitary Flow Calculations

Appendix B
– 20-128 Domestic Water Demand Calculations
– 20-128 FUS Fire Flow Calculations
– 20-128 Fire Flow Calculation Distances
– Norfolk County ISMP Available Fire Flow

APPENDIX A

DWG 10-034 SA1 – Sanitary Sewer Drainage Areas
10-034 Sanitary Design Sheet
20-128 Sanitary Flow Calculations



REV. No.	DATE	REVISION
0		

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
YIN PHASE 5
WATERFORD - NORFOLK COUNTY

Drawing Title
SANITARY SEWER DRAINAGE AREAS

Designed by : DJB	Drawn By : TJC
Checked by : TGS	Date Started : SEPTEMBER 2010
Drawing Scale : 1:1000	Drawing No. SA1
Project No. 10-034	

DATE LAST PLOTTED :

SANITARY SEWER DESIGN SHEET

Pipe Material: PVC
N: 0.013

Project: Yin's Subdivision Phase 6

Job No.: 14123

Date: 1-Feb-15
Designed by: TGS
Checked by: JDV
Sheet of: 1 of 1

Location				Area						Flow			Sewer Design						
Area	Street	From MH	To MH	Section Ha	Cumul. Ha	Section Units	Cumul Units	Total Pop.	M=Peak Factor	Q(i) L/s	Q(s) L/s	Q(d) L/s	Material	Size mm	Length m	N	Slope %	Cap L/s	Full V m/s
10-18	Lam Blvd	10	18	0.3	0.30	2	2	6	4.4363	0.084	0.1271	0.211	PVC	200	42	0.013	0.70%	27.4	0.87
19-18	Tan Ave	19	18	0.25	0.55	2	4	11	4.4106	0.154	0.2527	0.407	PVC	200	40	0.013	1.00%	32.8	1.04
18-17	Tan Ave	18	17	0.93	1.48	10	14	39	4.3363	0.4144	0.8695	1.284	PVC	200	105.3	0.013	0.50%	23.2	0.74
17-16	Tan Ave	17	16	1.06	2.54	10	24	66	4.2888	0.7112	1.4743	2.185	PVC	200	105.3	0.013	0.80%	29.3	0.93
16-15	Tan Ave	16	15	0.62	3.16	6	30	83	4.2655	0.8848	1.8328	2.718	PVC	200	61.8	0.013	2.10%	47.5	1.51
15-14	Tan Ave	15	14	0.51	3.67	5	35	96	4.2481	1.0276	2.1296	3.157	PVC	200	62.2	0.013	1.00%	32.8	1.04
14A-14	Block 1 - TWNHSE	14A	14	0.67	0.67	12	12	33	4.348	0.1876	0.7473	0.935	PVC	200	10	0.013	0.50%	23.2	0.74
14-4	Yu Blvd	14	4	0.17	4.51	0	47	129	4.2114	1.2628	2.835	4.098	PVC	200	94	0.013	1.00%	32.8	1.04
10-9	Lam Blvd	10	9	0.34	0.34	2	2	6	4.4363	0.0952	0.1271	0.222	PVC	200	46.8	0.013	2.00%	46.4	1.48
9-8	Lam Blvd	9	8	0.35	0.69	2	4	11	4.4106	0.1932	0.2527	0.446	PVC	200	11.3	0.013	1.70%	42.8	1.36
8-7	Lam Blvd	8	7	0.92	1.61	8	12	33	4.348	0.4508	0.7473	1.198	PVC	200	98.5	0.013	1.40%	38.8	1.24
13-7	Tai Shan Place	13	7	1.00	1.00	10	10	28	4.3607	0.28	0.6246	0.905	PVC	200	70	0.013	0.50%	23.2	0.74
7-6	Lam Blvd	7	6	0.65	3.26	7	29	80	4.2692	0.9128	1.7733	2.686	PVC	200	84.5	0.013	0.50%	23.2	0.74
6-5	Lam Blvd	6	5	0.34	3.60	3	32	88	4.2584	1.008	1.9517	2.96	PVC	200	50.5	0.013	0.50%	23.2	0.74
12-11	Jong St	12	11	0.48	0.48	5	5	14	4.4003	0.1344	0.3151	0.45	PVC	200	67.5	0.013	0.70%	27.4	0.87
11-5	Jong St	11	5	0.39	0.87	4	9	25	4.3676	0.2436	0.563	0.807	PVC	200	67.3	0.013	0.50%	23.2	0.74
5-4	Lam Blvd	5	4	0.37	4.84	4	45	124	4.2171	1.3552	2.718	4.073	PVC	200	54.9	0.013	0.50%	23.2	0.74
4-3	Lam Blvd	4	3	0.28	9.63	3	95	261	4.1034	2.6964	5.5835	8.28	PVC	200	48	0.013	0.50%	23.2	0.74
3A-3	Block 2 Aptmnts.	3A	3	0.73	0.73	60	60	165	4.1773	0.2044	3.5899	3.794	PVC	200	10	0.013	0.50%	23.2	0.74
3-2	Lam Blvd	3	2	0.22	10.58	2	157	432	4.0062	2.9624	9.0087	11.97	PVC	200	60	0.013	0.50%	23.2	0.74
2A-2	Block 3 Commercial	2A	2	0.75	0.75	25	25	67	4.2867	0.21	1.5043	1.714	PVC	200	10	0.013	0.50%	23.2	0.74
2B-2	Block 2 Aptmnts.	2B	2	1.4	1.40	46	46	126	4.2148	0.392	2.7648	3.157	PVC	200	10	0.013	0.50%	23.2	0.74
2-1	Lam Blvd	2	1	0.09	12.07	0	227	625	3.9224	3.3796	12.77	16.15	PVC	200	99.8	0.013	0.50%	23.2	0.74

Design Information:

Q(s) = Sewage Flow = P q M / 86.4
Q(i) = Infiltration Flow = I A
Q(d) = Peak Design Flow = Q(s) + Q(i)

P = Population in thousands
M = Peaking Factor = 1 + 14 / (4 + P^.5)
A = Tributary Area

q = Per Capita Flow= 450 L/cap d
I = Peak Extraneous Flow = 0.28 L/s/ha
Population Density 2.75 persons /unit

Existing Sewer

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Subject:	Orchard Square Phase		
Date:	2/28/2024	By:	NLO
Project #:	20-128	Page:	1
Description:	Phase 1 - Commercial		

Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow

9.2.01 Tributary Population

Commercial:

Commercial Development:	90	persons/ha
Site Area:	0.71	ha
Number of Persons:	64	persons

9.2.02 Sewage Flow

Per Capita Flow:	40	m^3/hectare/day
Average Sewage Flow:	0.329	L/s

9.2.03 Peak Sanitary Flow Factor

Commerical Peaking Factor Formula:

M = 0.8(1+(14/(4+(Pe^0.5))))

P =	0.0639
M =	3.434

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28	L/s/ha
Infiltration Allowance:	0.199	L/s

9.2.05 Design Flow

Design Flow:

Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	1.33	L/s

Norfolk County Design Criteria Section 9.2 - Sanitary Sewage Flow

9.2.01 Tributary Population

Residential:

Residential Development:	2.75	persons/unit
Units:	44	Units
Number of Persons:	121	persons
Site Area:	0.60	ha

9.2.02 Sewage Flow

Per Capita Flow:	0.45	m^3/person/day
Average Sewage Flow:	0.630	L/s

9.2.03 Peak Sanitary Flow Factor

Residential Peaking Factor Formula:

M = 1+(14/(4+(Pe^0.5)))

P =	0.121
M =	4.220

9.2.04 Infiltration Allowance

Infiltration Allowance:	0.28	L/s/ha
Infiltration Allowance:	0.168	L/s

9.2.05 Design Flow

Design Flow:

Design Flow = (Average Sewage Flow * Peak Sanitary Flow Factor) + Infil. Allowance

Design Flow =	2.83	L/s

Summary of Design Flows

Phase 1: 1.33 L/s

Phase 2: 2.83 L/s

Total Design Flow:	**4.15 L/s**

APPENDIX B

20-128 Domestic Water Demand Calculations
20-128 FUS Fire Flow Calculations
20-128 Fire Flow Calculation Distances
Norfolk County ISMP Available Fire Flow

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Subject:	Orchard Square		
Date:	2/28/2024	By:	NLO
Project #:	20-128	Page:	1
Description:	Phase 1		

Maximum Daily Demand

Area	0.71	ha
Zoning of Land	Commercial	
Equiv. Population Density	90	ppl/ha
Equiv. Population	64	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Daily Demand Peaking Factor	2.25	
Maximum Daily Demand	64.80	m^3/day
	0.75	l/s

Maximum Hourly Demand

Area	0.71	ha
Zoning of Land	Commercial	
Equiv. Population Density	90	ppl/ha
Equiv. Population	64	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Hourly Demand Peaking Factor	2	
Maximum Hourly Demand	2.40	m^3/hour
	0.67	l/s

Maximum Daily Demand

Total Number of Units	44	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/unit
Equiv. Population	121	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Daily Demand Peaking Factor	2.25	
Maximum Daily Demand	122.51	m^3/day
	1.42	l/s

Maximum Hourly Demand

Total Number of Units	44	units
Zoning of Land	Residential	
Equiv. Population Density	2.75	ppl/ha
Equiv. Population	121	
Av. Daily Demand Per Capita	0.45	m^3/capita/day
Maximum Hourly Demand Peaking Factor	4	
Maximum Hourly Demand	9.08	m^3/hour
	2.52	l/s

Summary of Maximum Daily Demand

Phase 1:	0.67	L/s
Phase 2:	1.42	L/s
Total Maximum Daily Demand:	**2.08**	**L/s**

Summary of Maximum Hourly Demand

Phase 1:	0.67	L/s
Phase 2:	2.52	L/s
Total Maximum Hourly Demand:	**3.19**	**L/s**

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Subject:	Orchard Sqaure		
Date:	2/28/2024	By:	NLO
Project #:	20-128	Page:	1

PHASE 1 COMMERCIAL BUILDING

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.0 Construction coefficient for ordinary construction

A= 849 Floor Area m^2 = Main Floor Area

F_1= 6410 L/min

F_1= 6000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Mercentile Occupancy - Limited to Combustable Contents

Reduction: 0%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 6000 L/min

3) Sprinkler System

Sprinkler System: Applicable (Assumes the building is protected by a complete automatic sprinkler system, conforming to NFPA 13 and other standards)

Reduction: 40%

$F_3=F_2*Reduction$ (L/min)

F_3= 2400 L/min

4) Seperation

Direction	Distance (m)	Surcharge
South	17.1	15%
East	16.6	15%
West	> 30m	0%
North	> 30m	0%
	Total:	30%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)

F_4= 1800 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 5400 L/min

= 5000 L/min (Round to the nearest 1,000 l/min)

= **83.3 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

PHASE 1 FAST FOOD RESTAURANT

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 1.5 Construction coefficient for wood frame construction

A= 410 Floor Area m^2 = Main Floor Area

F_1= 6682 L/min

F_1= 7000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Mercentile Occupancy - Limited to Combustable Contents

Reduction: 0%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 7000 L/min

3) Sprinkler System

Sprinkler System: Applicable (Assumes the building is protected by a complete automatic sprinkler system, conforming to NFPA 13 and other standards)

Reduction: 40%

$F_3=F_2*Reduction$ (L/min)

F_3= 2800 L/min

4) Seperation

Direction	Distance (m)	Surcharge
South	> 30m	0%
East	> 30m	0%
West	> 30m	0%
North	> 30m	0%
	Total:	0%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)

F_4= 0 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 4200 L/min

= 4000 L/min (Round to the nearest 1,000 l/min)

= **66.7 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

PHASE 2 - 5-STOREY MID-RISE RESIDENTIAL BUILDING

1) Fire Flow Requirement

$F_1=220C(A^{1/2})$ (L/min)

C= 0.8 Non Combustible Construction

Af= 1142 m^2 = main floor area

1142 m^2 = second floor area

A= 3997 Fire Area m^2 = two adjoining floor areas plus 50% of all floors immediately above them

F_1= 11127 L/min

F_1= 11000 L/min (Round to the nearest 1,000 l/min)

2) Occupancy

Occupancy Type: Residential Occupancy

Reduction: 15%

Surcharge: 0%

$F_2=F_1+(F_1*Reduction/Surcharge)$ (L/min)

F_2= 9350 L/min

3) Sprinkler System

Sprinkler System: Applicable (Assumes the building is protected by a complete automatic sprinkler system, conforming to NFPA 13 and other standards)

Reduction: 40%

$F_3=F_2*Reduction$ (L/min)

F_3= 3740 L/min

4) Seperation

Direction	Distance (m)	Surcharge
North	17.1	15%
East	> 30m	0%
West	> 30m	0%
South	> 30m	0%
	Total:	15%

Separation Surcharges	
0 to 3m	25%
3.1m to 10m	20%
10.1m to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

F4=(TOTAL)*F2 (L/min)

F_4= 1403 L/min

Total Fire Flow

$F=F_2-F_3+F_4$ = 7013 L/min

= 7000 L/min (Round to the nearest 1,000 l/min)

= **116.7 L/s**

Notes: *1) All calculations and factors from Part 2 "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 2020*

Water Supply for Public Fire Protection - Fire Underwriters Survey 2020
Tables & Figures

Method for Determining Required Fire Flows

Fire Underwriters Survey defines **Required Fire Flow** as the amount and rate of water application required in firefighting to confine and control the fires possible in a building or group of buildings which comprise essentially the same fire area by virtue of immediate exposure. This may include as much as a city block.

To determine the estimated amount of water required to confine and control a fire in a building or group of buildings, Fire Underwriters Survey uses the following base formula:

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

Where:

RFF = the Required Fire Flow in litres per minutes (LPM)
C = the Construction Coefficient is related to the type of construction of the building
A = the Total Effective Floor Area (effective building area) in square metres of the building

Construction Coefficient (C)

Note that the construction typology used by the insurance industry and public fire protection differs from the terms of reference in the National Building Code of Canada (NBC).

The following Construction Types and Coefficients are used in the required fire flow formula:

C = 1.5 for **Type V** Wood Frame Construction
= 0.8 for **Type IV-A** Mass Timber Construction
= 0.9 for **Type IV-B** Mass Timber Construction
= 1.0 for **Type IV-C** Mass Timber Construction
= 1.5 for **Type IV-D** Mass Timber Construction
= 1.0 for **Type III** Ordinary Construction
= 0.8 for **Type II** Noncombustible Construction
= 0.6 for **Type I** Fire Resistive Construction

Occupancy and Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with a very low fire hazard or may be increased by up to 25% for occupancies having contents with a high fire hazard. The Occupancy and Contents Adjustment Factor should not be made at greater than 25% or less than -25%.

- *Noncombustible Contents* *-25%*
  - Includes merchandise or materials, including stock, or equipment, which in permissible quantities does not in themselves constitute an active fuel for the spread of fire.
  - May include limited or controlled amounts of combustible material, not exceeding 5% of the Total Effective Area of the occupancy. Combustible components of construction (ex. interior walls, finishes, etc.) should be included in the limit on combustible materials.
- *Limited Combustible Contents* *-15%*
  - Includes merchandise or materials, including furniture, stock, or equipment, of low combustibility, with limited concentrations of combustible materials.
- Combustible Contents 0% no adjustment
  - Includes merchandise or materials, including furniture, stock, or equipment, of moderate combustibility.
- *Free Burning Contents* *+15%*
  - Includes merchandise or materials, including furniture, stock, or equipment, which burn freely, constituting an active fuel.
- *Rapid Burning Contents* *+25%*
  - Includes merchandise or materials, including furniture, stock, or equipment, which either
    - Burn with great intensity
    - spontaneously ignite and are difficult to extinguish
    - give off flammable or explosive vapors at ordinary temperatures
    - as a result of an industrial processing, produce large quantities of dust or other finely divided debris subject to flash fire or explosion

Table 3 Recommended Occupancy/Contents Charges by Major Occupancy Examples[1]

Group	Division	Description of Major Occupancies	Occupancy and Contents	Adjustment Factor
A	1	***Assembly** occupancies* intended for the production and viewing of the performing arts	Combustible	0%
A	2	***Assembly** occupancies* not elsewhere classified in Group A	Limited to Combustible	-15% to 0%
A	3	***Assembly** occupancies* of the arena type	Limited to Combustible	-15% to 0%
A	4	***Assembly** occupancies* in which occupants are gathered in the open air	Limited to Combustible	-15% to 0%
B	1	**Detention** occupancies	Noncombustible to Limited	-25% to -15%
B	2	**Care** and treatment occupancies	Noncombustible to Limited	-25% to -15%
B	3	**Care** occupancies	Limited	-15%
C	---	**Residential** occupancies	Limited	-15%
D	---	**Business** and personal services occupancies		
D	---	• *Police stations without detention quarters*	Non-combustible	-20%
D	---	• *Banks, Barber and hairdressing shops, Beauty parlours, Dental offices, Laundries (self-service), Medical offices, Offices, Radio stations*	Limited	-15%
D	---	• *Dry cleaning establishments (self-service, not using flammable or explosive solvents or cleaners), Small tool and appliance rental and service establishments*	Combustible	0%
E	---	**Mercantile** occupancies		
E	---	• *Exhibition halls*	Limited	-15%
E	---	• *Supermarkets*	Limited	-15%
E	---	• *Shops/Stores*	Limited to Combustible	-15% to 0%
E	---	• *Markets*	Combustible	0
E	---	• *Department stores*	Free Burning	15%
F	1	**High hazard industrial** occupancies	Rapid Burning	+25%
F	2	**Medium hazard industrial** occupancies		
F	2	• *Television studios not admitting a viewing audience*	Limited	-15%
F	2	• *Cold storage plants*	Combustible	0%
F	2	• *Electrical substations*	Combustible	0%
F	2	• *Helicopter landing areas on roofs*	Limited	-15%

[1] *The values presented in this table are intended as a guideline and the occupancy/contents adjustment should be based on the actual severity of conditions within the risk structure.*

Total Effective Area (A)

To determine a required fire flow for an individual building, the Total Effective Area that would be affected during the design fire must be determined. The Total Effective Area is the largest Floor Area (in square metres) plus the following percentages of the total area of the other floors:

1) For a building classified with a Construction Coefficient from 1.0 to 1.5:
   a) 100% of all Floor Areas are considered in determining the Total Effective Area to be used in the formula.
2) For a building classified with a Construction Coefficient below 1.0:
   a) if any vertical openings in the building (ex. interconnected floor spaces, atria, elevators, escalators, etc.) are unprotected, consider the two largest adjoining floor areas plus 50% of all floors immediately above them up to a maximum of eight; or
   b) if all vertical openings and exterior vertical communications are properly protected in accordance with the National Building Code, consider only the single largest Floor Area plus 25% of each of the two immediately adjoining floors.

Automatic Sprinkler Protection

The required fire flow may be reduced by up to 50 percent for complete Automatic Sprinkler Protection depending upon adequacy of the system. Where only part of a building is protected by Automatic Sprinkler Protection, credit should be interpolated by determining the percentage of the Total Floor Area being protected by the automatic sprinkler system.

To be able to apply the full 50 percent reduction, the following areas should be reviewed to determine the appropriate level of credit for having Automatic Sprinkler Protection as per the table below:

Table 4 Sprinkler Credits

Automatic Sprinkler System Design	Credit	
	With complete building coverage	With partial building coverage of X%
Automatic sprinkler protection designed and installed in accordance with NFPA 13	30%	30% × Percentage of Total Floor Area Serviced by Sprinkler System
Water supply is standard for both the system and Fire Department hose lines	10%	10% × Percentage of Total Floor Area Serviced by Sprinkler System
Fully supervised system	10%	10% × Percentage of Total Floor Area Serviced by Sprinkler System

Exposure Adjustment Charge

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

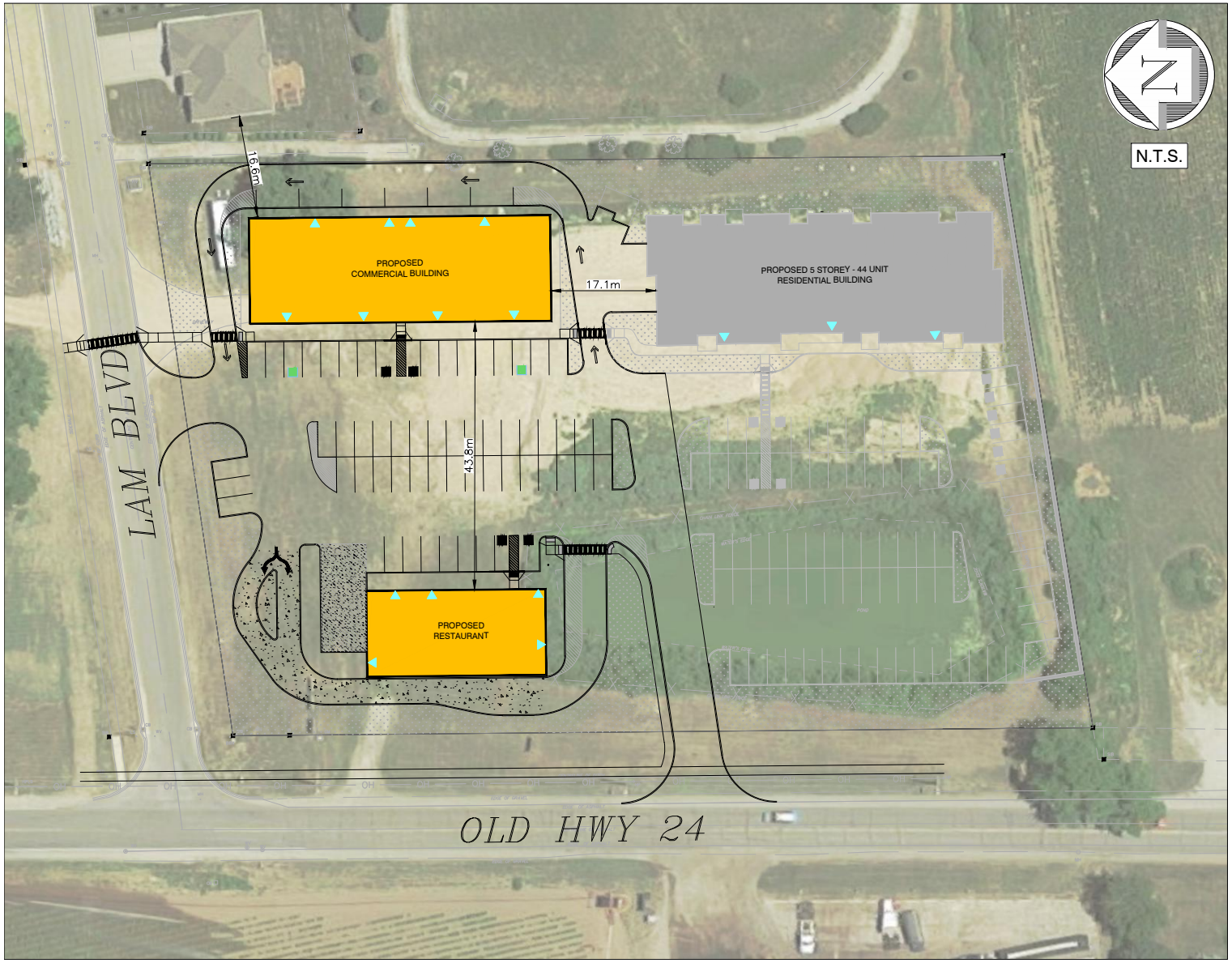
The maximum Exposure Adjustment Charge to be applied to a subject building is 75% when summing the percentages for all sides of the building. Table 5 outlines the maximum Exposure Adjustment Charge to apply for any one side of the subject building based on the following separation distances between the subject building and the exposed risk (aka. exposure):

Table 5 Exposure Charges

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

Table 6 Exposure Adjustment Charges for Subject Building considering Construction type of Exposed Building Face

Distance (m) to the Exposure	Length-height factor of exposing building face	Type V	Type III-IV[2]	Type III-IV[3]	Type I-II[2]	Type I-II[3]
0 to 3	0-20	20%	15%	5%	10%	0%
	21-40	21%	16%	6%	11%	1%
	41-60	22%	17%	7%	12%	2%
	61-80	23%	18%	8%	13%	3%
	81-100	24%	19%	9%	14%	4%
	Over 100	25%	20%	10%	15%	5%
3.1 to 10	0-20	15%	10%	3%	6%	0%
	21-40	16%	11%	4%	7%	0%
	41-60	17%	12%	5%	8%	1%
	61-80	18%	13%	6%	9%	2%
	81-100	19%	14%	7%	10%	3%
	Over 100	20%	15%	8%	11%	4%
10.1 to 20	0-20	10%	5%	0%	3%	0%
	21-40	11%	6%	1%	4%	0%
	41-60	12%	7%	2%	5%	0%
	61-80	13%	8%	3%	6%	1%
	81-100	14%	9%	4%	7%	2%
	Over 100	15%	10%	5%	8%	3%
20.1 to 30	0-20	0%	0%	0%	0%	0%
	21-40	2%	1%	0%	0%	0%
	41-60	4%	2%	0%	1%	0%
	61-80	6%	3%	1%	2%	0%
	81-100	8%	4%	2%	3%	0%
	Over 100	10%	5%	3%	4%	0%
Over 30 m	all sizes	0%	0%	0%	0%	0%


N
N.T.S.
16.6m
PROPOSED
COMMERCIAL BUILDING
17.1m
PROPOSED 5 STOREY - 44 UNIT
RESIDENTIAL BUILDING
LAM BLVD
43.8m
PROPOSED
RESTAURANT
OLD HWY 24

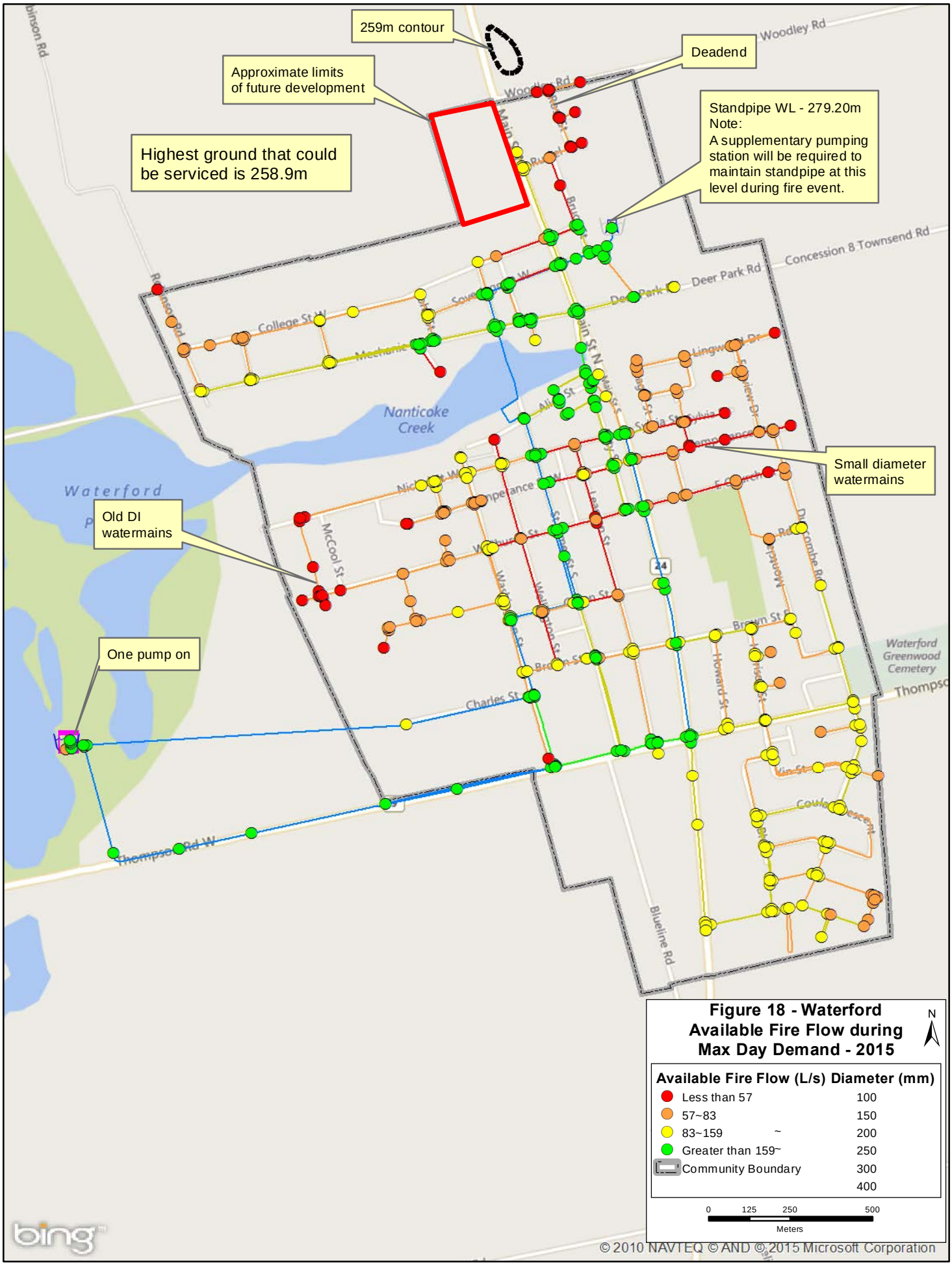


Figure 18 - Waterford Available Fire Flow during Max Day Demand - 2015

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Consulting Engineers,
Architects & Planners

March 1, 2024

Verlinda Homes
26 Main Street South PO Box 1152
Waterford, ON
N0E 1Y0

Attention: **Mr. Tom O'Hara**

Reference: **Stormwater Management Report**
Orchard Square Development
Waterford, Norfolk County
Our Project # 20-128

Introduction

This Stormwater Management (SWM) Report has been prepared on behalf of Verlinda Homes, in support of the site plan application for the proposed Orchard Square Development located at municipal address 750 Old Highway 24, on the southeast corner of Old Hwy 24 and Lam Boulevard in Waterford - Norfolk County. The proposed development site has been severed into two properties, and will be constructed in two phases, with Phase 1 including a four-unit commercial building, and a fast-food restaurant and Phase 2 includes a 5-storey, 44-unit residential mid-rise building. The following SWM strategy is a comprehensive plan for both parcels. It is the intention to submit this report to Norfolk County for review and approval of the proposed site plan.

The 1.31 ha development site is vacant land which features open grassed area and an irrigation pond. The sites are bound by Lam Boulevard to the north, old Highway 24 to the west, an existing subdivision and stormwater management pond to the east and agricultural land to the south. Refer to Figure 1 below.

Figure 1 - Site Location

Stormwater Management Design Criteria

Under pre-development conditions, the subject property is vacant land which features open grassed area and an irrigation pond. Stormwater runoff from the subject property drains uncontrolled, overland in a southwesterly direction towards Old Hwy 24.

As part of the Yin's Subdivision - Phase 5 Project (Vallee Project No. 10-034), a peak flow allowance of 0.015 m^3/s was allocated for the subject site as part of the storm sewer design along Old Highway 24. Refer to the 10-034 Yin's Subdivision - Phase 5 Stormwater Management Report in Appendix F for details.

Consequently, the design criteria for the proposed development are as follows:

- Quantity Control: Reduce or control the total post-development peak flow rates from the site to levels that do not exceed the 0.015 m^3/s flow allowance, for all storm events up to and including the 100-year storm event.
- Quality Control: Stormwater is to be treated to a Normal Protection Level as defined in the MOECC Ministry of Environment and Climate Change Design Manual - March 2003.

A Visual Otthymo computer model has been used to simulate the drainage areas under post-development conditions. The simulations were conducted using the 4-hour Chicago Distribution design storm of the 2-year, 5-year, 10-year, 25-year, 50-year and 100-year storm events. The Norfolk County rainfall IDF curve data has been used for the storm analysis using the parameters in Table 1 below.

Table 1
Norfolk County Rainfall IDF Parameters

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

Post Development Condition

The overall stormwater management quantity control strategy is to reduce the total post-development peak flow rates from the site to less than or equal to the allowable release rate of 0.015 m^3/s. To meet this objective, runoff from the proposed development will be detained in an underground storage facility, and released at a rate such that the peak flow allowance is not exceeded. Infiltration beneath the chamber facility will be utilized to decrease the required storage volume and promote groundwater infiltration. Minor and major storm events (2-year to 100-year storm) will be conveyed to the proposed SWM storage facility through a storm sewer network. Runoff released from the storage facility will be directed to the existing municipal 600mm diameter storm sewer along Old Highway 24. In addition, soakaway pits will be utilized to capture and infiltrate runoff from a small portion of the development on the east side of the property that can't be conveyed to the SWM facility.

The post-development drainage areas are shown in Drawing SWM – Stormwater Management Drainage Areas in Appendix A, and can generally be described as follows:

- Area A1: Approximately 1.12 ha of the development site. This area encompasses the majority of the development site. Flows from this area are conveyed to the underground SWM chamber facility via the proposed storm sewer network.
- Area A2: Approximately 0.08 ha of the development site. This area encompasses a portion of the site behind the proposed Phase 2 mid-rise residential building. Runoff from this area will be completely infiltrated by two proposed infiltration trenches.
- Area A3: Approximately 0.11 ha of the development site. This area encompasses the frontage along Old Highway 24 and a portion of the frontage along Lam Boulevard. Flows from this area will flow uncontrolled, overland towards Lam Boulevard and Old Highway 24 as they do under pre-development conditions.

Table 2 summarizes the site soil parameters and the post-development catchment input parameters for the Visual OTTHYMO computer model with complete details included in Appendix B and E. The model uses a modified SCS procedure to estimate losses that occur naturally during a rainfall event such as evaporation and infiltration.

Table 2
Visual Otthymo Model Input – Post-Development

Parameter	A1	A2	POST3
Area	1.12 ha	0.08 ha	0.11 ha
Soil Type	Sandy Textures over Gravelly Sand & Loamy Sand		
Hydrologic Soil Group	A		
SCS Curve Number	Pasture & Other Improved Land - 58		
Initial Abstraction	15.6 mm ($IA/S_{0.05}$ = 0.05, with $S_{0.05}$ = 1.33 * $S_{0.20}$^1.15 in inches and $S_{0.20}$ = 1000/CN-10 in inches)		
Longest Flow Path	N/A	5m	5m
Average Slope	N/A	4%	20%
Runoff Coefficient	N/A	0.25	0.30
Time to Peak	N/A	0.04 hr	0.02 hr
Impervious Percentage	92%	N/A	N/A
Directly Connected Impervious Percentage	92%	N/A	N/A

Infiltration Trenches

Two infiltration trenches/soakaway pits will be installed behind the mid-rise residential building in Phase 2 to capture and infiltrate runoff that cannot be conveyed to the underground SWM chamber facility. Infiltration basins provide not only water quantity benefits such as a reduced runoff volume, but also provide water quality benefits by promoting natural groundwater recharge. The depth of an infiltration basin is governed by the native soil infiltration rate, the porosity of the aggregate material used in the stone reservoir and the targeted time period to achieve complete drainage between storm events.

As presented in the Geotechnical Investigation completed by Soil -Mat Engineers & Consultants Limited (refer to Appendix C), the recommended native soil infiltration rate was determined to be 30 mm/hr. Applying a safety factor of 2.5, the design infiltration rate was taken as 12mm/hr. Therefore, the maximum allowable stone depth was determined to be 2.88m based on the design infiltration rate of 12 mm/hr, a void ratio of 0.4 and a drainage time of 96 hours, as defined in the Norfolk County Design Criteria (2012). Corresponding calculations are detailed in Appendix B. Using Visual OTTHYMO, the infiltration trenches in catchment area A2 were sized to infiltrate 100% of the runoff captured under all storm events up to and including the 100-year event. Table 3 outlines the storage capacity and drawdown time during the 100-year storm event for each proposed infiltration trench.

Table 3
Infiltration Trench Sizing & Drawdown

Soakaway Pit	Length (m)	Width (m)	Depth (m)	Storage Volume (m^3)	Drawdown Time (hr)
Soakaway #1	10.0	1.5	1.0	6.0	26.1
Soakaway #2	10.0	1.5	1.0	6.0	26.1

Stormwater Management Chamber Facility

An underground chamber system is proposed to provide stormwater storage, control post-development peak flow rates, and promote further infiltration. To determine the storage volume required in the proposed system, the relationship between the storage volume and the discharge is defined by a rating curve. This rating curve is determined by calculating the expected discharge from the facility based on the water level in the system and the proposed outlet control configuration.

Generally, orifices or weirs can control discharge from SWM facilities. Each of these control methods can be used by the singular control or they can be used in combination depending on the discharge characteristics desired. For this facility both a single orifice is proposed with the following equation used to estimate discharge:

Sharp-Crested Circular Orifice

$$Q = C * A * \sqrt{2 * g * h}$$

where: Q = Discharge in cms
C = constant, 0.63
A = orifice area in m^2
g = gravitational constant, 9.81 m/s^2
h = height above orifice, m

The proposed underground chamber system utilizes 133 StormTech MC-3500 chambers, with 14 end caps, a 500mm stone reservoir above the chambers and a 300mm stone reservoir below, resulting in a total storage volume of 777 m^3. Drawings and specifications for the proposed StormTech chamber facility are located in Appendix D. To control the release rate from the proposed facility, a single 75mm orifice at an elevation of 242.10m, will be installed in the outlet control structure. The complete discharge-to-storage rating curve is appended to this report as part of Appendix B.

Table 4 summarizes the total peak post-development runoff rates from the entire subject site found using Visual OTTHYMO and compares them to the allowable release rate for each storm event up to and including the 100-year storm event. The utilized storage volumes in the StormTech chamber facility and corresponding ponding elevations and drawdown times for each storm event are also presented in Table 4.

Table 4
Post-Development Flow Rates, Storage Volumes, Ponding Elevations & Drawdown

Event	Allowable Release Rate (cm/s)	Post-Development (cm/s)	Net Change (cm/s)	Utilized Storage Volume (cm)	Ponding Elevation (m)	Drawdown Time (hr)
2-year	0.015	0.000	-0.015	324	242.01	39.5
5-year		0.005	-0.010	443	242.24	49.7
10-year		0.007	-0.008	514	242.39	52.2
25-year		0.009	-0.006	611	242.63	54.8
50-year		0.011	-0.004	688	242.90	56.6
100-year		0.013	-0.002	765	243.19	58.1

As presented above, the total peak post-development flow rates from the entire site have been attenuated to less than or equal to the allowable release rate of 0.015 m^3/s, for all storm events up to and including the 100-year storm event. In addition, the drawdown time for each storm event is less than the maximum drawdown time of 96 hours specified in the Norfolk County Design Criteria. All corresponding calculations completed during the development of the Visual OTTHYMO model can be found in Appendix B and the results from the Visual OTTHYMO analysis are detailed in Appendix E.

Quality Control

Chamber Facility Quality Control

The selection of the level of water quality treatment is based on the proposed outlet for a SWM facility. For this site, the proposed outlet is the Old Highway 24 storm sewer, therefore a normal level of protection has been selected. The Ministry of the Environment Stormwater Management Planning and Design Manual defines a normal level of protection as the removal of 70% of the total suspended solids (TSS).

Quality control will be provided by the StormTech Isolator PLUS Row, which is a row of standard StormTech chambers surrounded by filter fabric. The isolator row creates a detention basin that allows water to egress through the surrounding filter fabric while sediment is trapped within. In addition, a flared end ramp is attached to the inlet pipe inside of the chamber end cap to provide a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance over time by distributing sediment and debris that would otherwise collect at the inlet.

Each MC-3500 isolator row chamber has an ETV-verified treated flow rate of 11.19 L/s corresponding to greater than 81% TSS removal. The proposed chamber facility features 19 isolator row chambers, which allows for a total treated inlet flow rate of approximately 213 L/s. Using Visual OTTHYMO, the maximum flow rate entering the chambers during the 25mm storm event (quality control event) was determined to be 143 L/s. Consequently, it can be concluded that the proposed chamber facility provides more than sufficient capacity to provide a normal level of water quality protection, corresponding to 70% TSS removal. The StormTech Isolator Row Sizing Chart can be found in Appendix B.

Inspection and maintenance are fundamental to the long-term performance of any stormwater quality treatment device. StormTech recommends that the chamber system be inspected annually at a minimum, and every six months for the first year of operation to determine the sediment accumulation rate. In subsequent years inspections can be based on observations or local requirements. The unit should be inspected immediately after an oil, fuel or chemical spill, and a licensed waste management company should remove oil and sediment for proper disposal.

Minimum Orifice Size
A minimum orifice of 75mm is recommended as per the MOE guidelines. For this facility, a 200m orifice is proposed.

Erosion and Sediment Control
During construction, the contractor is required to protect the worksite and all adjacent lands from sediment and erosion regardless of the source, to the satisfaction of all applicable parties. The measures installed by the contractor are to remain in place until such time as there is no further threat of damage and all vegetation is established. Measures that are to be put into place as an absolute minimum include silt fences, mud mats, and filter cloths over catch basins onsite.

Conclusions and Recommendations

Based on the review presented by this Stormwater Management Report, the comprehensive stormwater management design for the proposed development can be summarized as follows:

- Storm sewers will convey stormwater from the subject site to the proposed underground SWM chamber facility located in Phase 1 of the development.
- Runoff released from the SWM facility will be conveyed to the existing municipal 600mm diameter storm sewer along Old Highway 24.
- Two infiltration trenches in Phase 2 and infiltration beneath the chamber facility are used to reduce the required stormwater storage volume and promote groundwater infiltration.
- The underground storage chamber facility uses 133 StormTech MC-3500 chambers and has a total storage volume of 777 m^3.
- The required storage volume in the chamber facility ranges between 324 m^3 to 765 m^3 for the 2-year and 100-year storm events, respectively.
- Discharge from the chamber facility is controlled by a 75mm orifice at an elevation of 242.10m.
- The proposed stormwater management facility has sufficient volume to detain runoff such that discharge from the total post-development site is controlled to less than or equal to the allowable release rate of 0.015 m^3/s for all storm events up to and including the 100-year storm event.
- During events greater than the 100-year storm, runoff from the site will surcharge the SWM facility, and flow overland towards Old Highway 24 as it does under pre-development conditions.
- The proposed StormTech Isolator PLUS Row shall be utilized to achieve a normal level of water quality protection, corresponding to 70% TSS removal.

It is recommended that this report be provided to Norfolk County in support of the application for site plan approval of the proposed development.

We trust that this information is complete and sufficient for submission. Should you have any questions or require further information please do not hesitate to contact us.

Respectfully submitted,

Natalie Ongena, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

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Appendix A
– 20-128 DWG SWM – Stormwater Management Drainage Areas

Appendix B
– Soil Parameter Calculations
– Post-Development Parameters
– Rating Curve
– Post-Development Flows & Storage
– Quality Control
– Soakaway Sizing

Appendix C
– Soil Parameters
– Geotechnical Investigation Orchard Square
(Soil-Mat Engineers & Consultants Limited, December 20, 2021)

Appendix D
– ADS StormTech Chamber Drawings & Specifications

Appendix E
– Visual OTTHYMO Summary Outputs

Appendix F
– 10-034 Yin's Subdivision - Phase 5 Stormwater Management Report
(G. Douglas Vallee Engineering Limited, December 10, 2010)

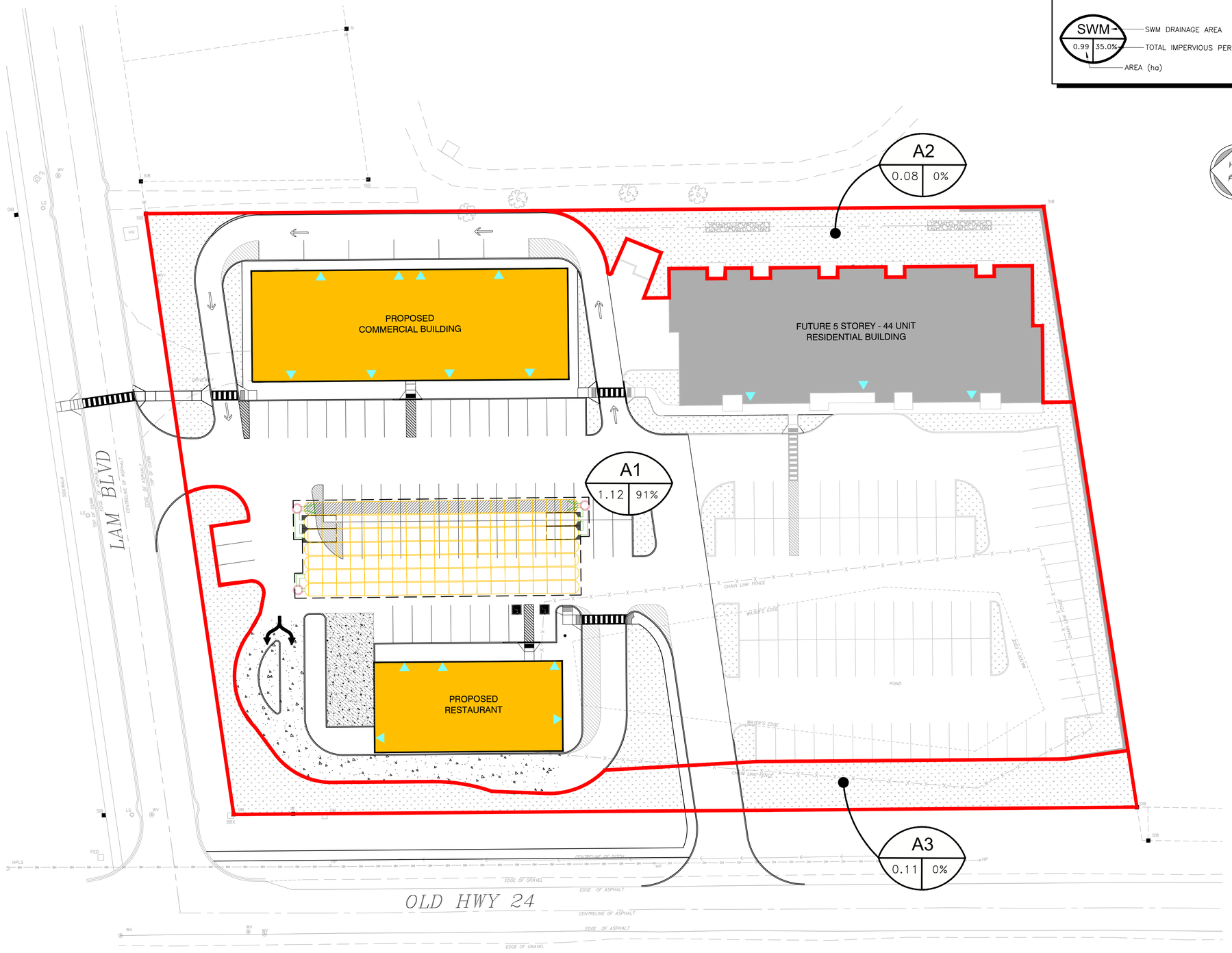
APPENDIX A

20-128 DWG SWM – Stormwater Management Drainage Areas

REV. No.	DATE	REVISION

LEGEND

- OVERLAND FLOW (MAJOR)
- CATHMENT BOUNDARY
- SWM — SWM DRAINAGE AREA
- 0.99 | 35.0% — TOTAL IMPERVIOUS PERCENTAGE (%)
- AREA (ha)



SCALE:
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HORIZONTAL : 1:300

vallee
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G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
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Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
STORMWATER MANAGEMENT
DRAINAGE AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : 2/27/2024
Drawing Scale : 1:300	Drawing No. SWM
Project No. 20-128	

DATE LAST PLOTTED : February 29, 2024

APPENDIX B

Soil Parameter Calculations
Post-Development Parameters
Rating Curve
Post-Development Flows & Storage
Quality Control
Soakaway Sizing

SOIL PARAMETERS

Soil Type	Sandy textures over gravelly sand & loamy sand	
Soil Group	A	
CN	58	Pasture & Other Improved Land
Initial Abstraction	16.5	mm

INFILTRATION PARAMETERS

Infiltration Rate (i)	30	mm/hr
Safety Factor	2.5	
Design Infiltration Rate	12	mm/hr
Design Infiltration Rate	0.012	m/hr
Void Ratio (Vr)	0.4	
Drainage Time (ts)	96	hr
Max allowable stone depth (drmax)	2.88	m

**Soil-Mat Engineers & Consultants Ltd. Geotechnical Investigation dated December 20th 2021*

POST-DEVELOPMENT AREA PARAMETERS:

Area Description	Area (ha)
Grass	0.28
Buildings	0.24
Roads/Parking/Sidewalks	0.79
Total Site	1.31

Drainage Area	Control?	Total Area (ha)	Impervious Area (ha)	TIMP (%)	Dir. Conn. Imperv. Area (ha)	XIMP (%)
A1	SWM Chambers	1.12	1.03	92%	1.03	92%

Drainage Area	Control?	Total Area (ha)	Runoff Coeff.	Drainage Length (m)	Slope (%)	Time of Concentration (min)	Time to Peak (0.6*tc) (hr)
A2	Infiltration Basin	0.08	0.25	5.00	4.0	3.92	0.04
A3	Uncontrolled	0.11	0.30	5.00	20.0	2.17	0.02

CHAMBERS PARAMETERS

Model	MC-3500	
Number of Chambers	133	
Number of End Caps	14	
Depth of Stone Above Chamber	500	mm
Depth of Stone Below Chambers	300	mm
Base of Stone Elev.	241.30	m
Base of Chamber Elev.	241.60	m
Height of Chambers	1143	mm
Top of Chamber Elv.	242.74	m
Top of Stone Elev.	243.24	m
Min. Cover (For Vehicles)	0.54	m
Min Surface Elev.	243.78	m
System Footprint	679.72	m2

ORIFICE PARAMETERS

Diameter	0.075	m
Area	0.0044	m2
Inv. Elev.	242.10	m
CL Elev.	242.14	m
Depth	0.80	m

$$Q = CA\sqrt{2gh}$$

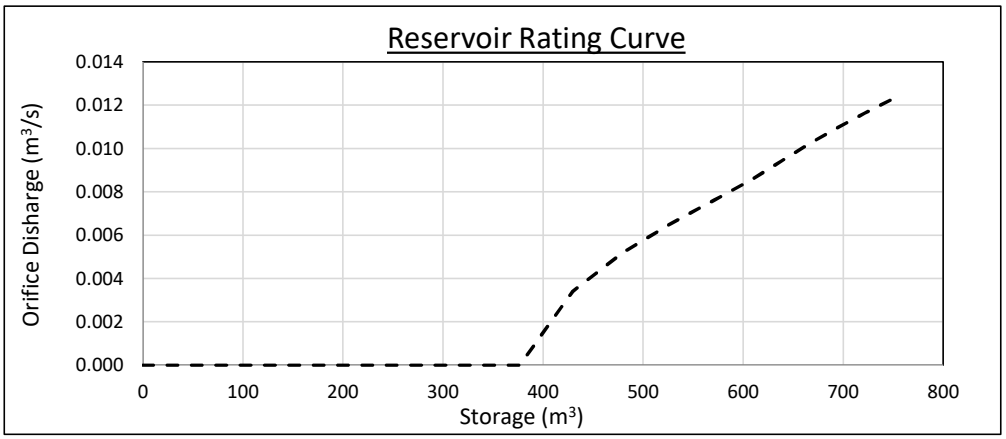
C = 0.63

**300mm Gran B, 150mm Gran A, 50mm base, 40mm surface*

STAGE-STORAGE-DISCHARGE

Description	Elevation (m)	Stage (mm)	Stage (m)	Volume (m3)	Height Above Invert (m)	Q (m3/s) Orifice 1
Base of Stone Storage	241.30	0	0.00	0	0.00	0.0000
	241.40	102	0.10	28	0.00	0.0000
	241.50	203	0.20	55	0.00	0.0000
Base of Chambers	241.61	305	0.31	91	0.00	0.0000
	241.71	406	0.41	150	0.00	0.0000
	241.81	508	0.51	209	0.00	0.0000
	241.91	610	0.61	266	0.00	0.0000
	242.01	711	0.71	322	0.00	0.0000
Orifice 1	242.11	813	0.81	377	0.00	0.0000
	242.21	914	0.91	430	0.08	0.0034
	242.32	1016	1.02	480	0.18	0.0052
	242.42	1118	1.12	528	0.28	0.0065
	242.52	1219	1.22	571	0.38	0.0076
	242.62	1321	1.32	609	0.48	0.0086
Top of Chambers	242.72	1422	1.42	639	0.58	0.0094
	242.82	1524	1.52	666	0.69	0.0102
	242.93	1626	1.63	694	0.79	0.0109
	243.03	1727	1.73	722	0.89	0.0116
	243.13	1829	1.83	749	0.99	0.0123
Top of Stone Storage	243.23	1930	1.93	777	1.09	0.0129

**Storage volumes obtained from OTTHYMO*



PRE TO POST FLOWS

Return Period	Q (m3/s)			Check
	Allowable	Total Post	Net	
2	0.015	0.000	-0.015	✓
5		0.005	-0.010	✓
10		0.007	-0.008	✓
25		0.009	-0.006	✓
50		0.011	-0.004	✓
100		0.013	-0.002	✓

STAGE-STORAGE-DISCHARGE

Description	Elevation (m)	Depth (m)	Volume (m^3)	Q (m3/s)
Base of Stone Storage	241.30	0.00	0	0.000
	241.40	0.10	28	0.000
	241.50	0.20	55	0.000
Base of Chambers	241.61	0.31	91	0.000
	241.71	0.41	150	0.000
	241.81	0.51	209	0.000
	241.91	0.61	266	0.000
	242.01	0.71	322	0.000
Orifice 1	242.11	0.81	377	0.000
	242.21	0.91	430	0.003
	242.32	1.02	480	0.005
	242.42	1.12	528	0.007
	242.52	1.22	571	0.008
	242.62	1.32	609	0.009
Top of Chambers	242.72	1.42	639	0.009
	242.82	1.52	666	0.010
	242.93	1.63	694	0.011
	243.03	1.73	722	0.012
	243.13	1.83	749	0.012
Top of Stone Storage	243.23	1.93	777	0.013

**Storage volumes obtained from OTTHYMO*

APPROXIMATE STORAGE & PONDING DEPTHS

Return Period	Storage (m)	Ponding Depth (m)	Elev. (m)	Drawdown Time (hr)
2	324	0.71	242.01	39.5
5	443	0.94	242.24	49.7
10	514	1.09	242.39	52.2
25	611	1.33	242.63	54.8
50	688	1.60	242.90	56.6
100	765	1.89	243.19	58.1

**Storage volumes obtained from OTTHYMO*

Water Quality Control Provided by Stormtech Isolator Row

Inflow to Chambers During 25mm Quality Storm Event	0.143	m^3/s
	143	L/s
Chamber Type	MC-3500	
Treated Flowrate / Isolator Row Chamber	11.19	L/s
Required Number of Isolator Row Chambers	13	
Provided Number of Isolator Row Chambers	19	
Provided Treated Flowrate	213	L/s ✓

StormTech
Detention • Retention • Water Quality
An ADS company

StormTech Isolator Row Sizing Chart

StormTech Isolator Row - Water Quality Flowrate for >81% TSS Removal							
	SC-160	SC-310	SC-740	DC-780	MC-3500	MC-4500	MC-7200
Chamber Bottom Area (m²)	1.06	1.64	2.58	2.58	3.99	2.80	4.65
Treated Flowrate / Chamber (L/s)	2.97	4.62	7.25	7.25	11.19	7.84	12.74

Notes:

- Results per ETV verified results, independently verifed by VerifiGlobal: https://www.verifiglobal.com/media/knubjbej/verifiglobal-verification-statement-for-stormtech-isolator-row-plus-final-2020-10-27-for-posting.pdf
- ETV verified treated flowrate = 4.13 GPM/ft² (2.80 L/s/m²)
- Above rates based on 81.2% removal of ETV/NJDEP particle size distribution.

Soakaway Sizing for Area POST3

Contributing Area	0.08	ha
Runoff from VO (100-YR)	11.683	mm
Volume Required	**9.35**	**m^3**

Soakaway Pit #1

Void Ratio	0.4	m
Soakaway Depth	1	m
Soakaway Width	1.5	m
Soakaway Length	10	m
Volume	6	m^3

Soakaway Pit #1

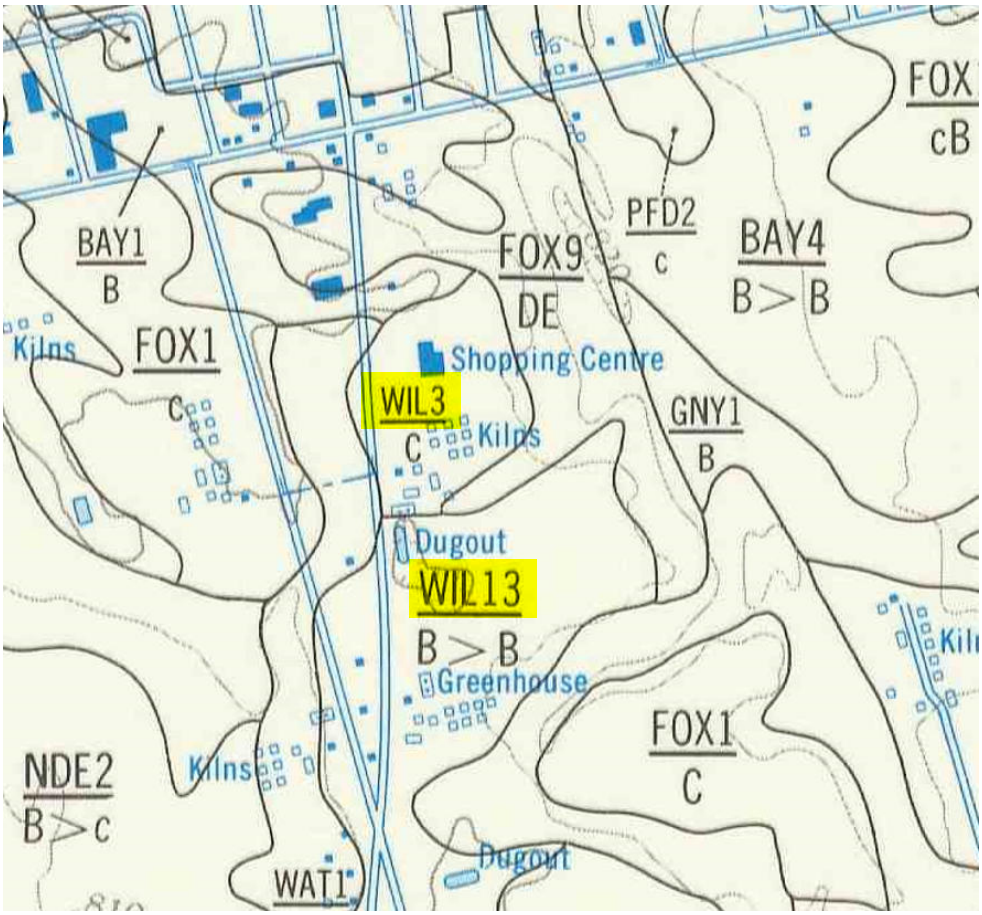
Void Ratio	0.4	m
Soakaway Depth	1	m
Soakaway Width	1.5	m
Soakaway Length	10	m
Volume	6	m^3

Total Provided Volume	**12**	**m^3**	✓
Drawdown Time	**26.1**	**hr**	< 96 hr OK.

APPENDIX C

Soil Parameters
Geotechnical Investigation Orchard Square
(Soil-Mat Engineers & Consultants Limited, December 20, 2021)

20-128 Soil Parameters



WIL - Wilsonville						
WIL 1	WIL	None	Mainly gravelly sandy till		Rapid to well	
WIL 3	WIL.C	None	15-40 cm sandy textures over gravelly sandy till		Rapid to well	
WIL 5	WIL	WIL.C	see WIL 1	see WIL 3	Rapid to well	Rapid to well
WIL 9	WIL.L	WIL	15-40 cm loamy textures over gravelly sandy till	see WIL 1	Rapid to well	Rapid to well
WIL 10	WIL.L	BRT	see WIL 9	see BRT 1	Rapid to well	Well
WIL 11	WIL.C	WIL	see WIL 3	see WIL 1	Rapid to well	Rapid to well
WIL 12	WIL.C	STD	see WIL 3	see STD 1	Rapid to well	Rapid to well
WIL 13	WIL.C	NDE	see WIL 3	see NDE 1	Rapid to well	Imperfect

NDE - Normandale					
NDE 1	NDE	None	Mainly loamy fine sand and fine sandy loam	Imperfect	

CHART C2-2 - HYDROLOGIC SOIL GROUPS FOR GENERAL SOIL TYPES

Sands, sandy loams, and gravels	
- overlying sand, gravel or limestone bedrock, very well drained	A
- ditto, imperfectly drained	AB
- Shallow, overlying precambrian bedrock or clay subsoil	B
Coarse loams	
- overlying sand, gravel or limestone, well drained	AB
- shallow, overlying precambrian bedrock or clay subsoil	B
Medium textured loams	
- shallow, overlying limestone bedrock	B
- overlying medium textured subsoil	BC
Silt loams, some loams	
- with good internal drainage	BC
- with slow internal drainage and good external drainage	C
Clays, clay loams, silty clay loams	
- with good internal drainage	C
- with imperfect or poor external drainage	C
- with slow internal drainage and good external drainage	D

Note: Soils are classified on the basis of bare soil having maximum swelling at the end of a long storm whose rainfall exceeds infiltration into soil. Classifications shown are subject to modification as experience dictates.

Classifications are based on S.C.S. definitions (9) modified to suit Ontario conditions.

CHART C2-8 - SOIL/LAND USE CURVE NUMBERS

Land Use	Hydrologic Soil Group						
	A	AB	B	BC	C	CD	D
Fallow (special cases only)	77	82	86	89	91	93	94
Crop and other improved land	66*	70	74	78	82	84	86
Pasture & other unimproved land	58*	62*	65	71	76	79	81
Woodlots and forest	50*	54*	58	65	71	74	77
Impervious areas (paved)		98					
Bare rock draining directly to stream		98					
Bare rock draining indirectly to stream		70					
Water surfaces		100	(use in special cases only)				

Notes

1. Figures are based on average antecedent moisture condition (AMC II) except those marked *, which are initially wet (AMC III) or an intermediate condition. For definition of AMC's see Chart C2-10.
2. Table is not applicable to frozen soils or to periods in which snowmelt contributes to runoff.
3. For detailed values in urban areas see Table 2.2 of ref. 14.
4. Source: SCS Handbook of Hydrology, Chapter 9 (9), with modifications.

CHART C2-9 - PERCENT IMPERVIOUSNESS OF URBAN AREAS

Urban Land Use	% Imperviousness
Business - Commercial	40 - 90
Industrial - Light	45 - 65
Industrial - Heavy	50 - 70
Residential - Low density	20 - 30
Residential - Medium density	25 - 35
Residential - High density	30 - 40

Source: SCS Handbook of Hydrology, Chapter 15 (9)

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PROJECT NO.: SM 302104-G December 20, 2021

2525228 ONTARIO LTD.
c/o Thomas O'Hara
Box 1152, 26 Main Street South
Waterford, Ontario
N0E1Y0

Attention: Thomas O'Hara

GEOTECHNICAL INVESTIGATION
ORCHARD SQUARE
OLD HIGHWAY 24 AND LAM BOULEVARD
WATERFORD, ONTARIO

Dear Mr. O'Hara

Further to your authorisation, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P302104, dated August 17, 2021. Our comments and recommendations based on our findings at the six [6] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a residential development located at the southeast corner of Old Highway 24 and Lam Boulevard in Waterford, Ontario. The development will consist of townhouses including the installation of underground municipal services, along asphalt paved roadways. It is understood that the stormwater management is likely to involve the use of an underground storage chamber system. The purpose of this geotechnical investigation work was to assess the subsurface soil and groundwater conditions, and to provide our comments and recommendations with respect to the design and construction of the proposed development, from a geotechnical point of view.

This report is based on the above summarised project description, and on the assumption that the design and construction will be performed in accordance with applicable codes and standards. Any significant deviations from the proposed project design may void the recommendations given in this report. If significant changes are made to the proposed design, this office must be consulted to review the new design with respect to the results of this investigation.

2. PROCEDURE

A total of six [6] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using continuous flight power auger equipment on November 3, 2021 under the direction of a staff member of SOIL-MAT ENGINEERS & CONSULTANTS LTD., to termination at depths of between approximately 3.7 and 6.7 metres below the existing ground surface.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using split barrel sampling equipment driven in accordance with the requirements of ASTM test specification D1586, Standard Penetration Resistance Testing. After undergoing a general field examination, the soil samples were preserved and transported to the SOIL-MAT laboratory for visual, tactile, and olfactory classifications. Routine moisture content tests were performed on all soil samples recovered from the borings. Selected samples were also subjected to laboratory grain size analyses.

Groundwater observations were made during the drilling operations. Upon completion of drilling, groundwater monitoring wells were installed at two [2] of the borehole locations. The monitoring wells consisted of 50-millimetre diameter PVC pipe, screened in the lower 1.5 metres. The monitoring wells were encased in well filter sand up to approximately 0.3 metres above the screened portion, then fitted with protective steel 'stick up' casings. The remaining boreholes were backfilled in general accordance with Ontario Regulation 903, and the ground surface was reinstated even with the existing grade.

Additionally, a total of three [3] selected samples of the subsurface soils recovered from the boreholes were submitted to AGAT Laboratories, an independent Canadian accredited analytical laboratory for background environmental testing. These samples were submitted for a standard panel of metal parameters, pH, and petroleum hydrocarbons [PHCs]. The purpose of this testing was to assess the background environmental characteristics of the subsurface soils for comparison to the relevant Standards under Ontario Regulation 406/19 [as amended] and provide preliminary comment regarding off-site disposal of surplus soil from the project. The results of this background analytical testing have been appended to the end of this report.

The boreholes were located in the field by representatives of SOIL-MAT ENGINEERS, based on accessibility over the site and clearance of underground utilities. The ground surface elevation at the borehole locations has been referenced to a site-specific temporary benchmark, described as the manhole cover at the southeast corner of the intersection of Old Highway 24 and Lam Boulevard, at the northwest corner of the

property, as illustrated in the attached Drawing No. 1, Borehole Location Plan. This benchmark has been assigned an elevation of 100.0 metres for convenience.

Details of the conditions encountered in the boreholes, together with the results of the field and laboratory tests, are presented in Log of Borehole Nos. 1 to 6, inclusive, following the text of this report. It is noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design and therefore should not be construed at the exact depths of geological change.

3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is located at the southeast corner of the intersection of Old Highway 24 and Lam Boulevard in Waterford, Ontario, and is currently occupied by a pond, a dirt driveway and parking area. The site is bound to the west by Old Highway 24, to the north Lam Boulevard, to the south by a single family dwelling and an agricultural field, and to the east by a walking trail and a residential development. The site is relatively flat, roughly level with Old Highway 24, with an overall topographic relief of approximately 1 metre based on the borehole elevations.

The subsurface conditions encountered at the borehole locations are summarised as follows:

Topsoil

A surficial veneer of topsoil approximately 250 to 350 millimetres in thickness was encountered at all borehole locations. It is noted that the depth of topsoil may vary across the site and from the depths encountered at the borehole locations, and a conservative approach should be taken in estimating topsoil quantities across the site. It is also noted that the term ‘topsoil’ has been used from a geotechnical point of view, and does not necessarily reflect its nutrient content or ability to support plant life.

Sand Fill

Sand fill was encountered beneath the topsoil at Borehole Nos. 1, 2, and 3. The sand fill soils were brown in colour with organic staining in the upper levels, contained trace clay, trace to some silt with occasional cobbles, and were generally in a loose condition. The sand fill was proven to depths of approximately 1.8 in Borehole No. 3, and to

approximately 4.1 metres in Borehole Nos. 1 and 2, however greater depths of fill material may be present across the site.

Sand

Native sand was encountered beneath the topsoil and/or the fill deposits at all borehole locations. The native fine grained soils were brown in colour, contained trace to some silt, clay and gravel. The soils were generally in a compact condition, and 'wet' between approximately 3.5 to 4.5 metres. The native sand was proven to terminations at depths between 3.7 to 6.7 metres below the existing ground surface at all borehole locations.

It is noted that due to the granular nature of the fill and native soils encountered, the transition from sand fill to native sand is somewhat indistinct. As such, some material identified as fill may in fact be loose or disturbed native soils. Conversely, some material identified as native soils may in fact be well compact fill.

Grain Size Analyses

Grain size analyses were conducted on four [4] selected samples of the native soils recovered from the boreholes. The results of this grain size testing can be found appended to the end of this report, and are summarized as follows:

Sample ID	Depth	% Clay	% Silt	% Sand	% Gravel	Hydraulic Conductivity, k [cm/s]	Estimated Infiltration Rate, [mm/hr]
BH1 SS4	2.3 m	8	11	81	0	10^{-5}	30 to 40
BH1 SS6	4.6 m	3	11	80	6	10^{-4}	50 to 75
BH5 SS5	3.0 m	2	6	70	22	10^{-3}	100 to 150
BH7 SS3	1.5 m	3	9	88	0	10^{-3}	50 to 75

The results of the lab testing indicate the soils to consist predominately of sand, with trace clay, and trace to some silt and gravel. These soils are relatively permeable, with hydraulic conductivities on the order of 10^{-3} to 10^{-5} cm/sec. According to the Unified Soil Classification System (USCS), the soils are classified as S.M. – sand silt mixtures to S.P. – poorly graded sands or S.W. – well graded sands, gravelly sands little or no fines, or S.W. – well graded sands. These results of consistent with our observations of the soils during drilling and visual assessment of the recovered samples. These soils would generally be considered suitable for low impact development (LID) stormwater management systems. As in-situ infiltration rates vary with compaction, silt, and clay content, it is recommended that a conservative approach be taken for preliminary design of such LID stormwater management systems such as infiltration galleries/trenches,

considering a design of 30 mm/hr across the site. If the use of greater infiltration rates would be beneficial to the project, in-situ testing may be conducted at specific locations and depths of proposed galleries/trenches.

A review of available published information [Quaternary Geology of Ontario, Southern Sheet Map 2556] indicate the subsurface soils to consist of coarse-textured glaciolacustrine deposits of sand, gravel, with minor silt and clay. These conditions are consistent with our observations during drilling and experience in the area, encountering predominately fine grained granular soils with trace silt and clay.

Groundwater Observations

Borehole Nos. 1, 2, 3, 4, and 5 were noted to be open and 'wet' at a depths between 3.5 to 4.6 metres, while Borehole No. 6 was open and 'dry' upon completion of drilling. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes. As noted above, Borehole Nos. 1, and 2 were fitted with monitoring wells to allow for future measurements of the groundwater level. Measurements of the water level at the monitoring well locations were taken at two separate occasions, summarised as follows:

Borehole No.	Ground Surface Elevation (m)	November 25, 2021		December 2, 2021	
		Groundwater Depth (m)	Groundwater Elevation (m)	Groundwater Depth (m)	Groundwater Elevation (m)
BH1/MW1	100.02	3.40	96.62	3.40	96.62
BH2/MW2	100.85	4.09	96.76	4.09	96.76

It is noted that the elevations noted above are based on reference to a temporary benchmark with an assumed elevation of 100.00 metres. These elevations may be corrected once the geodetic elevation of the benchmark has been established.

Based on the measurements at the monitoring well locations, the groundwater level is estimated at depths of 3.5 to 4 metres, at an elevation of roughly 96.5 to 97.0 metres below the ground surface, and would be expected to fluctuate seasonally. Based on the time of year of the groundwater measurements, this may be more indicative of a seasonal 'high'.

4. EXCAVATIONS

Excavations for the installation of foundations and underground services are anticipated to extend to depths of up to approximately 2 to 4 metres below the existing grade. Excavations through the fill materials and native sand would be expected to remain stable at inclinations of up to 45 degrees to the horizontal. Where wet sand seams are encountered, during periods of extended precipitation, or where excavations extend below the static groundwater level, the sides of excavations should be expected to 'slough in' to as flat as 3 horizontal to 1 vertical, or flatter. Where excavations extend below the ground water level or during the 'wet' times of the year, greater dewatering efforts should be anticipated, as well as increased excavation instability, and the contractor should expect to work in the 'wet'. Nevertheless, all excavations must comply with the current Occupational Health and Safety Act and Regulations for Construction Projects. The native sand soils encountered would be considered a Type 3 soil, as outlined in the Ontario Health and Safety Act III – Excavation. Excavation slopes steeper than those required in the Safety Act must be supported and a senior geotechnical engineer from this office should monitor the work.

As noted above the groundwater level is estimated at depths of approximately 3.5 to 4 metres, generally below the anticipated depths of construction, however some deeper excavations may extend near to below this level. Nevertheless, above the groundwater level, some infiltration of water from more permeable seams and surface runoff into the open excavations should be anticipated, however should be readily controlled using typical construction dewatering techniques for excavations above the groundwater level. Where excavations extend below the static groundwater level, increased excavation instability and groundwater infiltration should be expected. Significant infiltration of water should be expected for excavations extending below depths of about 4 metres, and as noted above, the contractor should be prepared to work in the 'wet'. It may be prudent to advance a series of test excavations in any areas of proposed deep excavations to assess first hand how groundwater levels may affect excavations operations. Surface water should be directed away from the excavations.

The base of the excavations in the native fine grained granular soils encountered in the boreholes should generally remain firm and stable above the groundwater level. Where excavations extend near to below the static groundwater level, during the 'wet' times of the year, or where left exposed to elements for extended periods of time, stabilisation of excavation bases may be required. Such stabilisation efforts may include sub-excavation of unsuitable materials, additional bedding, or 'punching' in coarse granular material or 'rip rap'. Stabilised where required, standard pipe bedding material as specified by the Ontario Provincial Standard Specification [OPSS] or Norfolk County should be satisfactory. The bedding should be well compacted to provide sufficient

support to the pipes and components (i.e. valve chambers, manholes etc.), and to minimize settlements of the roadway above the service trenches. Special attention should be paid to compaction under the pipe haunches.

We recommend that the invert elevations of any storm sewer pipes for rear yard catch basins be located above the proposed underside of footing elevations of adjacent residential structures, or that the trench excavations should be filled with 5 MPa 'lean mix' concrete product to the proposed underside of footing level where the excavations extend below an imaginary 10 horizontal to 7 vertical line extending outwards and down from a point 0.3 metres beyond the proposed townhouse foundations.

Any utility poles, light poles, etc. located within 3 metres of the top of an excavation slope should be braced to ensure their stability. Likewise, temporary support might be required for other existing above and below ground structures, including existing underground services, roadways, etc. depending on their proximity to the trench excavations.

5. BACKFILL CONSIDERATIONS

The excavated material will consist predominately of the fill and native sand soils encountered in the boreholes as described above. These soils are generally considered suitable for use as engineered fill, trench backfill, etc., provided that they are free of organics, construction debris, or other deleterious material, and that its moisture content can be controlled to within 3 per cent of its standard Proctor optimum moisture content.

It is noted that while moderately free draining, the on-site sandy soils encountered should not considered to be free draining and should not be used where this characteristic is necessary without additional assessment and testing. It is also noted that these fine grained soils will present difficulties in achieving effective compaction where access with compaction equipment is restricted. The on-site soils encountered are generally considered to be near to slightly 'dry' of their standard Proctor optimum moisture content. Some moisture conditioning may be required depending upon the weather conditions at the time of construction. It is noted that these soils will become nearly impossible to compact when wet of its optimum moisture content. Any material that becomes wet to saturated should be spread out to allow to dry, or removed and discarded, or utilised in non-settlement sensitive areas.

We note that where backfill material is placed near or slightly above its optimum moisture content, the potential for long term settlements due to the ingress of groundwater and collapse of the fill structure is reduced. Correspondingly, the shear

strength of the 'wet' backfill material is also lowered, thereby reducing its ability to support construction traffic and therefore impacting roadway construction. If the soil is well dry of its optimum value, it will appear to be very strong when compacted, but will tend to settle with time as the moisture content in the fill increases to equilibrium condition. The fine grained soils encountered may require high compaction energy to achieve acceptable densities if the moisture content is not close to its standard Proctor optimum value. It is therefore very important that the moisture content of the backfill soils be within 3 per cent of its standard Proctor optimum moisture content during placement and compaction to minimise long term subsidence [settlement] of the fill mass. Any imported fill required in service trenches or to raise the subgrade elevation should have its moisture content within 3 per cent of its optimum moisture content and meet the necessary environmental guidelines.

A representative of SOIL-MAT should be present on-site during the backfilling and compaction operations to confirm the uniform compaction of the backfill material to project specification requirements. Close supervision is prudent in areas that are not readily accessible to compaction equipment, for instance near the end of compaction 'runs'. In the event that site grading activities result in the placement of engineered fill below founding level, all structural fill should be compacted to 100 per cent of its standard Proctor maximum dry density [SPMDD]. Backfill within service trenches, areas to be paved, etc., should be placed in loose lifts not exceeding 300 millimetres in thickness and compacted to a minimum of 98 per cent of its SPMDD. The appropriate compaction equipment should be employed based on soil type, i.e. pad-toe for cohesive soils and smooth drum/vibratory plate for granular soils. A method should be developed to assess compaction efficiency employing the on-site compaction equipment and backfill materials during construction.

It is understood that the existing pond at the southwest corner of the property will be filled as part of site development. Care will be required to ensure that all saturated, organic, or otherwise unsuitable soils are removed from the base of the pond and the based assessed by a representative of SOIL-MAT ENGINEERS prior to placement of engineered fill. Depending on the depth of the pond, the contractor may encounter difficulties completely removing all of the water from the pond. If feasible, draining of the pond and placement of engineered fill in this area should be conducted during the dry summer months. The pond should be filled with a quality engineered fill compacted in accordance with the requirements noted above with monitoring and testing by a representative of SOIL-MAT ENGINEERS on a full time basis. It is understood it is proposed to make used of a crushed concrete product as engineered fill to fill the pond. This material should be crushed down into a well graded granular material and assessed by our office prior to its acceptance and use as engineered fill.

6. MANHOLES, CATCH BASINS AND THRUST BLOCKS

Properly prepared bearing surfaces for manholes, valve chambers, etc. in the native competent soils or engineered fill, stabilised where required, will be practically non-yielding under the anticipated loads. Proper preparation of the founding soils will tend to accentuate the protrusion of these structures above the pavement surface if compaction of the fill around these structures is not adequate, causing settlement of the surrounding paved surfaces. Conversely, the pavement surfaces may rise above the valve chambers and around manholes under frost action. To alleviate the potential for these types of differential movements, free-draining, non-frost susceptible material should be employed as backfill around the structures located within the paved roadway limits, and compacted to 100 per cent of its standard Proctor maximum dry density.

The thrust blocks in the native soils or quality engineered fill may be conservatively sized as recommended by the applicable Ontario Provincial Standard Specification conservatively using a horizontal allowable bearing pressure of up to 150 kPa [~3,000 psf]. Any backfill required behind the blocks should be a well-graded granular product and should be compacted to 100 per cent of its standard Proctor maximum dry density.

7. PAVEMENT STRUCTURE DESIGN CONSIDERATIONS

All areas to be paved must be cleared of all organic and otherwise unsuitable materials, and the exposed subgrade proof rolled with 3 to 4 passes of a loaded tandem-axle truck in the presence of a representative of SOIL-MAT ENGINEERS & CONSULTANTS LTD., immediately prior to the placement of the sub-base material. Any areas of distress revealed by this or other means should be subexcavated and replaced with suitable backfill material. Where the subgrade condition is poorer it may be necessary to implement more aggressive stabilisation methods, such as the use of coarse aggregate [50-millimetre clear stone, ‘rip rap’, etc.] ‘punched’ into the soft areas.

Good drainage provisions will optimise the long-term performance of the pavement structure. The subgrade must be properly crowned and shaped to promote drainage to the subdrain system. Subdrains should be installed to intercept excess subsurface water and to prevent softening of the subgrade material. Surface water should not be allowed to pond adjacent to the outer limits of the paved areas.

The most severe loading conditions on the subgrade typically occur during the course of construction, therefore precautionary measures may have to be taken to ensure that the subgrade is not unduly disturbed by construction traffic. SOIL-MAT should be given the

opportunity to review the final pavement structure design and subdrain scheme prior to construction to ensure that they are consistent with the recommendations of this report.

If construction is conducted under adverse weather conditions, additional subgrade preparation may be required. During wet weather conditions, such as during the fall and spring months, it should be anticipated that additional subgrade preparation will be required, such as additional depth of Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed bedrock) sub-base material. It is also important that the sub-base and base granular layers of the pavement structure be placed as soon as possible after exposure, preparation and approval of the subgrade level.

The proposed roadways through the residential subdivision would be required to adequately support cars, trucks and intermittent delivery and garbage trucks. Where roadways are to be assumed by Norfolk County, they should conform to Norfolk County's pavement design requirements, understood to consist of 300 millimetres of OPSS Granular 'B', Type II (crushed bedrock) sub-base course, 150 millimetres of OPSS Granular 'A' base course, 50 millimetres of HL8 binder course asphaltic concrete, and 40 millimetres of HL3 surface course asphaltic concrete for local roads. This is considered a suitable pavement structure for the proposed development, provided the subgrade is good and firm prior to the placement of granular sub-base layers. If the subgrade is soft, remedial measures as discussed above may have to be implemented and/or the sub-base thickness may have to be increased. It is noted that a pit run sand and gravel Granular B Type I may be considered based on local availability. This would be considered an acceptable, cost effective alternative to a fully crushed Granular B Type II (crushed bedrock), however if utilised, the depth of Granular B Type I should be increased to a minimum of 400 millimetres. The granular sub-base and base courses and asphaltic concrete layers should be compacted to OPSS or Norfolk County requirements. A program of in-place density testing must be carried out to monitor that compaction requirements are being met. We note that this pavement structure is not to be considered as a construction roadway design.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during placement and compaction. All too often, significant temperature gradients exist in the delivered and placed asphalt with the cooler portions of the mat resisting compaction and presenting a honeycomb surface. As the spreader moves forward, a responsible member of the paving crew should monitor the pavement surface, to ensure a smooth uniform surface. The contractor can mitigate the surface segregation by 'back-casting' or scattering shovels of the full mix material over the segregated areas and raking out the coarse particles during compaction operations. Of course, the above assumes that the asphalt mix is sufficiently hot to allow the 'back-casting' to be performed.

Asphalt paving of driveways should be consistent with the general recommendations provided above. Proper preparation of the subgrade soils is essential to good long-term performance of the pavement. Likewise, sufficient depth and compaction of granular base materials and adequate drainage will be important in achieving good long-term performance, i.e. preventing/limiting premature cracking, subgrade failure, rutting, etc. It is understood that the Norfolk County standards indicate residential driveways to consist of a minimum of 150 millimetres of OPSS Granular 'A' base course, compacted to 100 percent standard Proctor maximum dry density, followed by a minimum of 50 millimetres of HL3 or HL3F asphaltic concrete, compacted to a minimum of 92 per cent of their Marshall maximum relative density [MRD].

8. HOUSE AND TOWNHOUSE CONSTRUCTION

The native soils encountered at the borehole locations are considered capable of supporting the loads associated with typical residential dwelling and townhouse structures on conventional spread footings, below any fill, organic, or otherwise unsuitable materials. This typically considers a nominal design bearing pressure of 75 kPa [~1,500 psf], however bearing pressures of up to 150 kPa [~3,000 psf] SLS and 225 kPa [~4,500 psf] ULS may be considered in the competent native soils, however it is not anticipated that such higher bearing values are required for the proposed development. The founding surfaces must be hand cleaned of any loose or disturbed material, along with any ponded water, immediately prior to placement of foundation concrete. Depending on the condition of the soil present at the founding level at the time of construction, depth of fill materials encountered, etc., some sub-excavation of unsuitable soils may be required.

In the event that site grading works or the remediation of existing unsuitable fill deposits require the placement of engineered fill below the founding elevations of the proposed structures, the general recommendations presented in the Backfill Considerations above should be strictly adhered to, with compaction to 100 per cent of its SPMDD, verified by monitoring and testing by a representative of SOIL-MAT ENGINEERS present on a full time basis. If there is a short fall in the volume of fill required, then the source of imported fill should be reviewed for gradation, Proctor value, compatibility with existing fill, environmental characteristics and be approved by this office prior to use. On a preliminary basis the design bearing capacity for footings within the engineered fill should be limited to 100 kPa [~2,000 psf] SLS and 150 kPa [~3,000 psf] ULS, pending confirmation based on monitoring and testing of the engineered fill works.

The support conditions afforded by the native soils and/or engineered fill are generally not uniform across the building footprint, nor are the loads on the various foundation elements. As such it is recommended that consideration be given to the provision of nominal reinforcement in the footings and foundation walls to account for variable support and loading conditions. The use of nominal reinforcement is considered good construction practice as it will act to reduce the potential for cracking in the foundation walls due to minor settlements, heaving, shrinkage, etc. and will assist in resisting the pressures generated against the foundation walls by the backfill. Such nominal reinforcement is an economical approach to the reduction and prevention of costly foundation repairs after completion and later in the life of the buildings. This reinforcement would typically consist of two continuous 15M steel bars placed in the footings [directly below the foundation wall], and similarly two steel bars placed approximately 300 millimeters from the top of the foundation walls at a minimum, depending on ground conditions exposed during construction. These reinforcement bars would be bent to reinforce all corners and under basement windows, and be provided with sufficient overlap at staggered splice locations. At 'steps' in the foundations and at window locations, the reinforcing steel should transition diagonally, rather than at 90 degrees, to maintain the continuous tensile capacity of the reinforcement. Where footings are founded on, or partially on, engineered fill the above provision for nominal reinforcement would be required.

All basement foundation walls should be suitably damp proofed, including the provision of a 'dimple board' type drainage product, and provided with a perimeter drainage tile system outlet to a gravity sewer connection or positive sump pit a minimum of 150 millimetres below the basement floor slab. The clear stone material surrounding the weeping tile should be encased with a geotextile material to prevent the migration of fines from the foundation wall backfill into the clear stone product. In the event that sump pit systems are required we would recommend that the sump pump system should be constructed with an 'oversized' reservoir and a 'back-flow' prevention valve so that the sump pump will not cycle repeatedly within short time periods.

All footings exposed to the environment must be provided with a minimum of 1.2 meters of earth or equivalent insulation to protect against frost penetration. This frost protection would also be required if construction were undertaken during the winter months. All footings must be proportioned to satisfy the requirements of the Ontario Provincial Building Code.

It is imperative that a soils engineer be retained from this office to provide geotechnical engineering services during the excavation and foundation construction phases of the project. This is to observe compliance with the design concepts and recommendations

outlined in this report, and to allow changes to be made in the event that subsurface conditions differ from the conditions identified at the borehole locations.

9. ENVIRONMENTAL CONSIDERATIONS

As noted above, selected samples of the subsurface soils recovered from the boreholes were submitted to AGAT Laboratories, an independent Canadian accredited analytical laboratory for background analytical testing. Three [3] selected samples of the samples recovered from the boreholes [identified as BH1 SS3, BH3 SS1, and BH4 SS3] were submitted for background analytical testing consisting of a standard panel of metal and inorganics, and petroleum hydrocarbons [PHCs]. The purpose of this testing was to provide preliminary comments with respect to the off-site disposal of surplus soil during construction. The results of this testing are presented in the attached AGAT Certificates of Analysis [21T825888]. The results of this analytical testing has been appended to the end of this report.

The laboratory test results received in our office were compared to the applicable standard from the Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*, as follows:

- **Table 1**: Full Depth Background Site Condition Standards.
- **Table 2.1**: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition for a Residential/ Parkland/ Institutional property use, [RPI], as well as for an Industrial/ Commercial/ Community [ICC] property use.
- **Table 3.1**: Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition for a Residential/ Parkland/ Institutional property use, [RPI], as well as for an Industrial/ Commercial/ Community [ICC] property use.

Based on SOIL-MAT ENGINEERS' field observations and the analytical test results from AGAT, SOIL-MAT ENGINEERS has the following comments to offer:

1. The sampled material was found to meet the Table 1 [RPI/ICC] Standards for all parameters tested.
2. The submitted samples were found to meet the Table 2.1 and 3.1 [RPI] Standards for the tested parameters.
3. The submitted samples were found to meet the Table 2.1 and 3.1 [ICC] Standards for the tested parameters.

4. The samples secured for analytical testing are believed to be representative of the soil conditions at the borehole locations only. If any significant changes are noted, i.e., odours, staining etc., SOIL-MAT should be contacted to reassess the environmental characteristics of the soil.

Given the above test results the following disposal options are applicable under Regulation 406/19, as amended:

- As the tested material has been shown to meet the Table 1 [RPI/ICC] Standards, surplus material may reasonably be accepted at an off-site Table 1 property, including a property subject to a Record of Site Condition or MECP Certificate of Authorisation, subject to approval of the receiving property owner or designated Qualified Person [QP].
- As the test results for the submitted sample was found to meet the Table 2.1 and 3.1 [RPI] Standards, surplus materials may reasonably be accepted at an off site RPI property in a potable or non-potable groundwater conditions, subject to approval of the receiving property owner/QP;
- As the sampled material was found to meet the Table 2.1 and 3.1 [ICC] Standards, surplus material may reasonably be accepted at an off-site ICC property in a potable or non-potable groundwater condition, subject to approval of the receiving property owner/QP.
- Depending on the volume of surplus soil to be handled, as well as the environmental requirements of the receiving site, additional testing may be required.
- Excavated soil may be reused on site.

10. SOIL IMPORT/EXPORT CONSIDERATIONS

It is anticipated that the proposed development will require import of some volume of soil as part of grading activities, filling the existing pond with engineered fill, etc. Ontario Regulation has recently come into effect, which governs the management of excess soils during construction. Where soil import is required, the import operations would require strict monitoring and control via the implementation of a Fill Management Plan, including pre-screening of potential source sites.

In the event that site development requires export of some volume of surplus soil from the site as part of grading activities, foundation construction etc. the management of excess soils requires the developer to conduct an assessment of the subject site, along with rigorous sampling and analysis based, based on volume of surplus soil generated, to support acceptance at an off-site location. Such testing can be conducted once development details have been finalised, based on volume of surplus soils to be generated, as well as the results of the Assessment of Past Uses, or a Phase One ESA, if available. Regardless of import or export volumes, SOIL-MAT ENGINEERS may be retained to provide such services, to ensure the operations are conducted in accordance with Ontario Regulation 406/19.

11. GENERAL COMMENTS

The comments provided in this document are intended only for the guidance of the design team. The material in it reflects SOIL-MAT ENGINEERS' best judgement in light of the information available at the time of preparation. The subsurface descriptions and borehole information are intended to describe conditions at the borehole locations only. It is the contractors' responsibility to determine how these conditions will affect the scheduling and methods of construction for the project. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. SOIL-MAT ENGINEERS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that this geotechnical report is sufficient for your present requirements. Should you require any additional information or clarification as to the contents of this document, please do not hesitate to contact the undersigned.

Yours very truly,
SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Evan Chambers, B.Eng., EIT.

Kyle Richardson, P. Eng.
Project Engineer

Enclosures: Drawing No. 1, Borehole Location Plan
Log of Borehole Nos. 1 to 6, inclusive
Drawing No. 2, Recommended Design Requirements for Basement Construction
AGAT Certificate of Analyses [21T825888]

Distribution: 2525228 Ontario Ltd [1, plus pdf]

LEGEND

BH# Borehole Location

TBM Temporary Benchmark
Top of manhole cover.
Assigned Elevation of 100.00 metres

NOTES

1. This drawing should be read in conjunction with Soil-Mat Engineers & Consultants Ltd. Report No. SM 302104-G.

2. Proposed Borehole locations are approximate and Subject to change.

SOIL-MAT
ENGINEERS & CONSULTANTS LTD.

Proposed Townhouse Development
Old Highway 24 & Lam Boulevard
Waterford, Ontario

Proposed Borehole Location Plan

Project No. SM 302104-G

Date: November 2021

Drawn: NS

SM 302104-G Borehole Location Plan

Drawing No. 1

Log of Borehole No. 01

Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752173
E: 558186

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	100.02	Ground Surface								
0 / 0	99.70	**Topsoil** Approximately 300 millimetres of topsoil.								
1 / 0 – 4 / 1		**Sand Fill** Brown, some organic staining in the upper levels, trace silt, trace clay, very loose to loose.		SS	1	3,3,4,5	7			
				SS	2	2,1,1,2	2			
6 / 2				SS	3	2,2,4,3	6			
9 / 3				SS	4	2,1,1,1	2			
11 / 3				SS	5	1,1,1,1	2			
13 / 4	95.90	**Sand** Brown, wet below this depth, trace gravel, trace silt, trace clay, very loose to compact.								
16 / 5				SS	6	6,11,11,12	22			
20 / 6				SS	7	4,5,6,9	11			
22 / 7	93.30	End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on November 3, 2021 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 4.6 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

November 25: 3.40 metres below ground surface.

Drill Method: Hollow Stem Augers
Drill Date: November 3, 2021
Hole Size: 200 Millimetres
Drilling Contractor: Elements Geo

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Sheet: 1 of 1

Log of Borehole No. 02

Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752096
E: 558262

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
	100.85	Ground Surface								
0 / 0	100.50	**Topsoil** Approximately 300 millimetres of topsoil.								
		Sand Fill Brown, some organic staining in the upper levels, trace silt, trace clay, trace cobbles, very loose.		SS	1	3,1,1,1	2			
1 / 0				SS	2	50/1"	100			
2 / 1				SS	3	3,3,2,2	5			
3 / 1				SS	4	1,1,1,1	2			
4 / 1				SS	5	1,1,1,1	2			
13 / 4	96.70	**Sand** Brown, wet below this depth, trace silt, trace clay, trace gravel, loose to compact.								
16 / 5				SS	6	9,10,12,11	22			
20 / 6										
21 / 6				SS	7	4,11,14,14	25			
22 / 7	94.10	End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

NOTES:

1. Borehole was advanced using hollow stem auger equipment on November 3, 2021 to termination at a depth of 6.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

4. A monitoring well was installed. The following free groundwater level readings have been measured:

November 25: 4.09 metres below ground surface.
December 2: 4.09 metres below ground

Drill Method: Hollow Stem Augers
Drill Date: November 3, 2021
Hole Size: 200 Millimetres
Drilling Contractor: Elements Geo

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Log of Borehole No. 03

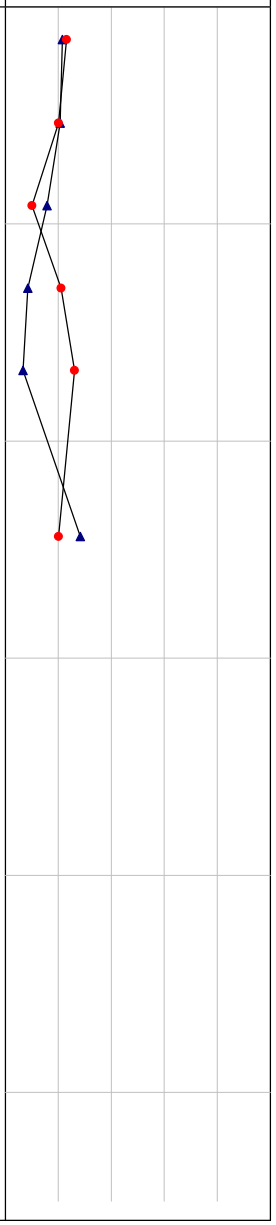
Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752116
E: 558247

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
ft 0 / m 0	100.85		Ground Surface								
0 / 0	100.55		**Topsoil** Approximately 300 millimetres of topsoil.		SS	1	4,11,12,12	23			
3 / 1			**Sand** Brown, some organic staining in upper levels, trace silt, clay and gravel, compact.		SS	2	8,10,10,8	20			
6 / 2					SS	3	5,5,5,8	10			
9 / 3					SS	4	5,9,12,14	21			
11 / 3					SS	5	8,12,14,13	26			
16 / 5	95.60		End of Borehole		SS	6	10,10,10,10	20			

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using hollow stem auger equipment on November 3, 2021 to termination at a depth of 5.2 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Hollow Stem Augers
Drill Date: November 3, 2021
Hole Size: 200 Millimetres
Drilling Contractor: Elements Geo

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Log of Borehole No. 04

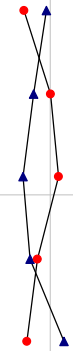
Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752147
E: 558210

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
ft / m	100.14		Ground Surface								
0 / 0	99.90		**Topsoil** Approximately 200 millimetres of topsoil.								
1 / 0			**Silty Sand/Sand** Brown, reworked in the upper levels, trace silt, trace clay, wet in the lower levels, loose to compact.		SS	1	4,5,5,4	10			
3 / 1					SS	2	7,8,12,13	20			
6 / 2					SS	3	10,10,13,14	23			
9 / 3					SS	4	7,7,8,7	15			
11 / 3	96.50				SS	5	5,5,6,7	11			
12 / 4			End of Borehole								

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)



NOTES:

1. Borehole was advanced using solid stem auger equipment on November 3, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Solid Stem Augers
Drill Date: November 3, 2021
Hole Size: 150 Millimetres
Drilling Contractor: Elements Geo

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Log of Borehole No. 05

Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752147
E: 558210

Depth (ft / m)	Elevation (m)	Symbol	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	99.64		Ground Surface								
0 / 0	99.40		**Topsoil** Approximately 200 millimetres of topsoil.								
1 / 0			**Sand** Brown, reworked in the upper levels, trace silt, trace clay, wet in the lower levels, compact.		SS	1	3,5,6,6	11			
3 / 1					SS	2	6,8,9,13	17			
6 / 2					SS	3	9,14,14,16	28			
9 / 3					SS	4	5,5,6,8	11			
11 / 3					SS	5	6,12,17,13	29			
12 / 4	96.00		End of Borehole								

NOTES:

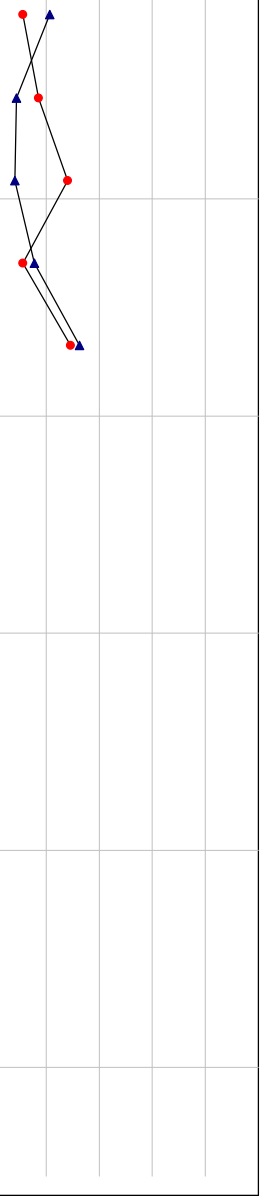
1. Borehole was advanced using solid stem auger equipment on November 3, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'wet' at a depth of 3.5 metres upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w%: 10 20 30 40

Standard Penetration Test blows/300mm: 20 40 60 80



Drill Method: Solid Stem Augers
Drill Date: November 3, 2021
Hole Size: 150 Millimetres
Drilling Contractor: Elements Geo

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Log of Borehole No. 06

Project No: SM 302104-G
Project: Proposed Townhouse Development
Location: Old Hwy 24 and Lam Blvd, Waterford
Client: 2525228 Ontario Ltd.

Project Manager: Ian Shaw, P.Eng
Borehole Location: See Drawing No.1
UTM Coordinates - N: 4752161
E: 558193

Depth (ft / m)	Elevation (m)	Description	Well Data	SAMPLE Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)
0 / 0	99.69	Ground Surface								
0 / 0		**Topsoil** Approximately 200 millimetres of topsoil.								
3 / 1		**Sand** Brown, reworked in the upper levels, trace silt, trace clay, compact.		SS	1	5,5,7,6	12			
5 / 1				SS	2	10,10,14,16	24			
7 / 2				SS	3	11,12,13,14	25			
9 / 3				SS	4	7,8,8,9	16			
11 / 3				SS	5	2,5,9,12	14			
12 / 4	96.00	End of Borehole								

NOTES:

1. Borehole was advanced using solid stem auger equipment on November 3, 2021 to termination at a depth of 3.7 metres.

2. Borehole was recorded as open and 'dry' upon completion and backfilled as per Ontario Regulation 903.

3. Soil samples will be discarded after 3 months unless otherwise directed by our client.

Moisture Content w% (10 20 30 40)

Standard Penetration Test blows/300mm (20 40 60 80)

Drill Method: Solid Stem Augers
Drill Date: November 3, 2021
Hole Size: 150 Millimetres
Drilling Contractor: Elements Geo

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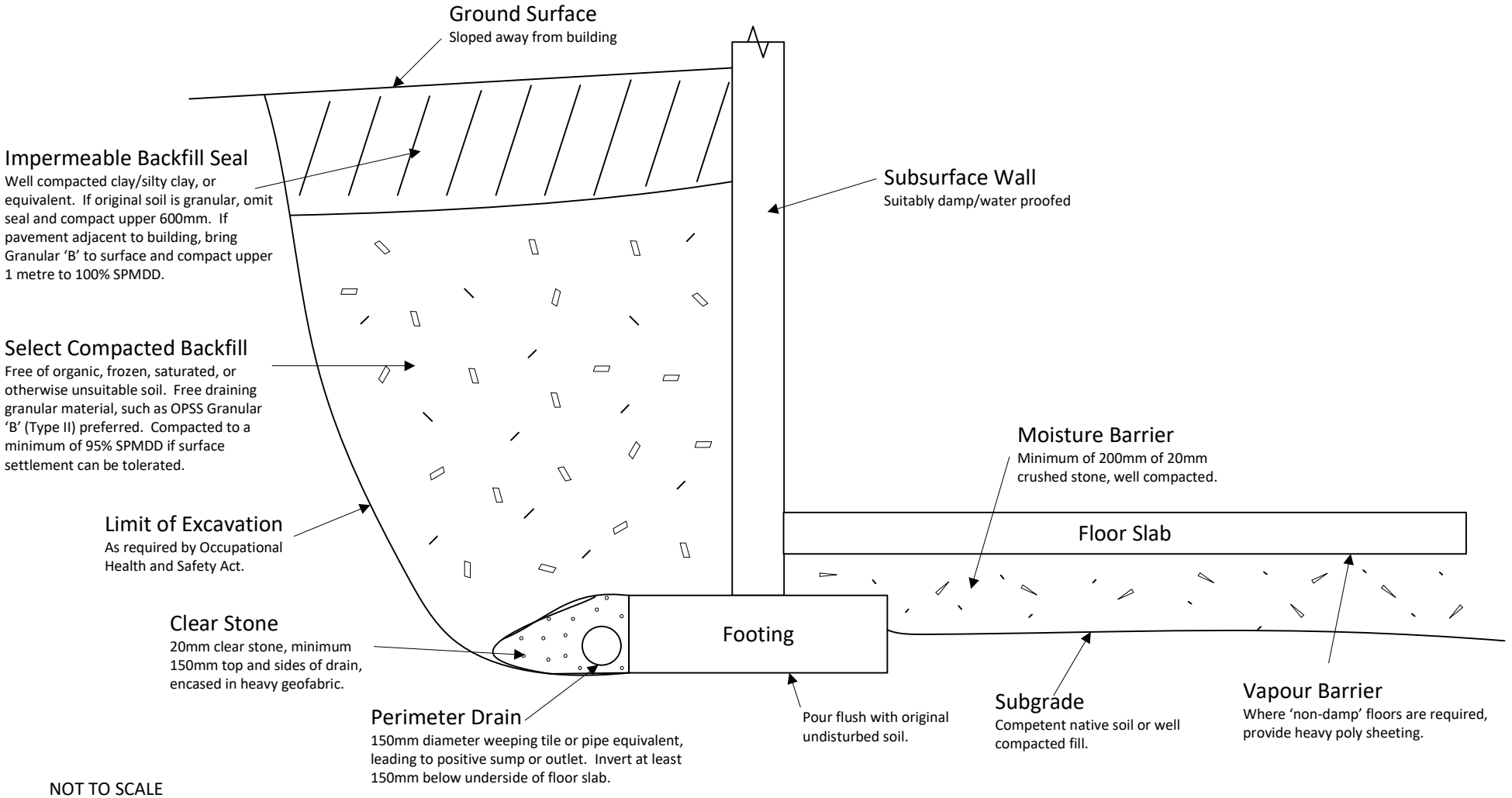

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Soil-Mat Engineers & Consultants Ltd.

Project No.:	SM 302104-G
Date:	December 2021

Typical Design Requirements
Drainage and Backfill for Basement Walls

Drawing No. 2

AGAT Laboratories

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CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT
130 LANCING DRIVE
HAMILTON, ON L8W3A1
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ATTENTION TO: Malcolm Craig

PROJECT: 302104

AGAT WORK ORDER: 21T825888

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganics Report Writer

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Nov 10, 2021

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

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- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
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Certificate of Analysis

AGAT WORK ORDER: 21T825888

PROJECT: 302104

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

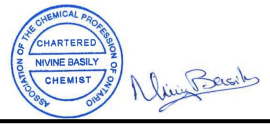
O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-11-04

DATE REPORTED: 2021-11-10

		SAMPLE DESCRIPTION:		BH1SS3	BH3SS1	BH4SS3
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2021-11-03	2021-11-03	2021-11-03
Parameter	Unit	G / S	RDL	3170855	3170859	3170861
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	2	3	2
Barium	µg/g	220	2.0	21.4	29.0	13.2
Beryllium	µg/g	2.5	0.4	<0.4	<0.4	<0.4
Boron	µg/g	36	5	<5	<5	<5
Boron (Hot Water Soluble)	µg/g	NA	0.10	<0.10	0.22	<0.10
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	5	12	10	<5
Cobalt	µg/g	21	0.5	3.2	3.3	1.6
Copper	µg/g	92	1.0	6.0	10.7	5.9
Lead	µg/g	120	1	5	10	3
Molybdenum	µg/g	2	0.5	<0.5	<0.5	<0.5
Nickel	µg/g	82	1	7	8	4
Selenium	µg/g	1.5	0.8	<0.8	<0.8	<0.8
Silver	µg/g	0.5	0.5	<0.5	<0.5	<0.5
Thallium	µg/g	1	0.5	<0.5	<0.5	<0.5
Uranium	µg/g	2.5	0.50	<0.50	<0.50	<0.50
Vanadium	µg/g	86	0.4	32.1	17.3	7.0
Zinc	µg/g	290	5	25	43	18
Chromium, Hexavalent	µg/g	0.66	0.2	<0.2	<0.2	<0.2
Cyanide, Free	µg/g	0.051	0.040	<0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.062	0.147	0.068
Sodium Adsorption Ratio (2:1) (Calc.)	N/A	2.4	N/A	0.123	0.166	0.088
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.20	7.60	7.86

Certified By:



Results relate only to the items tested. Results apply to samples as received.

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AGAT WORK ORDER: 21T825888

PROJECT: 302104

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2021-11-04

DATE REPORTED: 2021-11-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3170855-3170861 EC was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio. SAR is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Results relate only to the items tested. Results apply to samples as received.

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Certificate of Analysis

AGAT WORK ORDER: 21T825888

PROJECT: 302104

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2021-11-04

DATE REPORTED: 2021-11-10

		SAMPLE DESCRIPTION:		BH1SS3	BH3SS1	BH4SS3
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2021-11-03	2021-11-03	2021-11-03
Parameter	Unit	G / S	RDL	3170855	3170859	3170861
Benzene	µg/g	0.02	0.02	<0.02	<0.02	<0.02
Toluene	µg/g	0.2	0.05	<0.05	<0.05	<0.05
Ethylbenzene	µg/g	0.05	0.05	<0.05	<0.05	<0.05
m & p-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
o-Xylene	µg/g		0.05	<0.05	<0.05	<0.05
Xylenes (Total)	µg/g	0.05	0.05	<0.05	<0.05	<0.05
F1 (C6 - C10)	µg/g	25	5	<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	25	5	<5	<5	<5
F2 (C10 to C16)	µg/g	10	10	<10	<10	<10
F3 (C16 to C34)	µg/g	240	50	<50	<50	<50
F4 (C34 to C50)	µg/g	120	50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	120	50	NA	NA	NA
Moisture Content	%		0.1	17.2	9.6	4.1
Surrogate	Unit	Acceptable Limits				
Toluene-d8	% Recovery	60-140		90	88	105
Terphenyl	%	60-140		70	94	69

Certified By: NPopowich

Results relate only to the items tested. Results apply to samples as received.

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AGAT WORK ORDER: 21T825888

PROJECT: 302104

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2021-11-04

DATE REPORTED: 2021-11-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

3170855-3170861 Results are based on sample dry weight.
The C6-C10 fraction is calculated using Toluene response factor.
Xylenes is a calculated parameter. The calculated value is the sum of m&p-Xylene and o-Xylene.
C6–C10 (F1 minus BTEX) is a calculated parameter. The calculated value is F1 minus BTEX.
The calculated parameters are non-accredited. The parameters that are components of the calculation are accredited.
The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.
Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.
The chromatogram has returned to baseline by the retention time of nC50.
Total C6 - C50 results are corrected for BTEX contribution.
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
nC6 and nC10 response factors are within 30% of Toluene response factor.
nC10, nC16 and nC34 response factors are within 10% of their average.
C50 response factor is within 70% of nC10 + nC16 + nC34 average.
Linearity is within 15%.
Extraction and holding times were met for this sample.
Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.
Quality Control Data is available upon request.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Results relate only to the items tested. Results apply to samples as received.

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CANADA L4Z 1Y2
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FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T825888

PROJECT: 302104

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Nov 10, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	3166927		<0.8	<0.8	NA	< 0.8	104%	70%	130%	110%	80%	120%	111%	70%	130%
Arsenic	3166927		<1	1	NA	< 1	100%	70%	130%	108%	80%	120%	109%	70%	130%
Barium	3166927		7.1	7.2	NA	< 2.0	105%	70%	130%	105%	80%	120%	111%	70%	130%
Beryllium	3166927		<0.4	<0.4	NA	< 0.4	101%	70%	130%	112%	80%	120%	111%	70%	130%
Boron	3166927		<5	<5	NA	< 5	93%	70%	130%	98%	80%	120%	87%	70%	130%
Boron (Hot Water Soluble)	3173737		0.19	0.18	NA	< 0.10	93%	60%	140%	108%	70%	130%	96%	60%	140%
Cadmium	3166927		<0.5	<0.5	NA	< 0.5	124%	70%	130%	107%	80%	120%	110%	70%	130%
Chromium	3166927		<5	<5	NA	< 5	104%	70%	130%	96%	80%	120%	93%	70%	130%
Cobalt	3166927		1.0	1.1	NA	< 0.5	106%	70%	130%	96%	80%	120%	94%	70%	130%
Copper	3166927		1.9	1.8	NA	< 1.0	99%	70%	130%	97%	80%	120%	94%	70%	130%
Lead	3166927		2	2	NA	< 1	95%	70%	130%	89%	80%	120%	90%	70%	130%
Molybdenum	3166927		<0.5	<0.5	NA	< 0.5	100%	70%	130%	101%	80%	120%	105%	70%	130%
Nickel	3166927		2	2	NA	< 1	103%	70%	130%	106%	80%	120%	103%	70%	130%
Selenium	3166927		<0.8	<0.8	NA	< 0.8	96%	70%	130%	96%	80%	120%	101%	70%	130%
Silver	3166927		<0.5	<0.5	NA	< 0.5	109%	70%	130%	109%	80%	120%	112%	70%	130%
Thallium	3166927		<0.5	<0.5	NA	< 0.5	93%	70%	130%	110%	80%	120%	110%	70%	130%
Uranium	3166927		0.59	0.70	NA	< 0.50	97%	70%	130%	110%	80%	120%	109%	70%	130%
Vanadium	3166927		4.7	4.9	3.8%	< 0.4	110%	70%	130%	90%	80%	120%	92%	70%	130%
Zinc	3166927		9	8	NA	< 5	108%	70%	130%	111%	80%	120%	108%	70%	130%
Chromium, Hexavalent	3168179		<0.2	<0.2	NA	< 0.2	92%	70%	130%	87%	80%	120%	73%	70%	130%
Cyanide, Free	3175392		<0.040	<0.040	NA	< 0.040	98%	70%	130%	110%	80%	120%	101%	70%	130%
Mercury	3166927		<0.10	<0.10	NA	< 0.10	125%	70%	130%	116%	80%	120%	118%	70%	130%
Electrical Conductivity (2:1)	3173737		0.137	0.136	0.8%	< 0.005	108%	80%	120%						
Sodium Adsorption Ratio (2:1) (Calc.)	3173961		10.1	10.8	6.1%	NA									
pH, 2:1 CaCl2 Extraction	3170861	3170861	7.86	7.84	0.3%	NA	101%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.
Duplicate NA: results are under 5X the RDL and will not be calculated.

Certified By:

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.

Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

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Quality Assurance

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T825888

PROJECT: 302104

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Nov 10, 2021			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (Soil)															
Benzene	3170969		< 0.02	< 0.02	NA	< 0.02	95%	60%	140%	82%	60%	140%	98%	60%	140%
Toluene	3170969		< 0.05	< 0.05	NA	< 0.05	80%	60%	140%	95%	60%	140%	96%	60%	140%
Ethylbenzene	3170969		< 0.05	< 0.05	NA	< 0.05	99%	60%	140%	89%	60%	140%	82%	60%	140%
m & p-Xylene	3170969		< 0.05	< 0.05	NA	< 0.05	90%	60%	140%	96%	60%	140%	99%	60%	140%
o-Xylene	3170969		< 0.05	< 0.05	NA	< 0.05	91%	60%	140%	83%	60%	140%	93%	60%	140%
F1 (C6 - C10)	3170969		< 5	< 5	NA	< 5	100%	60%	140%	103%	60%	140%	80%	60%	140%
F2 (C10 to C16)	3170861	3170861	< 10	< 10	NA	< 10	117%	60%	140%	114%	60%	140%	113%	60%	140%
F3 (C16 to C34)	3170861	3170861	< 50	< 50	NA	< 50	133%	60%	140%	79%	60%	140%	71%	60%	140%
F4 (C34 to C50)	3170861	3170861	< 50	< 50	NA	< 50	106%	60%	140%	121%	60%	140%	62%	60%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

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Results relate only to the items tested. Results apply to samples as received.

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http://www.agatlabs.com

Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T825888

PROJECT: 302104

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Arsenic	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Barium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Beryllium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	modified from EPA 6010D and MSA PART 3, CH 21	ICP/OES
Cadmium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Cobalt	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Copper	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Lead	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Molybdenum	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Nickel	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Selenium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Silver	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Thallium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Uranium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Vanadium	MET-93-6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Zinc	MET 93 -6103	modified from EPA 3050B and EPA 6020B and ON MOECC	ICP-MS
Chromium, Hexavalent	INOR-93-6068	modified from EPA 3060 and EPA 7196	SPECTROPHOTOMETER
Cyanide, Free	INOR-93-6052	modified from ON MOECC E3015, SM 4500-CN- I, G-387	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	modified from EPA 7471B and SM 3112 B	ICP-MS
Electrical Conductivity (2:1)	INOR-93-6036	modified from MSA PART 3, CH 14 and SM 2510 B	EC METER
Sodium Adsorption Ratio (2:1) (Calc.)	INOR-93-6007	modified from EPA 6010D & Analytical Protocol	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER

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Method Summary

CLIENT NAME: SOIL MAT ENGINEERS & CONSULTANTS LT

AGAT WORK ORDER: 21T825888

PROJECT: 302104

ATTENTION TO: Malcolm Craig

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Benzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Toluene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Ethylbenzene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
m & p-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
o-Xylene	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
Xylenes (Total)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/MS
F1 (C6 - C10)	VOL-91-5009	modified from CCME Tier 1 Method	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	modified from CCME Tier 1 Method	P&T GC/FID
Toluene-d8	VOL-91-5009	modified from EPA SW-846 5030C & 8260D	(P&T)GC/MS
F2 (C10 to C16)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F3 (C16 to C34)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
F4 (C34 to C50)	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	modified from CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009	modified from CCME Tier 1 Method	GC/FID

Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

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Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 21T825888

Cooler Quantity:

Arrival Temperatures: 8 | 6.2 | 7.5
6.9 | 7.3 | 6.8

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: ICE PAK

Report Information:

Company: Soil-Mat

Contact:

Address:

Phone: Fax:

Reports to be sent to:

1. Email: Malcolm Craig
2. Email: Ian Shaw

Project Information:

Project: 302104

Site Location: Waterford, Ont

Sampled By: NS

AGAT ID #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company:

Contact:

Address:

Email:

Regulatory Requirements:

(Please check all applicable boxes)

☒ Regulation 153/04
Table 1 *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Excess Soils R406
Table _____ *Indicate One*

☐ Regulation 558

☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
_____ *Region*

☐ Prov. Water Quality Objectives (PWQO)

☐ Other
_____ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT (Most Analysis) ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y/N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs Analyze F4G if required ☐ Yes ☐ No	O. Reg 153: PAHs	O. Reg 153: Total PCBs ☐ Aroclor	O. Reg 153: VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	Potentially Hazardous or High Concentration (Y/N)
BH1SS3	Nov 3	AM/PM	3	S			X		X								
BH3SS1	1	AM/PM	1	1			X		X								
BH4SS3		AM/PM					X		X								
		AM/PM															
		AM/PM															
		AM/PM															
		AM/PM															
		AM/PM															
		AM/PM															
		AM/PM															
		AM/PM															
		AM/PM															

Samples Relinquished By (Print Name and Sign):	Date: Nov 4 2021	Time: 1:43pm	Samples Received By (Print Name and Sign):	Date: 11/4/21 Time: 1:45
Samples Relinquished By (Print Name and Sign):	Date: 11/04/21	Time: 4:10	Samples Received By (Print Name and Sign):	Date: Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date: Time:

Page _____ of _____

Nº: T 123762

APPENDIX D

ADS StormTech Chamber Drawings & Specifications

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

Advanced Drainage Systems, Inc.

SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR APP

2024.02.27 20-128 ORCHARD SQUARE

WATERFORD, ON, CANADA

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE WELL GRADED BETWEEN ¾" AND 2" (20-50 mm)..
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

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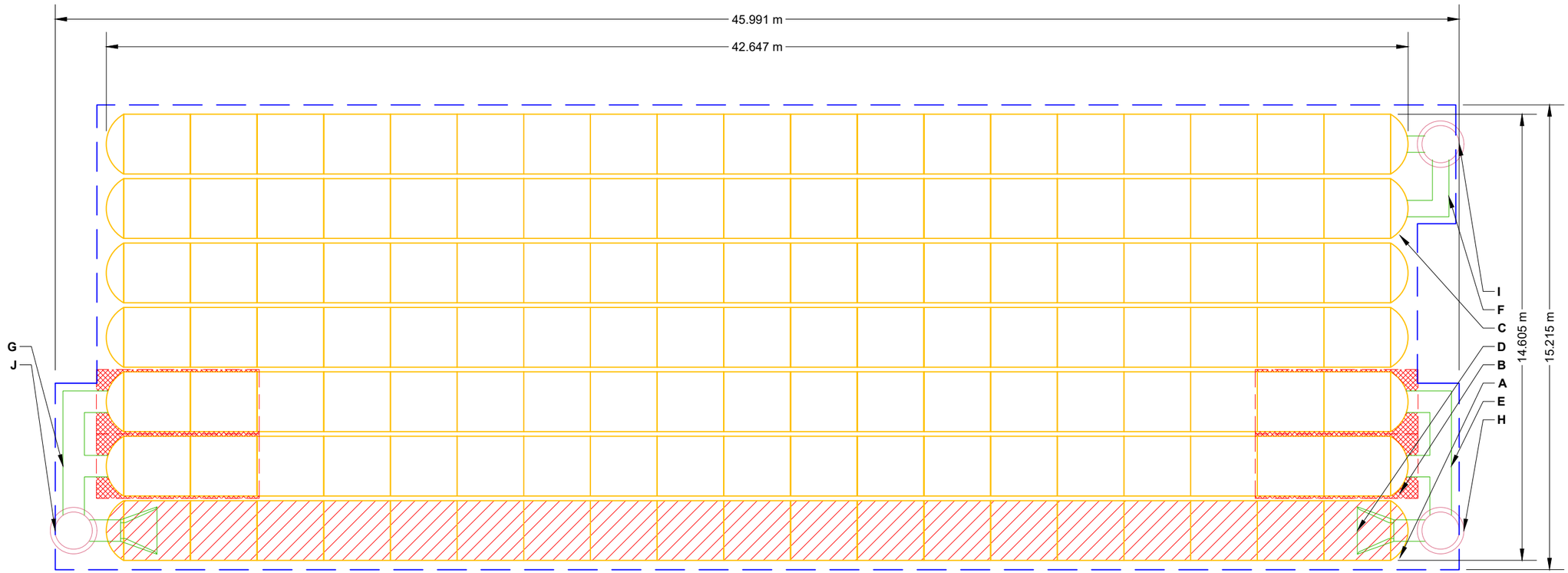
PROPOSED LAYOUT		PROPOSED ELEVATIONS:	
133	STORMTECH MC-3500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	245.181
14	STORMTECH MC-3500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	243.353
500	STONE ABOVE (mm)	TOP OF STONE:	243.243
300	STONE BELOW (mm)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	243.200
40	STONE VOID	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	243.200
783.8	INSTALLED SYSTEM VOLUME (m^3) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	243.200
		TOP OF MC-3500 CHAMBER:	242.743
		600 mm x 600 mm TOP MANIFOLD INVERT:	241.968
		600 mm x 600 mm TOP MANIFOLD INVERT:	241.968
679.7	SYSTEM AREA (m^2)	600 mm ISOLATOR ROW PLUS INVERT:	241.652
124.9	SYSTEM PERIMETER (m)	600 mm ISOLATOR ROW PLUS INVERT:	241.652
		450 mm x 450 mm BOTTOM MANIFOLD INVERT:	241.645
		450 mm BOTTOM CONNECTION INVERT:	241.645
		BOTTOM OF MC-3500 CHAMBER:	241.600
		BOTTOM OF STONE:	241.300

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	600 mm BOTTOM CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 600 mm BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	52 mm	
PREFABRICATED END CAP	B	600 mm TOP CORED END CAP, PART#: MC3500IEPP24TC / TYP OF ALL 600 mm TOP CONNECTIONS	368 mm	
PREFABRICATED END CAP	C	450 mm BOTTOM CORED END CAP, PART#: MC3500IEPP18BC / TYP OF ALL 450 mm BOTTOM CONNECTIONS	45 mm	
FLAMP	D	INSTALL FLAMP ON 600 mm ACCESS PIPE / PART#: MCFLAMP (TYP 2 PLACES)		
MANIFOLD	E	600 mm x 600 mm TOP MANIFOLD, ADS N-12	368 mm	
MANIFOLD	F	450 mm x 450 mm BOTTOM MANIFOLD, ADS N-12	45 mm	
MANIFOLD	G	600 mm x 600 mm TOP MANIFOLD, ADS N-12	368 mm	
CONCRETE STRUCTURE	H	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		481 L/s IN
CONCRETE STRUCTURE	I	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		227 L/s OUT
CONCRETE STRUCTURE	J	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		481 L/s IN



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 5.334 m OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

2024.02.27 20-128 ORCHARD SQUARE
WATERFORD, ON, CANADA

DRAWN: NB | CHECKED: N/A
DATE: | PROJECT #:

DATE	DRW	CHK	DESCRIPTION

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Chamber System
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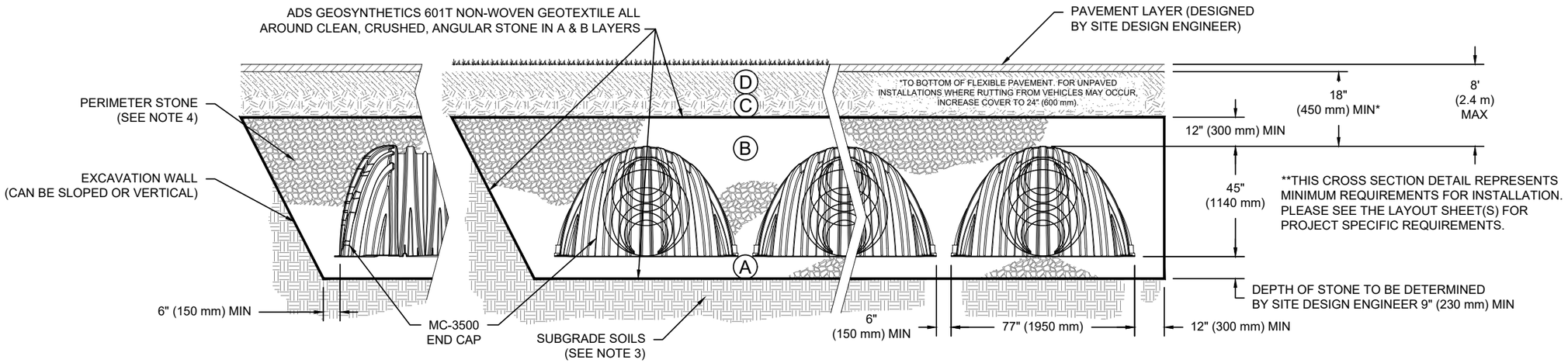
ADS
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

SCALE = 1 : 150

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

2024.02.27 20-128 ORCHARD SQUARE
WATERFORD, ON, CANADA
DRAWN: NB
CHECKED: N/A
DATE:
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

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888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

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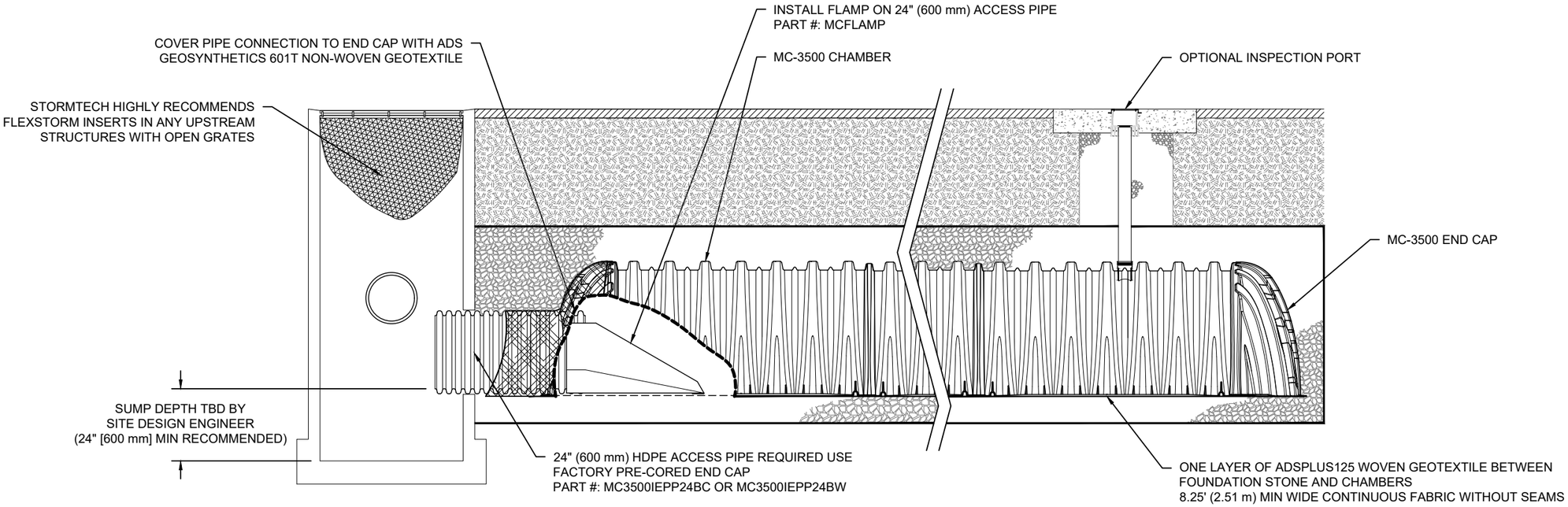

MC-3500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

2024.02.27 20-128 ORCHARD SQUARE
WATERFORD, ON, CANADA

DATE: | DRAWN: NB
PROJECT #: | CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

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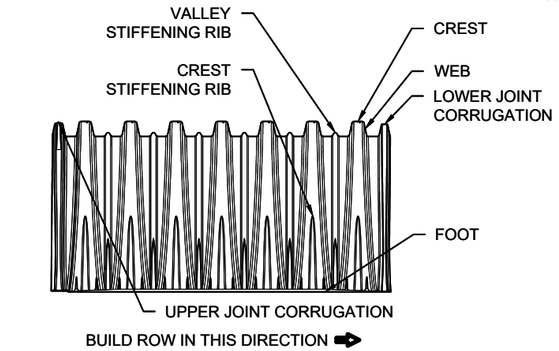
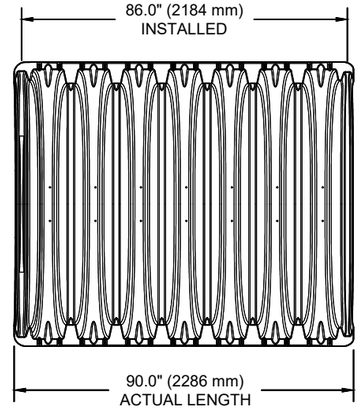
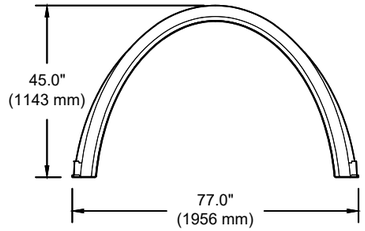
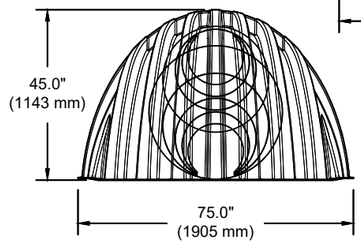
MC-3500 TECHNICAL SPECIFICATION

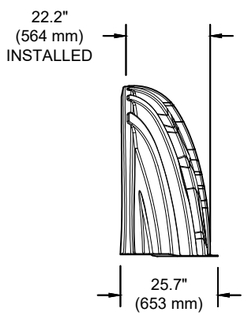
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

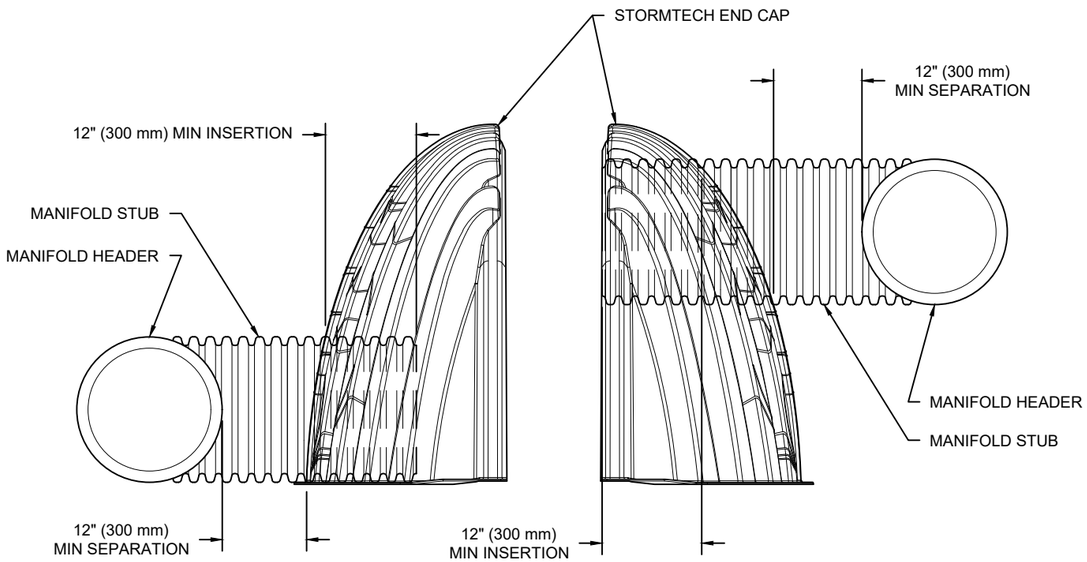
NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" SPACING BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

MC-SERIES END CAP INSERTION DETAIL

NTS

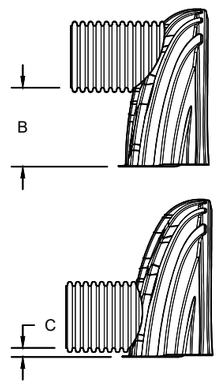


NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

2024.02.27 20-128 ORCHARD SQUARE
WATERFORD, ON, CANADA

DATE: | DRAWN: NB | CHECKED: N/A
PROJECT #:

DESCRIPTION	CHK	DRW	DATE

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473

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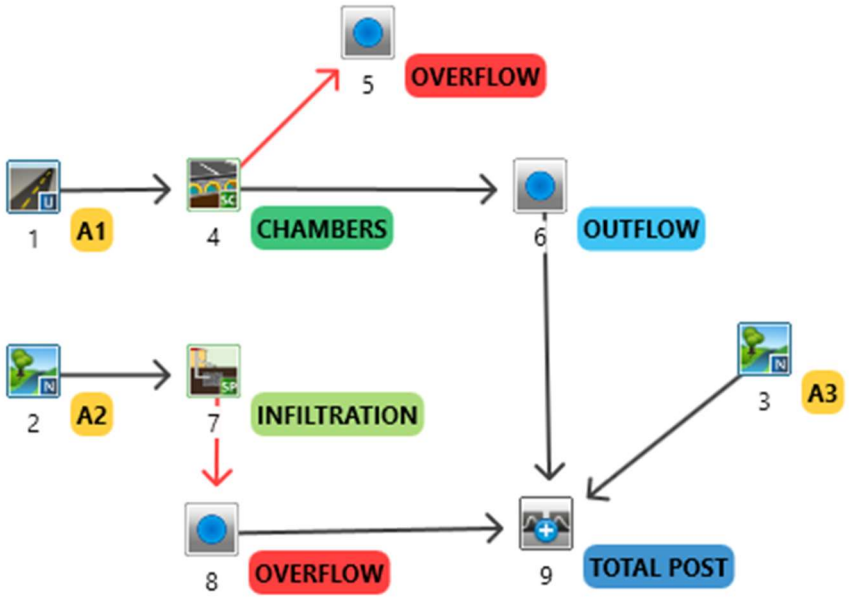
APPENDIX E

Visual OTTHYMO Summary Outputs

20-128 ORCHARD SQUARE
POST-DEVELEPMENT OTTHYMO MODEL



2-YEAR STORM

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================================================================================

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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 02/29/2024                          TIME: 10:53:28

USER:


COMMENTS: _____________________________________________________________

--------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 01_2-Year Norfolk             **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 529.711
| Ptotal= 35.21 mm |                          B=   4.501
--------------------                          C=   0.745
                       used in:   INTENSITY =  A / (t + B)^C

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

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs  mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.68 |  1.00   17.69 |  2.00    5.90 |  3.00    3.14
                0.17    3.04 |  1.17   72.24 |  2.17    5.09 |  3.17    2.94
                0.33    3.53 |  1.33   22.78 |  2.33    4.50 |  3.33    2.76
                0.50    4.26 |  1.50   12.62 |  2.50    4.04 |  3.50    2.60
                0.67    5.49 |  1.67    8.98 |  2.67    3.68 |  3.67    2.47
                0.83    8.02 |  1.83    7.08 |  2.83    3.39 |  3.83    2.35


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=   1.12
|ID= 1 DT= 5.0 min |   Total Imp(%)=  92.00   Dir. Conn.(%)=  92.00
--------------------

                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=         1.03          0.09
     Dep. Storage      (mm)=         1.00         16.50
     Average Slope      (%)=         1.00          2.00
     Length             (m)=        86.41         40.00
     Mannings n            =        0.013         0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs  mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.68 | 1.083   17.69 | 2.083    5.90 |  3.08    3.14
               0.167    2.68 | 1.167   17.69 | 2.167    5.90 |  3.17    3.14
               0.250    3.04 | 1.250   72.24 | 2.250    5.09 |  3.25    2.94
               0.333    3.04 | 1.333   72.24 | 2.333    5.09 |  3.33    2.94
               0.417    3.53 | 1.417   22.78 | 2.417    4.50 |  3.42    2.76
               0.500    3.53 | 1.500   22.78 | 2.500    4.50 |  3.50    2.76
               0.583    4.26 | 1.583   12.62 | 2.583    4.04 |  3.58    2.60
               0.667    4.26 | 1.667   12.62 | 2.667    4.04 |  3.67    2.60
               0.750    5.49 | 1.750    8.98 | 2.750    3.68 |  3.75    2.47
               0.833    5.49 | 1.833    8.98 | 2.833    3.68 |  3.83    2.47
               0.917    8.02 | 1.917    7.08 | 2.917    3.39 |  3.92    2.35
               1.000    8.02 | 2.000    7.08 | 3.000    3.39 |  4.00    2.35


     Max.Eff.Inten.(mm/hr)=      72.24          1.16
               over (min)        5.00         10.00
     Storage Coeff.  (min)=      2.67 (ii)     5.69 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.29          0.15
                                                        *TOTALS*
     PEAK FLOW        (cms)=     0.20          0.00          0.203 (iii)
     TIME TO PEAK     (hrs)=     1.33          1.58          1.33
     RUNOFF VOLUME     (mm)=    34.21          1.73         31.61
     TOTAL RAINFALL    (mm)=    35.21         35.21         35.21
     RUNOFF COEFFICIENT   =      0.97          0.05          0.90

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

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  58.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CHAMBER(  0004)|  OUTFLOW: ON,   UNDERDRAIN: OFF,  INFIL: ON
|IN= 2--> OUT= 3 |  CHAMBER:
| DT=  5.0 min   |  MAX STO VOL (cu.m.)=  776.77  Bottom Area(m2)   =  679.72
------------------
                      DEPTH       STORAGE          |    DEPTH       STORAGE
                      (mm)        (cu.m.)          |    (mm)        (cu.m.)
                         0.00          0.00        |     991.00       467.67
                        25.00          6.90        |    1016.00       480.03
                        51.00         13.81        |    1041.00       492.21
                        76.00         20.71        |    1067.00       504.21
                       102.00         27.62        |    1092.00       515.99
                       127.00         34.52        |    1118.00       527.56
                       152.00         41.43        |    1143.00       538.89
                       178.00         48.33        |    1168.00       549.97
                       203.00         55.23        |    1194.00       560.77
                       229.00         62.14        |    1219.00       571.26
                       254.00         69.04        |    1245.00       581.41
                       279.00         75.95        |    1270.00       591.17
                       305.00         90.92        |    1295.00       600.42
```

330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.12	0.203	1.33	31.61
OUTFLOW:ID= 1	0.00	0.000	0.00	0.00
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 100.00
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 322.10
Volume of maximum water storage (cu.m.)= 323.75
Calculated Drawdown Time (Hr)= 39.50

Junction Command(0005)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

CALIB	NASHYD (0002)	ID= 1 DT= 5.0 min

Area (ha)= 0.08 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.68	1.083	17.69	2.083	5.90	3.08	3.14
0.167	2.68	1.167	17.69	2.167	5.90	3.17	3.14
0.250	3.04	1.250	72.24	2.250	5.09	3.25	2.94
0.333	3.04	1.333	72.24	2.333	5.09	3.33	2.94
0.417	3.53	1.417	22.78	2.417	4.50	3.42	2.76
0.500	3.53	1.500	22.78	2.500	4.50	3.50	2.76
0.583	4.26	1.583	12.62	2.583	4.04	3.58	2.60
0.667	4.26	1.667	12.62	2.667	4.04	3.67	2.60
0.750	5.49	1.750	8.98	2.750	3.68	3.75	2.47
0.833	5.49	1.833	8.98	2.833	3.68	3.83	2.47
0.917	8.02	1.917	7.08	2.917	3.39	3.92	2.35
1.000	8.02	2.000	7.08	3.000	3.39	4.00	2.35

Unit Hyd Qpeak (cms)= 0.076

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 1.030
TOTAL RAINFALL (mm)= 35.210
RUNOFF COEFFICIENT = 0.029

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

SOAKAWAY(0007)	IN= 2--> OUT= 3	DT= 5.0 MIN

UNDERDRAIN: OFF
STORAGE LAYER:
Length (m)= 20.00 Height (m)= 1.00
Porosity = 0.40 Initial Water Level (m)= 0.00
Width (m)= 1.50 Min. Drawdown (hr)= 24.00
Max. Drawdown (hr)= 33.33 Available Storage (cu.m.)= 12.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.08	0.001	4.08	1.52
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 0.30
Volume of maximum water storage (cu.m.)= 0.33
Calculated Drawdown Time (Hr)= 0.83

Junction Command(0008)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

CALIB	NASHYD (0003)	ID= 1 DT= 5.0 min

Area (ha)= 0.11 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.02

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.68	1.083	17.69	2.083	5.90	3.08	3.14
0.167	2.68	1.167	17.69	2.167	5.90	3.17	3.14
0.250	3.04	1.250	72.24	2.250	5.09	3.25	2.94
0.333	3.04	1.333	72.24	2.333	5.09	3.33	2.94
0.417	3.53	1.417	22.78	2.417	4.50	3.42	2.76
0.500	3.53	1.500	22.78	2.500	4.50	3.50	2.76
0.583	4.26	1.583	12.62	2.583	4.04	3.58	2.60
0.667	4.26	1.667	12.62	2.667	4.04	3.67	2.60
0.750	5.49	1.750	8.98	2.750	3.68	3.75	2.47
0.833	5.49	1.833	8.98	2.833	3.68	3.83	2.47
0.917	8.02	1.917	7.08	2.917	3.39	3.92	2.35
1.000	8.02	2.000	7.08	3.000	3.39	4.00	2.35

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 0.100
TOTAL RAINFALL (mm)= 35.210
RUNOFF COEFFICIENT = 0.003

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

Junction Command(0006)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0006)	0.00	0.00	0.00	0.00

ADD HYD (0009)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0006 <ID= 2> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0003 = HYDROGRAPH 0001				
ID1= 1 (0003):	0.11	0.000	1.50	0.10
+ ID2= 2 (0006):	0.00	0.000	0.00	0.00
ID = 3 (0009):	0.11	0.000	1.50	0.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)	3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003				
ID1= 3 (0009):	0.11	0.000	1.50	0.10
+ ID2= 2 (0008):	0.00	0.000	0.00	0.00
ID = 1 (0009):	0.11	0.000	1.50	0.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

5-YEAR STORM

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

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

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\5bb580c0-366b-4902-9154-f6d484d1b822\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\5bb580c0-366b-4902-9154-f6d484d1b822\scen

DATE: 02/29/2024 TIME: 10:53:28

USER:

COMMENTS: _____

** SIMULATION : 02_5-Year Norfolk **

| CHICAGO STORM | Ptotal= 49.03 mm |

IDF curve parameters: A= 583.017
B= 3.007
C= 0.703
used in: INTENSITY = A / (t + B)^C

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.20	1.00	23.22	2.00	8.64	3.00	4.87
0.17	4.72	1.17	96.03	2.17	7.56	3.17	4.58
0.33	5.42	1.33	29.33	2.33	6.76	3.33	4.32
0.50	6.44	1.50	17.13	2.50	6.13	3.50	4.10
0.67	8.09	1.67	12.62	2.67	5.63	3.67	3.90
0.83	11.39	1.83	10.19	2.83	5.22	3.83	3.72

| CALIB | STANDHYD (0001) | ID= 1 DT= 5.0 min |

Area (ha)= 1.12
Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.09
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.41	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.20	1.083	23.22	2.083	8.64	3.08	4.87
0.167	4.20	1.167	23.22	2.167	8.64	3.17	4.87
0.250	4.72	1.250	96.03	2.250	7.56	3.25	4.58
0.333	4.72	1.333	96.03	2.333	7.56	3.33	4.58
0.417	5.42	1.417	29.33	2.417	6.76	3.42	4.32
0.500	5.42	1.500	29.33	2.500	6.76	3.50	4.32
0.583	6.44	1.583	17.13	2.583	6.13	3.58	4.10
0.667	6.44	1.667	17.13	2.667	6.13	3.67	4.10
0.750	8.09	1.750	12.62	2.750	5.63	3.75	3.90
0.833	8.09	1.833	12.62	2.833	5.63	3.83	3.90
0.917	11.39	1.917	10.19	2.917	5.22	3.92	3.72
1.000	11.39	2.000	10.19	3.000	5.22	4.00	3.72

				TOTALS
Max.Eff.Inten.(mm/hr)=		96.03	4.65	
over (min)		5.00	10.00	
Storage Coeff. (min)=		2.38 (ii)	5.08 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.30	0.16	
PEAK FLOW	(cms)=	0.27	0.00	0.272 (iii)
TIME TO PEAK	(hrs)=	1.33	1.42	1.33
RUNOFF VOLUME	(mm)=	48.03	4.89	44.58
TOTAL RAINFALL	(mm)=	49.03	49.03	49.03
RUNOFF COEFFICIENT	=	0.98	0.10	0.91

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

| CHAMBER(0004) | IN= 2--> OUT= 3 | DT= 5.0 min |

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.12	0.272	1.33	44.58
OUTFLOW:ID= 1	1.12	0.005	4.00	5.42
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 87.84
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 437.63
Volume of maximum water storage (cu.m.)= 443.13
Calculated Drawdown Time (Hr)= 49.67

| Junction Command(0005) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

| CALIB | NASHYD (0002) | ID= 1 DT= 5.0 min |

Area (ha)= 0.08 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	4.20	1.083	23.22	2.083	8.64	3.08	4.87
0.167	4.20	1.167	23.22	2.167	8.64	3.17	4.87
0.250	4.72	1.250	96.03	2.250	7.56	3.25	4.58
0.333	4.72	1.333	96.03	2.333	7.56	3.33	4.58
0.417	5.42	1.417	29.33	2.417	6.76	3.42	4.32
0.500	5.42	1.500	29.33	2.500	6.76	3.50	4.32
0.583	6.44	1.583	17.13	2.583	6.13	3.58	4.10
0.667	6.44	1.667	17.13	2.667	6.13	3.67	4.10
0.750	8.09	1.750	12.62	2.750	5.63	3.75	3.90
0.833	8.09	1.833	12.62	2.833	5.63	3.83	3.90
0.917	11.39	1.917	10.19	2.917	5.22	3.92	3.72
1.000	11.39	2.000	10.19	3.000	5.22	4.00	3.72

Unit Hyd Qpeak (cms)= 0.076

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 2.915

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     TOTAL RAINFALL   (mm)=  49.033
     RUNOFF COEFFICIENT   =   0.059

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

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|SOAKAWAY(  0007)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  5.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=  20.00   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level   (m)=   0.00
                    Width           (m)=   1.50   Min. Drawdown         (hr)=  24.00
                    Max. Drawdown  (hr)=  33.33   Available Storage   (cu.m.)=  12.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0120

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.08         0.001             4.08         3.56
    OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                       If RVout= (Overflow            )=      100.00
              Time to reach Max storage             (Hr)=        4.17
              Volume of water for drawdown in LID (cu.m.)=        1.76
              Volume of maximum water storage     (cu.m.)=        1.79
              Calculated Drawdown Time              (Hr)=        4.83

  --------------------------
  | Junction Command(0008) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0007)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0008)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.11   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  16.50   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.02

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.20 | 1.083   23.22 | 2.083    8.64 |  3.08    4.87
               0.167    4.20 | 1.167   23.22 | 2.167    8.64 |  3.17    4.87
               0.250    4.72 | 1.250   96.03 | 2.250    7.56 |  3.25    4.58
               0.333    4.72 | 1.333   96.03 | 2.333    7.56 |  3.33    4.58
               0.417    5.42 | 1.417   29.33 | 2.417    6.76 |  3.42    4.32
               0.500    5.42 | 1.500   29.33 | 2.500    6.76 |  3.50    4.32
               0.583    6.44 | 1.583   17.13 | 2.583    6.13 |  3.58    4.10
               0.667    6.44 | 1.667   17.13 | 2.667    6.13 |  3.67    4.10
               0.750    8.09 | 1.750   12.62 | 2.750    5.63 |  3.75    3.90
               0.833    8.09 | 1.833   12.62 | 2.833    5.63 |  3.83    3.90
               0.917   11.39 | 1.917   10.19 | 2.917    5.22 |  3.92    3.72
               1.000   11.39 | 2.000   10.19 | 3.000    5.22 |  4.00    3.72

     Unit Hyd Qpeak  (cms)=   0.210

     PEAK FLOW       (cms)=   0.000 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   0.340
     TOTAL RAINFALL   (mm)=  49.033
     RUNOFF COEFFICIENT   =   0.007

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

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0006) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0004)    1.12     0.00    4.00     5.42
  OUTFLOW: ID= 2(  0006)    1.12     0.00    4.00     5.42

  --------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     0.11   0.000     1.33     0.34
      + ID2= 2 (  0006):     1.12   0.005     4.00     5.42
        ====================================================
        ID = 3 (  0009):     1.23   0.005     4.00     4.96

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0008 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0009):     1.23   0.005     4.00     4.96
      + ID2= 2 (  0008):     0.00   0.000     0.00     0.00
        ====================================================
        ID = 1 (  0009):     1.23   0.005     4.00     4.96

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

10-YEAR STORM

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

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

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***** D E T A I L E D O U T P U T *****

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DATE: 02/29/2024 TIME: 10:53:28

USER:

COMMENTS: _____

** SIMULATION : 03_10-Year Norfolk **

CHICAGO STORM
Ptotal= 57.94 mm

IDF curve parameters: A= 670.324
B= 3.007
C= 0.698
used in: INTENSITY = A / (t + B)^C

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	5.04	1.00	27.43	2.00	10.30	3.00	5.84
0.17	5.66	1.17	111.84	2.17	9.03	3.17	5.49
0.33	6.49	1.33	34.58	2.33	8.07	3.33	5.18
0.50	7.70	1.50	20.31	2.50	7.33	3.50	4.92
0.67	9.66	1.67	15.00	2.67	6.74	3.67	4.68
0.83	13.55	1.83	12.13	2.83	6.25	3.83	4.47

CALIB
STANDHYD (0001)
ID= 1 DT= 5.0 min

Area (ha)= 1.12
Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.09
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.41	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

				TOTALS
Max.Eff.Inten.(mm/hr)=		111.84	8.30	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.24 (ii)	4.78 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.30	0.22	
PEAK FLOW	(cms)=	0.32	0.00	0.319 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	56.94	7.62	53.00
TOTAL RAINFALL	(mm)=	57.94	57.94	57.94
RUNOFF COEFFICIENT	=	0.98	0.13	0.91

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHAMBER(0004)
IN= 2--> OUT= 3
DT= 5.0 min

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.12	0.319	1.33	53.00
OUTFLOW:ID= 1	1.12	0.007	4.00	12.01
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 77.34
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 506.78
Volume of maximum water storage (cu.m.)= 514.18
Calculated Drawdown Time (Hr)= 52.17

Junction Command(0005)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

CALIB
NASHYD (0002)
ID= 1 DT= 5.0 min

Area (ha)= 0.08 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

Unit Hyd Qpeak (cms)= 0.076

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 4.548
TOTAL RAINFALL (mm)= 57.945

RUNOFF COEFFICIENT = 0.078

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

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)=	20.00	Height	(m)=	1.00
Porosity	=	0.40	Initial Water Level	(m)=	0.00
Width	(m)=	1.50	Min. Drawdown	(hr)=	24.00
Max. Drawdown	(hr)=	33.33	Available Storage	(cu.m.)=	12.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.08	0.001	1.33	4.62
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):		
If RVout= (Overflow	)=	100.00
Time to reach Max storage	(Hr)=	4.17
Volume of water for drawdown in LID	(cu.m.)=	2.59
Volume of maximum water storage	(cu.m.)=	2.62
Calculated Drawdown Time	(Hr)=	7.17

Junction Command(0008)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

CALIB					
NASHYD (0003)		Area	(ha)=	0.11	Curve Number (CN)= 58.0
ID= 1 DT= 5.0 min		Ia	(mm)=	16.50	# of Linear Res.(N)= 3.00
		U.H. Tp(hrs)=		0.02	

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.04	1.083	27.43	2.083	10.30	3.08	5.84
0.167	5.04	1.167	27.43	2.167	10.30	3.17	5.84
0.250	5.66	1.250	111.84	2.250	9.03	3.25	5.49
0.333	5.66	1.333	111.84	2.333	9.03	3.33	5.49
0.417	6.49	1.417	34.58	2.417	8.07	3.42	5.18
0.500	6.49	1.500	34.58	2.500	8.07	3.50	5.18
0.583	7.70	1.583	20.31	2.583	7.33	3.58	4.92
0.667	7.70	1.667	20.31	2.667	7.33	3.67	4.92
0.750	9.66	1.750	15.00	2.750	6.74	3.75	4.68
0.833	9.66	1.833	15.00	2.833	6.74	3.83	4.68
0.917	13.55	1.917	12.13	2.917	6.25	3.92	4.47
1.000	13.55	2.000	12.13	3.000	6.25	4.00	4.47

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 0.531
TOTAL RAINFALL (mm)= 57.945
RUNOFF COEFFICIENT = 0.009

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

Junction Command(0006)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	1.12	0.01	4.00	12.01
OUTFLOW: ID= 2(0006)	1.12	0.01	4.00	12.01

ADD HYD (0009)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):		0.11	0.000	1.33	0.53
+ ID2= 2 (0006):		1.12	0.007	4.00	12.01
ID = 3 (0009):		1.23	0.007	4.00	10.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)					
3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.					
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003					
ID1= 3 (0009):		1.23	0.007	4.00	10.98
+ ID2= 2 (0008):		0.00	0.000	0.00	0.00
ID = 1 (0009):		1.23	0.007	4.00	10.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

25-YEAR STORM

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

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M M M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 02/29/2024 TIME: 10:53:28

USER:

COMMENTS: _____

****
** SIMULATION : 04_25-Year Norfolk **
****

| CHICAGO STORM | Ptotal= 69.38 mm |

IDF curve parameters: A= 721.533
B= 2.253
C= 0.679
used in: INTENSITY = A / (t + B)^C

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	6.34	1.00	31.84	2.00	12.58	3.00	7.30
0.17	7.08	1.17	131.63	2.17	11.08	3.17	6.87
0.33	8.07	1.33	39.74	2.33	9.96	3.33	6.50
0.50	9.51	1.50	23.97	2.50	9.08	3.50	6.18
0.67	11.82	1.67	17.98	2.67	8.38	3.67	5.90
0.83	16.33	1.83	14.70	2.83	7.79	3.83	5.64

CALIB	STANDHYD (0001)	ID= 1 DT= 5.0 min	Area (ha)= 1.12	Total Imp(%)= 92.00	Dir. Conn.(%)= 92.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.09
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.41	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

				TOTALS
Max.Eff.Inten.(mm/hr)=		131.63	13.63	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.10 (ii)	4.48 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.23	
PEAK FLOW	(cms)=	0.37	0.00	0.378 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	68.38	11.81	63.85
TOTAL RAINFALL	(mm)=	69.38	69.38	69.38
RUNOFF COEFFICIENT	=	0.99	0.17	0.92

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

CHAMBER(0004)	IN= 2--> OUT= 3	DT= 5.0 min

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.12	0.378	1.33	63.85
OUTFLOW:ID= 1	1.12	0.009	4.00	20.86
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 67.33
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 601.84
Volume of maximum water storage (cu.m.)= 611.33
Calculated Drawdown Time (Hr)= 54.83

Junction Command(0005)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

CALIB	NASHYD (0002)	ID= 1 DT= 5.0 min

Area (ha)= 0.08 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.34	1.083	31.84	2.083	12.58	3.08	7.30
0.167	6.34	1.167	31.84	2.167	12.58	3.17	7.30
0.250	7.08	1.250	131.63	2.250	11.08	3.25	6.87
0.333	7.08	1.333	131.63	2.333	11.08	3.33	6.87
0.417	8.07	1.417	39.74	2.417	9.96	3.42	6.50
0.500	8.07	1.500	39.74	2.500	9.96	3.50	6.50
0.583	9.51	1.583	23.97	2.583	9.08	3.58	6.18
0.667	9.51	1.667	23.97	2.667	9.08	3.67	6.18
0.750	11.82	1.750	17.98	2.750	8.38	3.75	5.90
0.833	11.82	1.833	17.98	2.833	8.38	3.83	5.90
0.917	16.33	1.917	14.70	2.917	7.79	3.92	5.64
1.000	16.33	2.000	14.70	3.000	7.79	4.00	5.64

Unit Hyd Qpeak (cms)= 0.076

PEAK FLOW (cms)= 0.002 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 7.046

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     TOTAL RAINFALL   (mm)=  69.379
     RUNOFF COEFFICIENT   =   0.102

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

--------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0007)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  5.0 MIN    |  STORAGE LAYER:
------------------  Length          (m)=  20.00   Height                (m)=   1.00
                    Porosity           =   0.40   Initial Water Level   (m)=   0.00
                    Width           (m)=   1.50   Min. Drawdown        (hr)=  24.00
                    Max. Drawdown  (hr)=  33.33   Available Storage  (cu.m.)=  12.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0120

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.08         0.002             1.33         7.12
    OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                       If RVout= (Overflow            )=      100.00
              Time to reach Max storage              (Hr)=       4.17
              Volume of water for drawdown in LID (cu.m.)=       4.59
              Volume of maximum water storage     (cu.m.)=       4.62
              Calculated Drawdown Time               (Hr)=      12.67

  --------------------------
  | Junction Command(0008) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0007)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0008)    0.00     0.00    0.00     0.00

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.11   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  16.50   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.02

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    6.34 | 1.083   31.84 | 2.083   12.58 |  3.08    7.30
               0.167    6.34 | 1.167   31.84 | 2.167   12.58 |  3.17    7.30
               0.250    7.08 | 1.250  131.63 | 2.250   11.08 |  3.25    6.87
               0.333    7.08 | 1.333  131.63 | 2.333   11.08 |  3.33    6.87
               0.417    8.07 | 1.417   39.74 | 2.417    9.96 |  3.42    6.50
               0.500    8.07 | 1.500   39.74 | 2.500    9.96 |  3.50    6.50
               0.583    9.51 | 1.583   23.97 | 2.583    9.08 |  3.58    6.18
               0.667    9.51 | 1.667   23.97 | 2.667    9.08 |  3.67    6.18
               0.750   11.82 | 1.750   17.98 | 2.750    8.38 |  3.75    5.90
               0.833   11.82 | 1.833   17.98 | 2.833    8.38 |  3.83    5.90
               0.917   16.33 | 1.917   14.70 | 2.917    7.79 |  3.92    5.64
               1.000   16.33 | 2.000   14.70 | 3.000    7.79 |  4.00    5.64

    Unit Hyd Qpeak  (cms)=   0.210

    PEAK FLOW       (cms)=   0.000 (i)
    TIME TO PEAK    (hrs)=   1.333
    RUNOFF VOLUME    (mm)=   0.822
    TOTAL RAINFALL   (mm)=  69.379
    RUNOFF COEFFICIENT   =   0.012

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

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  --------------------------
  | Junction Command(0006) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0004)    1.12     0.01    4.00    20.86
  OUTFLOW: ID= 2(  0006)    1.12     0.01    4.00    20.86

  --------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     0.11   0.000     1.33     0.82
      + ID2= 2 (  0006):     1.12   0.009     4.00    20.86
        ================================================
        ID = 3 (  0009):     1.23   0.009     4.00    19.07

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0008 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0009):     1.23   0.009     4.00    19.07
      + ID2= 2 (  0008):     0.00   0.000     0.00     0.00
        ================================================
        ID = 1 (  0009):     1.23   0.009     4.00    19.07

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

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

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

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\c4a8c3a6-c310-4267-a4ca-eb9a4d7c5de2\scen
Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\c4a8c3a6-c310-4267-a4ca-eb9a4d7c5de2\scen

DATE: 02/29/2024 TIME: 10:53:28

USER:

COMMENTS: _____

** SIMULATION : 05_50-Year Norfolk **

| CHICAGO STORM | Ptotal= 78.32 mm |

IDF curve parameters: A= 766.038
B= 1.898
C= 0.668
used in: INTENSITY = A / (t + B)^C

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	7.35	1.00	35.40	2.00	14.38	3.00	8.44
0.17	8.19	1.17	146.50	2.17	12.71	3.17	7.96
0.33	9.32	1.33	43.93	2.33	11.45	3.33	7.55
0.50	10.95	1.50	26.91	2.50	10.46	3.50	7.18
0.67	13.53	1.67	20.36	2.67	9.66	3.67	6.85
0.83	18.53	1.83	16.73	2.83	9.00	3.83	6.56

| CALIB | STANDHYD (0001) | ID= 1 DT= 5.0 min |

Area (ha)= 1.12
Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.09
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.41	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

				TOTALS
Max.Eff.Inten.(mm/hr)=		146.50	18.29	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.01 (ii)	4.29 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.23	
PEAK FLOW	(cms)=	0.42	0.01	0.422 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	77.32	15.55	72.38
TOTAL RAINFALL	(mm)=	78.32	78.32	78.32
RUNOFF COEFFICIENT	=	0.99	0.20	0.92

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CHAMBER(0004) | IN= 2--> OUT= 3 | DT= 5.0 min |

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.12	0.422	1.33	72.38
OUTFLOW:ID= 1	1.12	0.011	4.00	28.10
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 61.17
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 677.07
Volume of maximum water storage (cu.m.)= 688.32
Calculated Drawdown Time (Hr)= 56.58

| Junction Command(0005) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

| CALIB | NASHYD (0002) | ID= 1 DT= 5.0 min |

Area (ha)= 0.08 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	7.35	1.083	35.40	2.083	14.38	3.08	8.44
0.167	7.35	1.167	35.40	2.167	14.38	3.17	8.44
0.250	8.19	1.250	146.50	2.250	12.71	3.25	7.96
0.333	8.19	1.333	146.50	2.333	12.71	3.33	7.96
0.417	9.32	1.417	43.93	2.417	11.45	3.42	7.55
0.500	9.32	1.500	43.93	2.500	11.45	3.50	7.55
0.583	10.95	1.583	26.91	2.583	10.46	3.58	7.18
0.667	10.95	1.667	26.91	2.667	10.46	3.67	7.18
0.750	13.53	1.750	20.36	2.750	9.66	3.75	6.85
0.833	13.53	1.833	20.36	2.833	9.66	3.83	6.85
0.917	18.53	1.917	16.73	2.917	9.00	3.92	6.56
1.000	18.53	2.000	16.73	3.000	9.00	4.00	6.56

Unit Hyd Qpeak (cms)= 0.076

PEAK FLOW (cms)= 0.003 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 9.280
TOTAL RAINFALL (mm)= 78.320

```
     RUNOFF COEFFICIENT   =   0.118

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

--------------------------------------------------------------------------------
------------------
|SOAKAWAY(  0007)|  UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT=  5.0 MIN    |  STORAGE LAYER:
-----------------  Length          (m)=  20.00   Height                (m)=   1.00
                   Porosity           =   0.40   Initial Water Level   (m)=   0.00
                   Width           (m)=   1.50   Min. Drawdown        (hr)=  24.00
                   Max. Drawdown  (hr)=  33.33   Available Storage  (cu.m.)=  12.00

                   NATIVE SOIL LAYER:
                   Infiltration (m/hr) = 0.0120

                      AREA         QPEAK            TPEAK         R.V.
                      (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2     0.08         0.003             1.33         9.35
    OVERFLOW:ID= 3    0.00         0.000             0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%):
                       If RVout= (Overflow            )=      100.00
              Time to reach Max storage              (Hr)=        4.17
              Volume of water for drawdown in LID (cu.m.)=        6.37
              Volume of maximum water storage     (cu.m.)=        6.40
              Calculated Drawdown Time               (Hr)=       17.67

  --------------------------
  | Junction Command(0008) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 3(  0007)    0.00     0.00    0.00     0.00
  OUTFLOW: ID= 2(  0008)    0.00     0.00    0.00     0.00

  ------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.11   Curve Number   (CN)= 58.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  16.50   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.02

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    7.35 | 1.083   35.40 | 2.083   14.38 |  3.08    8.44
               0.167    7.35 | 1.167   35.40 | 2.167   14.38 |  3.17    8.44
               0.250    8.19 | 1.250  146.50 | 2.250   12.71 |  3.25    7.96
               0.333    8.19 | 1.333  146.50 | 2.333   12.71 |  3.33    7.96
               0.417    9.32 | 1.417   43.93 | 2.417   11.45 |  3.42    7.55
               0.500    9.32 | 1.500   43.93 | 2.500   11.45 |  3.50    7.55
               0.583   10.95 | 1.583   26.91 | 2.583   10.46 |  3.58    7.18
               0.667   10.95 | 1.667   26.91 | 2.667   10.46 |  3.67    7.18
               0.750   13.53 | 1.750   20.36 | 2.750    9.66 |  3.75    6.85
               0.833   13.53 | 1.833   20.36 | 2.833    9.66 |  3.83    6.85
               0.917   18.53 | 1.917   16.73 | 2.917    9.00 |  3.92    6.56
               1.000   18.53 | 2.000   16.73 | 3.000    9.00 |  4.00    6.56

     Unit Hyd Qpeak  (cms)=   0.210

     PEAK FLOW       (cms)=   0.001 (i)
     TIME TO PEAK    (hrs)=   1.333
     RUNOFF VOLUME    (mm)=   1.083
     TOTAL RAINFALL   (mm)=  78.320
     RUNOFF COEFFICIENT   =   0.014

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

--------------------------------------------------------------------------------

  --------------------------
  | Junction Command(0006) |
  --------------------------

                          AREA     QPEAK   TPEAK     R.V.
                          (ha)     (cms)    (hrs)     (mm)
  INFLOW : ID= 1(  0004)    1.12     0.01    4.00    28.10
  OUTFLOW: ID= 2(  0006)    1.12     0.01    4.00    28.10

  ------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     0.11   0.001     1.33     1.08
      + ID2= 2 (  0006):     1.12   0.011     4.00    28.10
        ================================================
        ID = 3 (  0009):     1.23   0.011     4.00    25.69

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0008 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0009):     1.23   0.011     4.00    25.69
      + ID2= 2 (  0008):     0.00   0.000     0.00     0.00
        ================================================
        ID = 1 (  0009):     1.23   0.011     4.00    25.69

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

100-YEAR STORM

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

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

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
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Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\4d080023-452c-4ab5-b196-efec8b939418\scen

DATE: 02/29/2024 TIME: 10:53:28

USER:

COMMENTS: _____

** SIMULATION : 06_100-Year Norfolk **

CHICAGO STORM
Ptotal= 87.09 mm

IDF curve parameters: A= 801.041
B= 1.501
C= 0.657
used in: INTENSITY = A / (t + B)^C

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	8.40	1.00	38.70	2.00	16.17	3.00	9.61
0.17	9.34	1.17	160.97	2.17	14.33	3.17	9.08
0.33	10.59	1.33	47.72	2.33	12.95	3.33	8.61
0.50	12.39	1.50	29.71	2.50	11.86	3.50	8.20
0.67	15.24	1.67	22.67	2.67	10.97	3.67	7.84
0.83	20.69	1.83	18.74	2.83	10.24	3.83	7.51

CALIB
STANDHYD (0001)
ID= 1 DT= 5.0 min

Area (ha)= 1.12
Total Imp(%)= 92.00 Dir. Conn.(%)= 92.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.09
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.41	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

				TOTALS
Max.Eff.Inten.(mm/hr)=		160.97	24.31	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.93 (ii)	4.13 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.24	
PEAK FLOW	(cms)=	0.46	0.01	0.465 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	86.09	19.58	80.77
TOTAL RAINFALL	(mm)=	87.09	87.09	87.09
RUNOFF COEFFICIENT	=	0.99	0.22	0.93

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHAMBER(0004)	IN= 2--> OUT= 3	DT= 5.0 min

OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.12	0.465	1.33	80.77
OUTFLOW:ID= 1	1.12	0.013	4.00	35.41
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)= 56.16
Time to reach Max storage (Hr)= 4.00
Volume of water for drawdown in LID (cu.m.)= 751.99
Volume of maximum water storage (cu.m.)= 764.90
Calculated Drawdown Time (Hr)= 58.08

Junction Command(0005)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

CALIB	NASHYD (0002)	ID= 1 DT= 5.0 min

Area (ha)= 0.08 Curve Number (CN)= 58.0
Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.04

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Unit Hyd Qpeak (cms)= 0.076

PEAK FLOW (cms)= 0.004 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 11.683
TOTAL RAINFALL (mm)= 87.089

RUNOFF COEFFICIENT = 0.134

FINISH

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

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length (m)= 20.00 Height (m)= 1.00
Porosity = 0.40 Initial Water Level (m)= 0.00
Width (m)= 1.50 Min. Drawdown (hr)= 24.00
Max. Drawdown (hr)= 33.33 Available Storage (cu.m.)= 12.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.08	0.004	1.33	11.76
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.17
Volume of water for drawdown in LID (cu.m.)= 8.28
Volume of maximum water storage (cu.m.)= 8.31
Calculated Drawdown Time (Hr)= 22.92

| Junction Command(0008) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

| CALIB |
| NASHYD (0003)| Area (ha)= 0.11 Curve Number (CN)= 58.0
|ID= 1 DT= 5.0 min | Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.02

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	8.40	1.083	38.70	2.083	16.17	3.08	9.61
0.167	8.40	1.167	38.70	2.167	16.17	3.17	9.61
0.250	9.34	1.250	160.97	2.250	14.33	3.25	9.08
0.333	9.34	1.333	160.97	2.333	14.33	3.33	9.08
0.417	10.59	1.417	47.72	2.417	12.95	3.42	8.61
0.500	10.59	1.500	47.72	2.500	12.95	3.50	8.61
0.583	12.39	1.583	29.71	2.583	11.86	3.58	8.20
0.667	12.39	1.667	29.71	2.667	11.86	3.67	8.20
0.750	15.24	1.750	22.67	2.750	10.97	3.75	7.84
0.833	15.24	1.833	22.67	2.833	10.97	3.83	7.84
0.917	20.69	1.917	18.74	2.917	10.24	3.92	7.51
1.000	20.69	2.000	18.74	3.000	10.24	4.00	7.51

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.001 (i)
TIME TO PEAK (hrs)= 1.333
RUNOFF VOLUME (mm)= 1.363
TOTAL RAINFALL (mm)= 87.089
RUNOFF COEFFICIENT = 0.016

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

| Junction Command(0006) |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	1.12	0.01	4.00	35.41
OUTFLOW: ID= 2(0006)	1.12	0.01	4.00	35.41

| ADD HYD (0009)|
| 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	0.11	0.001	1.33	1.36
+ ID2= 2 (0006):	1.12	0.013	4.00	35.41
ID = 3 (0009):	1.23	0.013	4.00	32.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0009)|
| 3 + 2 = 1 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.				
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003				
ID1= 3 (0009):	1.23	0.013	4.00	32.36
+ ID2= 2 (0008):	0.00	0.000	0.00	0.00
ID = 1 (0009):	1.23	0.013	4.00	32.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

25mm QUALITY STORM

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

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

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***** D E T A I L E D O U T P U T *****

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Summary filename: C:\Users\Natalie\AppData\Local\Civica\VH5\f825abd2-5f32-4c68-9c0f-9f2fb80764f6\35781785-a6fb-4e32-95b2-6436175a98e2\scen

DATE: 02/29/2024 TIME: 10:53:28

USER:

COMMENTS: _____

****
** SIMULATION : 25 mm, 4 hr Norfolk **
****

READ STORM | Filename: C:\Users\Natalie\AppData\Local\Temp\e9890c87-84a9-4a2d-8471-577fc49e9232\c2700bce
Ptotal= 25.00 mm | Comments: 25 mm, 4 hr Norfolk

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.17	12.56	2.33	3.61	3.50	1.96
0.17	1.90	1.33	51.29	2.50	3.19	3.67	1.85
0.33	2.16	1.50	16.17	2.67	2.87	3.83	1.75
0.50	2.51	1.67	8.96	2.83	2.61	4.00	1.67
0.67	3.03	1.83	6.38	3.00	2.41		
0.83	3.90	2.00	5.03	3.17	2.23		
1.00	5.69	2.17	4.19	3.33	2.09		

CALIB | STANDHYD (0001) | ID= 1 DT= 5.0 min | Area (ha)= 1.12 | Total Imp(%)= 92.00 | Dir. Conn.(%)= 92.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.03	0.09
Dep. Storage	(mm)=	1.00	16.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	86.41	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.167	5.69	2.250	4.19	3.33	2.23
0.167	0.00	1.250	12.56	2.333	4.19	3.42	2.09
0.250	1.90	1.333	12.56	2.417	3.61	3.50	2.09
0.333	1.90	1.417	51.29	2.500	3.61	3.58	1.96
0.417	2.16	1.500	51.29	2.583	3.19	3.67	1.96
0.500	2.16	1.583	16.17	2.667	3.19	3.75	1.85
0.583	2.51	1.667	16.17	2.750	2.87	3.83	1.85
0.667	2.51	1.750	8.96	2.833	2.87	3.92	1.75
0.750	3.03	1.833	8.96	2.917	2.61	4.00	1.75
0.833	3.03	1.917	6.38	3.000	2.61	4.08	1.67
0.917	3.89	2.000	6.38	3.083	2.41	4.17	1.67
1.000	3.90	2.083	5.03	3.167	2.41		
1.083	5.69	2.167	5.03	3.250	2.23		

Max.Eff.Inten.	(mm/hr)=	51.29	0.17	
over	(min)	5.00	10.00	
Storage Coeff.	(min)=	3.06 (ii)	6.53 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	10.00	
Unit Hyd. peak	(cms)=	0.27	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.14	0.00	0.143 (iii)
TIME TO PEAK	(hrs)=	1.50	2.58	1.50
RUNOFF VOLUME	(mm)=	24.00	0.38	22.11
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.02	0.88

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHAMBER(0004) | IN= 2--> OUT= 3 | DT= 5.0 min | OUTFLOW: ON, UNDERDRAIN: OFF, INFIL: ON
CHAMBER:
MAX STO VOL (cu.m.)= 776.77 Bottom Area(m2) = 679.72

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	991.00	467.67
25.00	6.90	1016.00	480.03
51.00	13.81	1041.00	492.21
76.00	20.71	1067.00	504.21
102.00	27.62	1092.00	515.99
127.00	34.52	1118.00	527.56
152.00	41.43	1143.00	538.89
178.00	48.33	1168.00	549.97
203.00	55.23	1194.00	560.77
229.00	62.14	1219.00	571.26
254.00	69.04	1245.00	581.41
279.00	75.95	1270.00	591.17
305.00	90.92	1295.00	600.42
330.00	105.81	1321.00	608.89
356.00	120.66	1346.00	616.72
381.00	135.46	1372.00	624.30
406.00	150.21	1397.00	631.65
432.00	164.91	1422.00	638.68
457.00	179.55	1448.00	645.59
483.00	194.14	1473.00	652.49
508.00	208.66	1499.00	659.39
533.00	223.12	1524.00	666.30
559.00	237.51	1549.00	673.20
584.00	251.83	1575.00	680.11
610.00	266.08	1600.00	687.01
635.00	280.25	1626.00	693.92
660.00	294.33	1651.00	700.82
686.00	308.33	1676.00	707.72
711.00	322.24	1702.00	714.63
737.00	336.05	1727.00	721.53
762.00	349.77	1753.00	728.44
787.00	363.37	1778.00	735.34
813.00	376.87	1803.00	742.25
838.00	390.24	1829.00	749.15
864.00	403.50	1854.00	756.05
889.00	416.62	1880.00	762.96
914.00	429.61	1905.00	769.86
940.00	442.45	1930.00	776.77
965.00	455.14	0.00	0.00

DEPTH (m)	DISCHARGE (cms)	DEPTH (m)	DISCHARGE (cms)
0.000	0.000	0.580	0.009
0.080	0.003	0.690	0.010
0.180	0.005	0.790	0.011
0.280	0.007	0.890	0.012
0.380	0.008	0.990	0.012
0.480	0.009	1.090	0.013

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	1.12	0.143	1.50	22.11
OUTFLOW:ID= 1	0.00	0.000	0.00	0.00
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)=		100.00
Time to reach Max storage	(Hr)=	4.17
Volume of water for drawdown in LID	(cu.m.)=	216.35
Volume of maximum water storage	(cu.m.)=	218.05
Calculated Drawdown Time	(Hr)=	26.50

Junction Command(0005)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0005)	0.00	0.00	0.00	0.00

****

CALIB | NASHYD (0002) | ID= 1 DT= 5.0 min | Area (ha)= 0.08 | Ia (mm)= 16.50 | U.H. Tp(hrs)= 0.04 | Curve Number (CN)= 58.0 | # of Linear Res.(N)= 3.00

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.167	5.69	2.250	4.19	3.33	2.23
0.167	0.00	1.250	12.56	2.333	4.19	3.42	2.09
0.250	1.90	1.333	12.56	2.417	3.61	3.50	2.09
0.333	1.90	1.417	51.29	2.500	3.61	3.58	1.96
0.417	2.16	1.500	51.29	2.583	3.19	3.67	1.96
0.500	2.16	1.583	16.17	2.667	3.19	3.75	1.85
0.583	2.51	1.667	16.17	2.750	2.87	3.83	1.85
0.667	2.51	1.750	8.96	2.833	2.87	3.92	1.75
0.750	3.03	1.833	8.96	2.917	2.61	4.00	1.75
0.833	3.03	1.917	6.38	3.000	2.61	4.08	1.67
0.917	3.89	2.000	6.38	3.083	2.41	4.17	1.67
1.000	3.90	2.083	5.03	3.167	2.41		
1.083	5.69	2.167	5.03	3.250	2.23		

Unit Hyd Qpeak (cms)= 0.076

PEAK FLOW	(cms)=	0.000 (i)
TIME TO PEAK	(hrs)=	2.333
RUNOFF VOLUME	(mm)=	0.224
TOTAL RAINFALL	(mm)=	24.999

RUNOFF COEFFICIENT = 0.009

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

FINISH

==========

|SOAKAWAY(0007)| UNDERDRAIN: OFF
|IN= 2--> OUT= 3 |
|DT= 5.0 MIN | STORAGE LAYER:

Length	(m)=	20.00	Height	(m)=	1.00
Porosity	=	0.40	Initial Water Level	(m)=	0.00
Width	(m)=	1.50	Min. Drawdown	(hr)=	24.00
Max. Drawdown	(hr)=	33.33	Available Storage	(cu.m.)=	12.00

NATIVE SOIL LAYER:
Infiltration (m/hr) = 0.0120

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW:ID= 2	0.08	0.001	4.25	0.66
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%):
If RVout= (Overflow)= 100.00
Time to reach Max storage (Hr)= 4.33
Volume of water for drawdown in LID (cu.m.)= 0.26
Volume of maximum water storage (cu.m.)= 0.29
Calculated Drawdown Time (Hr)= 0.67

Junction Command(0008)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 3(0007)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0008)	0.00	0.00	0.00	0.00

CALIB
NASHYD (0003)| Area (ha)= 0.11 Curve Number (CN)= 58.0
ID= 1 DT= 5.0 min	Ia (mm)= 16.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.02

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	1.167	5.69	2.250	4.19	3.33	2.23
0.167	0.00	1.250	12.56	2.333	4.19	3.42	2.09
0.250	1.90	1.333	12.56	2.417	3.61	3.50	2.09
0.333	1.90	1.417	51.29	2.500	3.61	3.58	1.96
0.417	2.16	1.500	51.29	2.583	3.19	3.67	1.96
0.500	2.16	1.583	16.17	2.667	3.19	3.75	1.85
0.583	2.51	1.667	16.17	2.750	2.87	3.83	1.85
0.667	2.51	1.750	8.96	2.833	2.87	3.92	1.75
0.750	3.03	1.833	8.96	2.917	2.61	4.00	1.75
0.833	3.03	1.917	6.38	3.000	2.61	4.08	1.67
0.917	3.89	2.000	6.38	3.083	2.41	4.17	1.67
1.000	3.90	2.083	5.03	3.167	2.41		
1.083	5.69	2.167	5.03	3.250	2.23		

Unit Hyd Qpeak (cms)= 0.210

PEAK FLOW (cms)= 0.000 (i)
TIME TO PEAK (hrs)= 0.000
RUNOFF VOLUME (mm)= 0.000
TOTAL RAINFALL (mm)= 24.999
RUNOFF COEFFICIENT = 0.000

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

Junction Command(0006)

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 1(0004)	0.00	0.00	0.00	0.00
OUTFLOW: ID= 2(0006)	0.00	0.00	0.00	0.00

ADD HYD (0009)			AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0003):		0.11	0.000	0.00	0.00
	+ ID2= 2 (0006):		0.00	0.000	0.00	0.00
	ID = 3 (0009):		0.11	0.000	0.00	0.00

*** W A R N I N G : HYDROGRAPH 0006 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0003 = HYDROGRAPH 0001

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)			AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1	ID1= 3 (0009):		0.11	0.000	0.00	0.00
	+ ID2= 2 (0008):		0.00	0.000	0.00	0.00
	ID = 1 (0009):		0.11	0.000	0.00	0.00

*** W A R N I N G : HYDROGRAPH 0008 <ID= 2> IS DRY.
*** W A R N I N G : HYDROGRAPH 0001 = HYDROGRAPH 0003

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

APPENDIX F

10-034 Yin's Subdivision - Phase 5 Stormwater Management Report
(G. Douglas Vallee Engineering Limited, December 10, 2010)

vallee

Consulting Engineers, Architects & Planners

December 10, 2010

Tony Yin
204 McMichael Rd
RR#4
Waterford, ON N0E 1Y0

Attention: **Mr. Tony Yin**

Dear Sir:

Reference: **Storm Water Management Report**
Yin's Subdivision – Phase 5
Waterford – Norfolk County
Our File 10034

1.0 Introduction

This storm water report has been completed to summarize the storm water management design for Phase 5 of the Yin's Subdivision in Waterford, Norfolk County, Ontario. It is the intention to submit this report to the Norfolk County and the Long Point Region Conservation Authority for review and approval.

Yin's Subdivision Phase 5 is a single family residential development located at the southern end of Waterford along Main Street (Old Highway 24). The site is bordered by agricultural lands to the south and west; single-family residences to the north and Main Street to the west. Figure 1 shows the overall development. This report will outline the SWM plan for the overall development.

The SWMHYMO computer model has been used to simulate the sub watershed under pre and post development conditions. The simulations were conducted using the 4-hour Chicago Distribution design storm of the 2-year, 5-year, 10-year, 25-year, 50-year and 100-year storm events.

The receiver for the discharge from the development is the Waterford South Municipal Drain. This municipal drain is a storm sewer system and also includes a dry pond facility at the down stream end of the system. Therefore, a basic level of protection is proposed with respect to water quality enhancement.

2.0 Pre-Development

Typically, it is requirement for development sites to reduce or control the post development runoff from the site to levels that do not exceed pre-development conditions. This is achieved by directing the majority of runoff to a retention area or areas. The release from these areas is controlled by means of orifice plates and/or weirs.

However, in this case the outlet for the proposed SWM facility will be the Waterford South Municipal Drain, which is a storm sewer system. Therefore, the Drain has a finite design capacity and the capacity attributable to the portion of the site within the drainage area of the municipal drain will be the limiting factor for the total discharge from the site, post development. Figure 2 shows the overall development site along with the portion of the site that is within the Waterford South Municipal Drain. Design information for the storm sewer along Main Street is unavailable from Norfolk County. However, this office completed the design of the Waterford South Municipal Drain and it is known the 2-year design storm was used.

The total site area is approximately 14.0 ha and the portion within the Waterford South Municipal drain is approximately 6.0 ha.

The SWMHYMO computer model was used to simulate pre-development conditions the portion of the site within the municipal drain's drainage area. The model uses a modified SCS procedure to estimate losses that occur naturally during a rainfall event such as evaporation and infiltration. For the areas with rural runoff characteristics, Table 1 summarizes the background information and input parameters for the computer model with complete notes included with this report as Appendix A.

Table 1
SWMHYMO Model Input – Pre Development

Parameters	Value
Area (ha)	6.0 ha
Soil Type	Fox – sand and loamy sand Granby – sand and loamy sand Wilsonville – sandy textures over gravelly sand
Hydrologic Soil Group	A
SCS Curve Number	58
Longest Flow Path (m)	429m
Average Slope (%)	1.63%
Runoff Coeff	0.2
Time to Peak (hrs)	0.52

The estimated peak pre-development storm water runoff generated from portion of the site within the Waterford South Municipal Drain is 0.064 cms.

3.0 Post-Development

Due the topography of the existing site, specifically the low elevation of Main Street relative to the elevation of the proposed SWM facility, Blocks 3 and 4 as well as small portion of Street B will not be able to drain to the SWM facility. These areas will connect directly to the proposed outlet sewer along Main Street. Therefore to achieve the required reduction in post development discharge to the identified criteria for the site, these two blocks will have a limiting post development discharge of 0.015 cms each. Both Blocks 3 and 4 will be subject to a site plan approval process with Norfolk County and as part of any submissions for these sites a SWM plan will need to be included demonstrating that the limiting discharge is achieved for these sites.

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As was indicated previously the total development site is approximately 14 ha. Therefore the contributing area to the proposed SWM facility can be estimated by reducing the total area by the areas of Blocks 3 and 4 as will as the portion of Street A (approximately 2.18 ha). This results in a contributing area to the SWM facility of 11.82 ha.

Post development, impervious land areas will be introduced to each of these areas to differing degrees. For the areas within the development the following assumptions have been made with respect to impervious surfaces introduced post development.

- Assumed roof and driveway area per town single family unit $230m^2$
- Municipal Road (includes sidewalk one side) $11m^2/m$
  (Road area considered directly connected to storm sewers)

The impervious land area introduced on the town house block and the apartment block has been assumed to be 75% of the total area of these blocks. Of this impervious area, 50% has been attributed to the parking/drive areas and therefore is considered directly connected.

For the commercial blocks, the impervious land area has assumed to 90% of total block areas with 50% of this impervious area corresponding to the parking/drive areas of the sites.

Table 2 summarizes the anticipated impervious land areas for the development.

Table 2
Post Development Impervious Areas

Area	Total Area (ha)	Impervious Area (ha)	Directly Connected (ha)
SFD	9.3	3.47	1.52
Block 1 – TWNHSE	0.57	0.43	0.21
Block 2 – Apartments	0.69	0.52	0.26
Block 3 - Commercial	0.8	0.72	0.36
Block 4 – Commercial	1.4	1.26	0.63
Block 5 – SWM	1.26	1.13	0.57
TOTAL	14.02	3.55	7.53

Discharge to Storage Relationship
To determine the required level of storage for a storm water detention pond, the post-development conditions were modeled, again using the SWMHYMO computer model. In order for the computer model to determine the storage volume required the relationship between the storage volume of the pond and the discharge must be defined and is referred to as the pond-rating curve. This rating curve is determined by calculating volume of the proposed pond facility up to a proposed contour elevation and then calculating the expected discharge from the facility based on the water level at this contour elevation and the proposed outlet control configuration.

Generally orifices or weirs can control discharge from SWM facilities. Each of these control methods can be used by the singular control or they can be used in combination depending on the discharge characteristics desired. For this facility only an orifice and weir will be used to control with the following equations used to estimate discharge

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1. Orifice
   - $Q = C * A * \sqrt{2 * g * h}$

   where: Q = Discharge in cms
   C = constant, 0.63
   A = orifice area in m^2
   g = gravitational constant, 9.81 m/s^2
   h = height above orifice, m

For this facility a 125mm orifice will be used as the outlet control beginning at elevation 243.25. The complete rating curve is appended to this report as Appendix B.

Post Development Model
The post development model developed for this report as included as Appendix C. Table 3 summarizes the post development conditions for the storm events analyzed.

Table 3
Post Development Discharge

Event	Post Development to WSMD (cms)	Allowable Discharge to WSMD (cms)
2-Year	0.047	0.064
5-Year	0.050	
10-Year	0.053	
25-Year	0.055	
50-Year	0.057	
100-Year	0.060	

For all storm events the peak post development discharge to the WSMD has been controlled to less than the estimated peak pre development runoff from the contributing area to the WSMD.

4.0 Proposed SWM Facility

The Ministry of the Environment's document titled **Stormwater Management Practices Planning and Design Manual** (March 2003) was used in conjunction with requirements of the Norfolk County to determine the design for the storm water ponds for Yin's Subdivision. The following summarizes the design guidelines presented by the manual along with the corresponding value for the proposed facility. The complete calculations are provided as Appendix D.

a) Storage Sizing: Table 3.2 of the MOE design manual provides levels of storage volume required dependent on the percent impervious land area to provide basic protection. For a dry pond facility based on 54% impervious area of the contributing area to the facility, the required volume of storage is $147 m^3/ha$ of contributing area. For the contributing area of 11.82 ha this results in a required storage of 1,738 m^3 and compares to the 1,768 m^3 provided during the quality storm (2-year event).

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b) Detention Time: During the quality storm the design manual indicates a 24 hr detention time as a minimum requirement for dry pond facilities with 48 hr preferred. For the proposed facility the runoff stored during the quality storm (2-year event) is estimated to be between 26 and 35 hours.

c) Minimum Orifice Size: A minimum orifice of 75mm is recommended for wet pond facilities and compares to the 125mm provided by this facility.

d) Active Storage Depth: The MOE guideline recommends a maximum active storage depth of 2.0m. The active storage depth ranges between 0.3m and 0.9m depending on the storm event.

e) Side Slopes: Average side slopes are recommended to be at 4(h):1(v) or flatter. The exposed side slopes of the proposed facility are proposed to be 5(h):1(v).

f) Forebay Settling Length: The design manual outlines the calculation of the required length for the forebay to allow a certain size of particle to settle. The calculation is based on the peak flow rate from the pond during the quality storm, the length to width ratio of the forebay and settling velocity of the particle size (0.0003 m/s). The resulting length is 11m and compares to the 50m provided depending on the pond inlet.

g) Forebay Dispersion Length: The design manual also outlines a calculation to determine the length of forebay required to slow a discharge. This calculation is based on the inlet flow rate during the quality storm (2-year), the depth of the permanent pool in the forebay and the desired velocity in the forebay (0.5 m/s). This results in a target forebay length of 8m and compares to the 38m provided.

h) Sediment Accumulation: Based on the anticipated sediment loading rates outlined by Table 6.3 of the MOE guidelines, the estimated sediment accumulation can be determined based on the impervious land area within the catchment area along with the target removal efficiency of the proposed facility. For the estimated 54% impervious land of the contributing area, sediment accumulation is estimated to be approximately 130m^3 over a 10-year period. This compares to the forebay volume of 444m^3.

5.0 Outlet Capacity

The proposed outlet for the SWM facility outlined by this report is the Waterford South Municipal Drain. The main branch of this drain was constructed along Thompson Road in Waterford and was designed based on the 2-year storm event. Following construction of this drain, the former Regional Municipality of Haldimand Norfolk constructed a storm sewer south along Main Street. The purpose of this storm sewer was to provide an outlet to lands identified within the drainage area of the WSMD. It is unclear as to the genesis of this extension, however it appears that drainage report was not completed to bring this extension under the umbrella of the WSMD.

As was noted previously by this report, the design information for the storm sewer extension along Main Street is unavailable. Therefore to determine if the Main Street storm sewer provides sufficient capacity, design calculations were completed based on the contributing drainage area and at the 2-year storm event, the design event for the WSMD. These calculations, which are appended to this report, indicate that the existing system has insufficient capacity to service the existing drainage area.

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Furthermore, a review of the existing system profile has indicated that the system would have insufficient depth to service the proposed development site.

Therefore, it is proposed to reconstruct this system beginning at the intersection of Thompson Road and proceeding southerly along Main Street with a new storm system of sufficient depth and capacity to service the existing drainage area and the development site. As the design of the WSMD is based on the 2-year event, the design of this new system is based on the 2-year event as well as the controlled discharges from the development site up to the 100-year event. The complete calculations for this system are appended to this report.

6.0 Emergency Overflow

As part of the outlet structure for the proposed SWM facility, a 1.8m square precast concrete catch basin structure has been placed with its top corresponding to the anticipated water level of the proposed SWM facility during the 100-year storm event (244.09 +/-). In the event that a storm event in excess of the 100-year storm occurs or the primary outlet is blocked, discharge from the facility will begin to occur over the top of this structure prior to overflowing the top of bank surrounding the SWM facility.

7.0 Proposed SWM Facility Summary

The following summarizes the proposed SWM Facility, shown drawings SWM1, for the Phase 5 of the Yin's Subdivision in Waterford.

- A dry pond facility with a permanent pool elevation in the sediment forebay of 243.25, pond bottom of elevation in the sediment forebay of 242.00 and top of slope 244.25.
- Permanent pool depth of 1.25m in the sediment forebay with a volume of 896m^3
- Total storage volume provided for the 100-year storm event is 5,0690m^3.
- Discharge from the proposed facility controlled by a 125mm diameter orifice at elevation 234.25.
- Outlet from the proposed facility to be provided by an extension of the WSMD along Main Street to the site. The design of this system to based on the 2-year event for the contributing area along Main Street and the controlled discharge from the development site as follows:
    - SWM Facility - 0.03 cms
    - Block 3 Commercial - 0.015 cms
    - Block 4 Commercial - 0.015 cms
- Emergency overflow flow provided by catch basin structure with top of casting elevation placed at the approximate 100-year storage level (244.09 +/-).

8.0 Erosion and Sediment Control

During construction, the contractor is required to protect the work site and all adjacent lands from sediment and erosion regardless of the source to the satisfaction of all applicable parties. The measures installed by the contractor are to remain in place until such time as there is no further threat of damage.

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9.0 The Drainage Act

During the draft plan approval stage of this development, County staff recognized that the development site was within the drainage area of the WSMD. Therefore, the following draft plan condition was stipulated:

> " 5. The applicant covenants and agrees to pay all costs related to the Corporation of Norfolk County hiring and engineer on behalf of the applicant as per Section 4(1) of the Drainage Act for the purpose of constructing an extension to the existing municipal drain or to construct an entirely new municipal drainage system to service the severed property(s)."

To begin this process a formal request needs to provided by the applicant to Norfolk County.

11.0 Conclusions and Recommendations

It is concluded that:

1. Post development flows from the development site have been controlled to less then the current discharge of the portion of the site within the drainage area of the WSMD.
2. The proposed storm water pond has sufficient capacity and meets the design guidelines outlined by the MOE's document titled **Stormwater Management Practices Planning and Design Manual** (March 2003) for basic protection and requirements Norfolk County.
3. The existing storm sewer along Main Street has insufficient capacity during the 2-year event for the current contributing area to this system.

It is recommended that:

1. This report is provided to the Norfolk County and the Long Point Region Conservation Authority as part of the engineering approval package for the development.
2. Pending approval by the municipality and receipt of the required Ministry of the Environment approvals, the Facility and associated appurtenances be constructed as outlined by this report.
3. The applicant formally request of Norfolk County the appointment of an engineer under the Drainage Act to address the extension of the WSMD to the development site.

We trust that this is the information for submission. Should you have any questions or require further information please do not hesitate to call. Thank you.

Yours truly,

T. Gregory Smith, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

H:\Projects\2010\10-034 Yin Phase 5 Design\DESIGN\10034 Stormwater Report November 2010.doc

Professional Engineers Ontario
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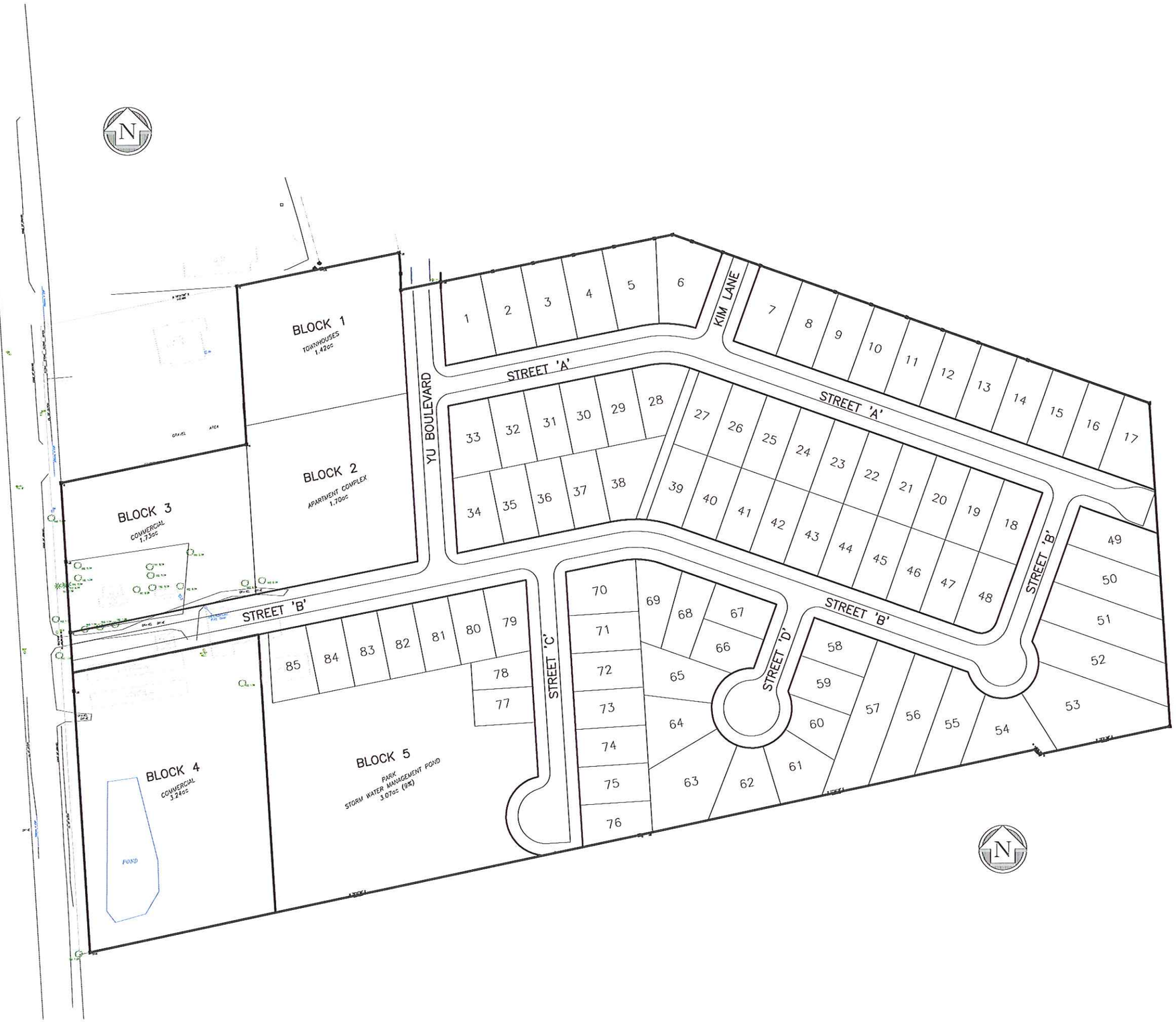
10034 SWM1 – Plan and Section Details



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SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

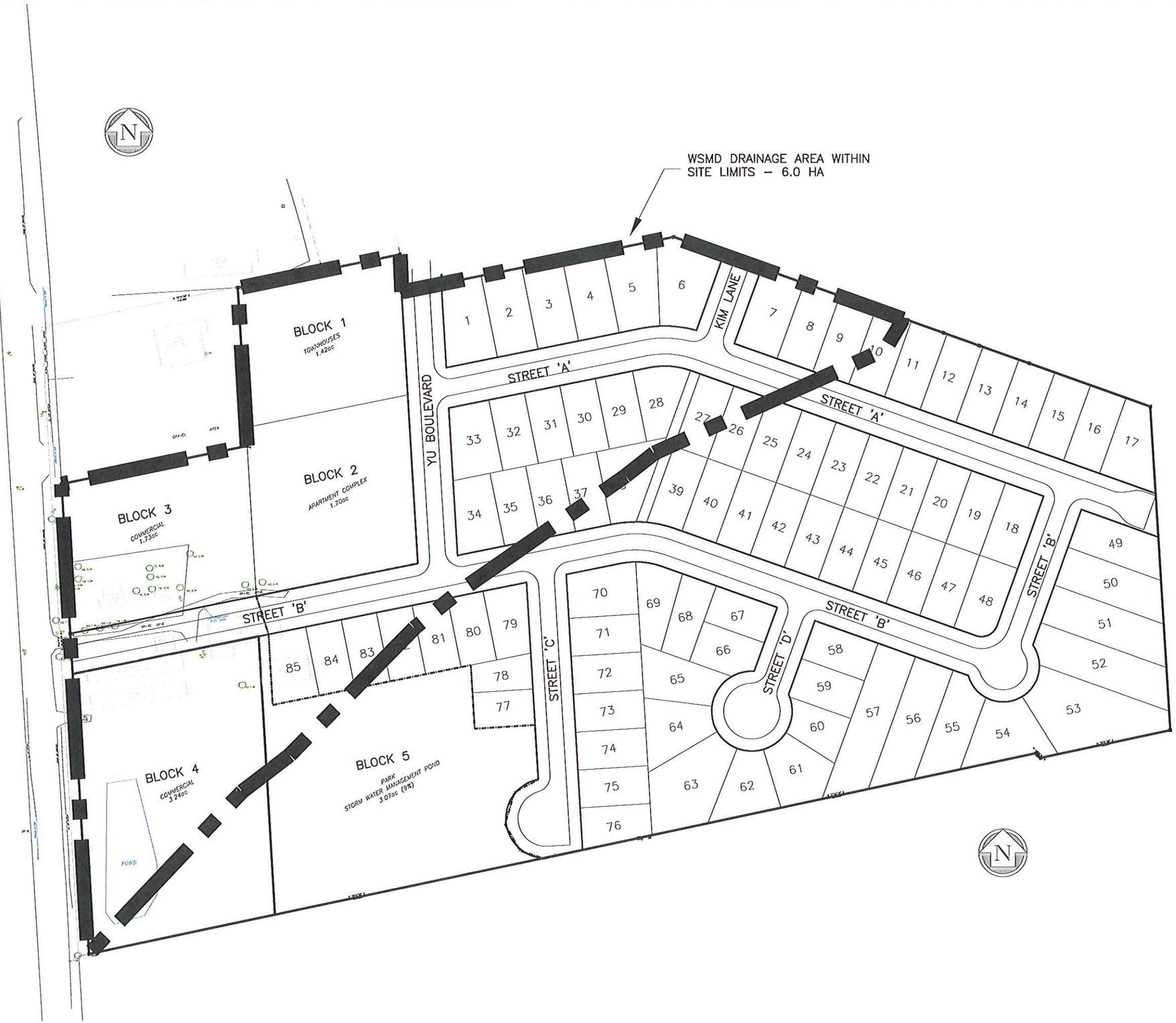
Project Title

YIN'S SUDIVISION
PHASE 5

Drawing Title

FIGURE 1
DEVELOPMENT LAYOUT

Designed by :	Drawn By :	Checked By :
TGS	TGS	
Scale : 1:2000	Date : DEC 2010	Drawing No. F1
Project No. 10034		



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(519) 426-6270

Project Title

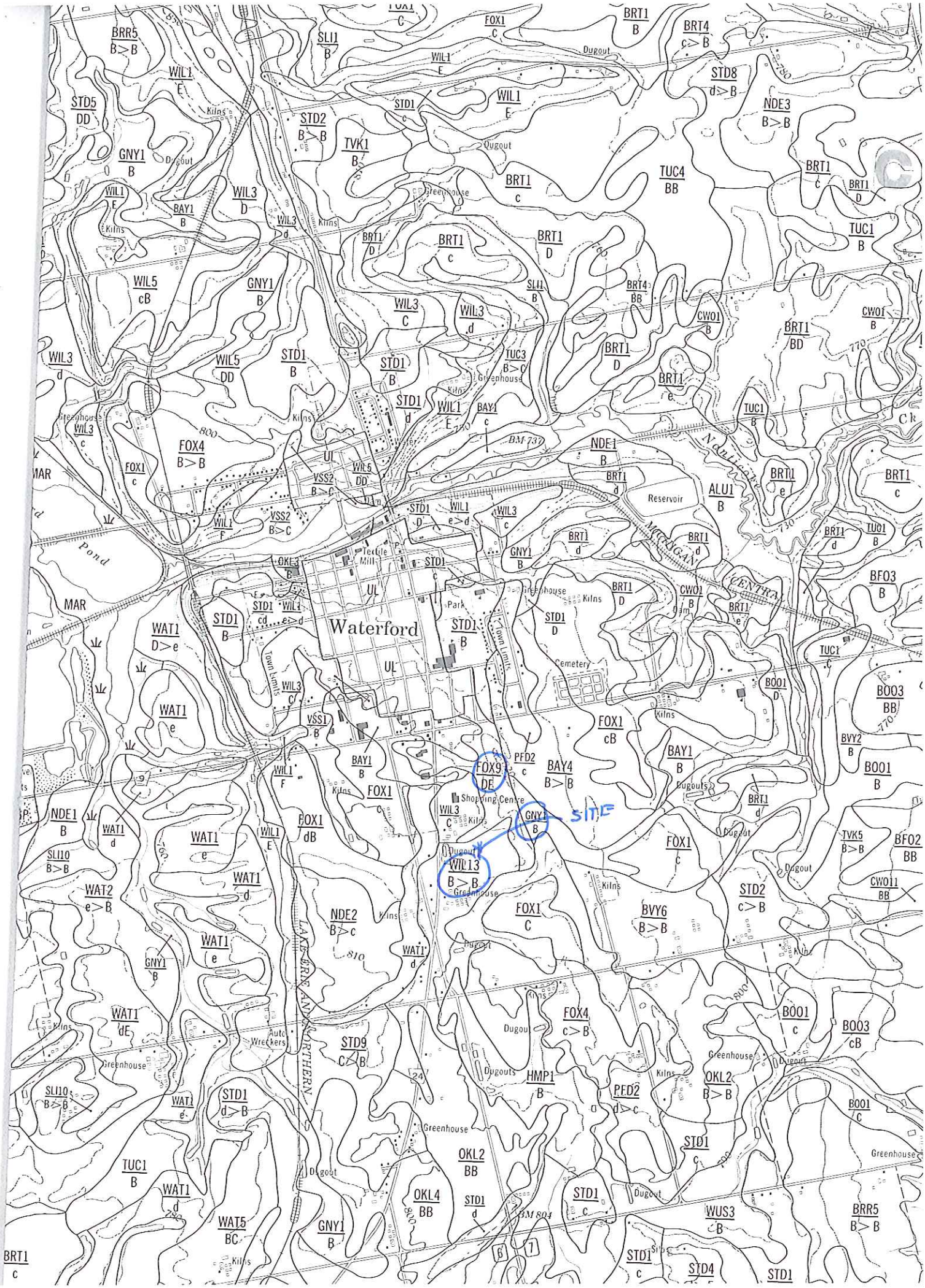
YIN'S SUDIVISION
PHASE 5

Drawing Title

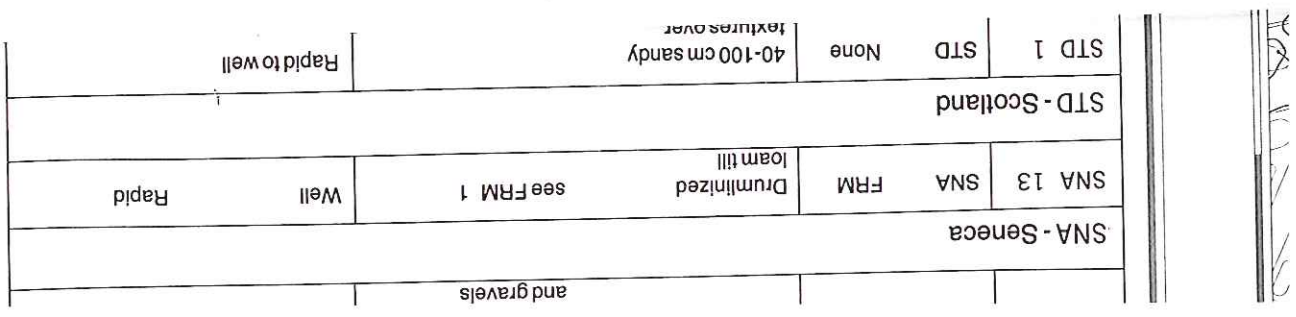
FIGURE 2
WSMD DRAINAGE AREA

Designed by :	Drawn By :	Checked By :
TGS	TGS	
Scale : 1:2000	Date : DEC 2010	Drawing No. F2
Project No. 10034		

Appendix A: Pre-Development Model


Waterford
SITE
Reservoir
Cemetery
Shopping Centre
Textile Mill
Auto Wreckers
Pond
Town Limits
Kilns
Greenhouse
Dugouts
Park
Nantucket
MICHIGAN
CENTRAL
LAKE ERIE AND NORTHERN
BM 737
BM 804
BRR5 B>B
SLI1 B
FOX1 C
BRT1 B
BRT4 c>B
STD8 d>B
NDE3 B>B
WIL1 E
STD5 DD
STD2 B>B
TVK1 B
GNY1 B
TUC4 BB
BRT1 c
BRT1 D
WIL3 D
BAY1 B
WIL3 d
TUC1 B
WIL5 cB
BRT4 BB
CWO1 B
WIL3 C
BRT1 BD
STD1 B
TUC3 B>C
BRT1 e
WIL5 DD
STD1 d
BAY1 c
FOX4 B>B
NDE1 B
ALU1 B
VSS2 B>C
OKL3 E
STD1 cd
WIL1 e>d
BRT1 d
BFO3 B
WAT1 D>e
STD1 D
BOO1 D
BOO3 BB
WAT1 e
VSS1 B
FOX1 cB
BAY1 B
FOX9 DE
PFD2 c
BAY4 B>B
BVY2 B
BOO1 B
NDE1 B
WAT1 d
FOX1 dB
WIL13 B>B
TVK5 B>B
BFO2 BB
SLI10 B>B
WAT2 e>B
WAT1 d
STD2 c>B
CWO11 BB
NDE2 B>c
FOX1 C
BVY6 B>B
WAT1 e
GNY1 B
WAT1 dE
STD9 C>B
FOX4 c>B
BOO1 c
BOO3 cB
HMP1 B
OKL2 B>B
SLI10 B>B
STD1 d>B
PFD2 d>c
BOO1 C
TUC1 B
OKL2 BB
STD1 c
WAT1 d
OKL4 BB
STD1 d
STD1 c
WUS3 cB
BRR5 B>B
WAT5 BC
GNY1 B
BRT1 c
STD4
STD1

CWO 20	CWO.C	BRR	15-40 cm sandy textures over lacustrine silt loam	see BRR 1	Poor	Imperfect
CWO 22	CWO.P	HMP	15-40 cm organic materials over lacustrine silt loam	see HMP 1	Poor	Very poor
FOX - Fox						
FOX 1	FOX	None	Mainly lacustrine sand and loamy sand		Rapid to well	
FOX 3	FOX	GNY	see FOX 1	see GNY 1	Rapid to well	Poor
FOX 4	FOX	BAY	see FOX 1	see BAY 1	Rapid to well	Imperfect
FOX 8	FOX	BRR	see FOX 1	see BRR 1	Rapid to well	Imperfect
FOX 9	FOX	STD	see FOX 1	see STD 1	Rapid to well	Well
FOX 10	FOX	OKL	see FOX 1	see OKL 1	Rapid to well	Imperfect
FOX 13	FOX	CWO	see FOX 1	see CWO 1	Rapid to well	Poor
FRM - Farmington						
FRM 1	FRM	None	Less than 20 cm variable textures over bedrock		Rapid	
GNY - Granby						
GNY 1	GNY	None	Mainly lacustrine sand and loamy sand		Poor	
GNY 3	GNY.P	None	15-40 cm organic materials over lacustrine sand and loamy sand		Very poor	
GNY 4	GNY	BAY	see GNY 1	see BAY 1	Poor	Imperfect
GNY 6	GNY	FOX	see GNY 1	see FOX 1	Poor	Rapid to well
GNY 7	GNY	CWO	see GNY 1	see CWO 1	Poor	Poor
GNY 11	GNY	GNY.P	see GNY 1	see GNY 3	Poor	Very poor
GNY 15	GNY	OKL	see GNY 1	see OKL 1	Poor	Imperfect
GNY 17	GNY	BRR	see GNY 1	see BRR 1	Poor	Imperfect
GNY 18	GNY.P	TLD.C	see GNY 3	see TLD 2	Very poor	Poor



RAINAGE MPONENTS No. 2
Rapid
Variable
Rapid
Rapid to well
Rapid
Rapid to well

ll

l drainages. This informa-

mate proportions, and the

ents in the map unit. The onent refers to the No. 2 ient has been mapped in

the slope symbols appear s, a "greater than" symbol hat occupies at least 80%

ls B, c, C, d, D, e, E, f, F,

tand that many soil bound- several hectares, of uniden- cs to a depth of about 100

MAP UNIT SYMBOL	MAP UNIT COMPONENTS No. 1	MAP UNIT COMPONENTS No. 2	PARENT MATERIAL COMPONENTS No. 1	PARENT MATERIAL COMPONENTS No. 2	DRAINAGE COMPONENTS No. 1	DRAINAGE COMPONENTS No. 2
WIL - Wilsonville						
WIL 1	WIL	None	Mainly gravelly sandy till		Rapid to well	
WIL 3	WIL.C	None	15-40 cm sandy textures over gravelly sandy till		Rapid to well	
WIL 5	WIL	WIL.C	see WIL 1	see WIL 3	Rapid to well	Rapid to well
WIL 9	WIL.L	WIL	15-40 cm loamy textures over gravelly sandy till	see WIL 1	Rapid to well	Rapid to well
WIL 10	WIL.L	BRT	see WIL 9	see BRT 1	Rapid to well	Well
WIL 11	WIL.C	WIL	see WIL 3	see WIL 1	Rapid to well	Rapid to well
WIL 12	WIL.C	STD	see WIL 3	see STD 1	Rapid to well	Rapid to well
WIL 13	WIL.C	NDE	see WIL 3	see NDE 1	Rapid to well	Imperfect
WIL 14	WIL.C	OKL	see WIL 3	see OKL 1	Rapid to well	Imperfect
WSH - Walsher						
WSH 1	WSH	None	40-100 cm sandy textures over lacustrine silt loam		Well	
WUS - Wauseon						
WUS 1	WUS	None	40-100 cm sandy textures over lacustrine silty clay		Poor	
WUS 3	WUS.P	None	15-40 cm organic materials over lacustrine silty clay		Very poor	
WUS 4	WUS	BRR	see WUS 1	see BRR 1	Poor	Imperfect
WUS 6	WUS	TLD.C	see WUS 1	see TLD 2	Poor	Poor
WUS 9	WUS	SLI	see WUS 1	see SLI 1	Poor	Poor
WUS 10	WUS	TUC.C	see WUS 1	15-40 cm sandy textures over lacustrine silt loam	Poor	Imperfect

TVK - Ta
TVK 1
TVK 2
TVK 3
TVK 4
TVK 5
TVK 7
TVK 9
VSS - Va
VSS 1
VSS 2
WAT - V
WAT 1
WAT 2
WAT 3
WAT 4
WAT 5
WAT 8
WAT 1

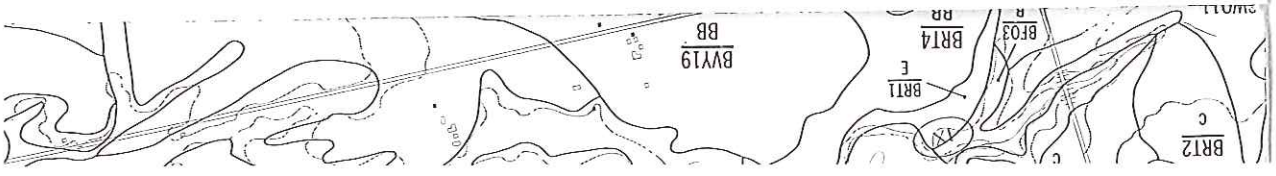


CHART C2-6 -continued

Soil Series	Soil Type	Hyd. Soil Grp.	Soil Series	Soil Type	Hyd. Soil Grp.	Soil Series	Soil Type	Hyd. Soil Grp.
Crombie	s l	B	Englehart	s l	B	Harriston	l	BC
"	si l	BC	Evanturel	si l	BC	"	si l	BC
Dack	c	D	"	si c l	C	Harrow	s	A
Dalton	s	AB	Falardeau	si l	BC	"	s l	AB
Darlington	s	B	"	si c l	C	"	l	B
"	l	C	Farmington	s l	A	Havelock	s /g	A
Dawson	s l	A	"	l	B	Hawkesvi.	l	B
"	l	B	"	c l	C	Haysville	s l	AB
Deloro	l	B	Ferndale	si l	BC	Heidelburg	f. s l	B
Devlin	si c /}	C	"	c l	C	Hendrie	s /g	AB
	c l }		Flamboro	s	B	Henwood	s /g	A
Dinorwic	c	BC	Floradale	l	B	Hespeler	s l	B
Dobie	c /l	BC	Fonthill	g	A	Hillier	c	C
Doe	s l	B	Font	g s l	A	Hillsburgh	s l	A
"	si l	BC	Forbes	c	D	Himsworth	si l	BC
Donald	l	B	Fox	s	A	Hinchinbr.	s l	B
Donnybrook	s g	A	"	s l	AB	"	l	BC
"	s l	AB	Foxboro	s	A	"	si l	BC
Dorion	c /l	C	Franktown	l	B	Honeywood	s l	AB
Dorking	si c l	BC	Freeport	s l	B	"	si l	BC
Dumfries	s l	A	Galesburg	s l	A	Howland	s l	B
"	l	AB	"	l	AB	"	l	BC
Dummer	s l	A	Gameland	s /g	AB	Huron	s l	B
"	l	B	Gananoque	c	C	"	l	BC
Dundonald	s l	AB	Gerow	c l	C	"	si l	BC
Dunedin	c	D	Gilford	s l	B	"	c l	CorD
Dymond	s l	AB	"	l	B	Innisville	s l	B
"	l	B	Gordon	si c	C	Jeddo	l	BC
Eagle Lake	s /g	AB	Granby	s	B	"	c l	C
Eamer	l	BC	"	s l	B	Kagawong	si l	BC
Earlton	si l	B	Grand	l	B	Kars	s /g	A
"	c l	C	Grenville	s l	A	Kemble	si l	BC
Eastport	s	A	"	l	BC	"	si c l	C
Edenvale	s	AB	Grimsby	s l	A	"	c l	D
Eganville	l	B	Guelph	s l	A	Kenabeek	s	B
Elderslie	si l	BC	"	l	BC	"	s l	B
"	si c l	C	"	si l	BC	Killean	l/s l	AB
"	c l	C	Guerin	s l	AB	King	si l	BC
Eldorado	s l	A	"	l	B	"	c l	C
"	l	B	Gwillimb.	g	AB	Kirkland	s l	A
Elk Pit	s g	A	Haileybury	si c l	C	Kossuth	s l	B
Ellwood	c l	C	"	si c	C	L'Achigan	s	AB
Elmbrook	si l	BC	"	c	CD	Lambton	l	BC
"	c l	C	Haldimand	si l	BC	"	si l	BC
"	c	C	"	si c l	C	Lanark	c	C
Elmira	l	B	"	c	CorD	Lansdowne	c /si l	C
Elmsley	s l	B	Hanbury	si c l	C	Leech	si c l	C
Embro	s l	BC	"	si c	C	"	c l	D
"	s l	C	"	c	D	Leitrim	g	B
Emily	l	B	Harkaway	l	B	Leith	si l	BC
Emo	c & p	C	"	si l	BC	Lily	l/s l	B

CHART C2-6

CHART C2-6 - continued

Soil Series	Soil Type	Hyd. Soil Grp.	Soil Series	Soil Type	Hyd. Soil Grp.	Soil Series Late	Soil Type Addit.	Hyd. Soil Grp.
Smithville	l	BC	Uplands	s	A	Percy	f s l	B
"	si c l	C	"	s l	A	Brisbane	l	B
"	si l	BC	Upsala	f s	AB	Donnybrook	l	B
Snedden	si c l	C	Vars	l	B			
Solmesville	c l	C	Vasey	s l	AB			
South Bay	c l	D	"	l	B			
"	c	D	Vergennes	si l	BC			
Spohn	s /g / c	BC	"	l	BC			
			"	c	C			
Springvale	s l	A	Vincent	si l	BC			
Stafford	l	B	"	si c l	C			
Stockdale	si l/f		"	c l	D			
	s	B	Vineland	s l	AB			
St, Clem.	s l	A	Wabi	s l	A			
"	si c l	C	"	l	B			
St. Jacobs	l	B	Wabigoon	c	C			
St. Peter	s /g	A	Waterloo	s	A			
St. Rosalie	c	C	"	s l	A			
St. Samuel	s	B	Watrin	s	B			
"	s l	B	Waupoos	c l	D			
St. Thomas	s	A	"	c	D			
Sullivan	s	A	Wauseon	s l	B			
"	s l	A	Wayside	s	AB			
Sutton Bay	s	B	Welland	c	C			
"	s l	B	Wellesley	s l	AB			
Tansley	c	D	"	si c l	C			
Tavistock	s l	AB	Wemyss	s l	AB			
"	si l	BC	Wendigo	s	A			
Tecumseth	s	AB	"	s l+r	AB			
Teeswater	si l	B	Wendover	c l	D			
Tennyson	s l	A	Westmeath	s	A			
Thames	c l	D	Whitby	l	BC			
Thorah	s	B	White Lake	s /g	A			
Thornloe	c	C	Whitfield	si l	B			
Thwaites	si l	BC	Wiarton	l	B			
Tioga	s	A	"	si l	BC			
"	s l	A	Wilmot	s l	B			
Toledo	si l	BC	"	si c l	C			
"	si c l	C	Winona	s l	AB			
"	c l	C	Woburn	s l	A			
"	c	C	"	l	B*			
Trafalgar	c	D	Wolford	c l	D			
Trent	s	AB	Wolsey	si c	C			
Tuscola	s l	AB	Wooler	si l/f				
"	si l	BC		s	AB			
Tweed	s l	A	Woolwich	l	BC			
Undiffer'd	s l +r	AB or B (dep. on depth)	Worthing.	s /g /c	BC			
			Wyevale	s /g	A			

WILSONVILLE NOT LISTED - SANDY => GROUP A.

*Rev. 79 06 01

CHART C2-8 - SOIL/LAND USE CURVE NUMBERS

Land Use	Hydrologic Soil Group						
	A	AB	B	BC	C	CD	D
Fallow (special cases only)	77	82	86	89	91	93	94
Crop and other improved land	66*	70	74	78	82	84	86
Pasture & other unimproved land	58*	62*	65	71	76	79	81
Woodlots and forest	50*	54*	58	65	71	74	77
Impervious areas (paved)		98					
Bare rock draining directly to stream		98					
Bare rock draining indirectly to stream		70					
Water surfaces		100	(use in special cases only)				

Notes

1. Figures are based on average antecedent moisture condition (AMC II) except those marked *, which are initially wet (AMC III) or an intermediate condition. For definition of AMC's see Chart C2-10.
2. Table is not applicable to frozen soils or to periods in which snowmelt contributes to runoff.
3. For detailed values in urban areas see Table 2.2 of ref. 14.
4. Source: SCS Handbook of Hydrology, Chapter 9 (9), with modifications.

CHART C2-9 - PERCENT IMPERVIOUSNESS OF URBAN AREAS

Urban Land Use	% Imperviousness
Business - Commercial	40 - 90
Industrial - Light	45 - 65
Industrial - Heavy	50 - 70
Residential - Low density	20 - 30
Residential - Medium density	25 - 35
Residential - High density	30 - 40

Source: SCS Handbook of Hydrology, Chapter 15 (9)

vallee
Consulting Engineers, Architects & Planners

Subject: Yin Phase 5
Date: Nov 2/10 By: TGS
Project #: 10034 Page

High Density - predevelopment and current state

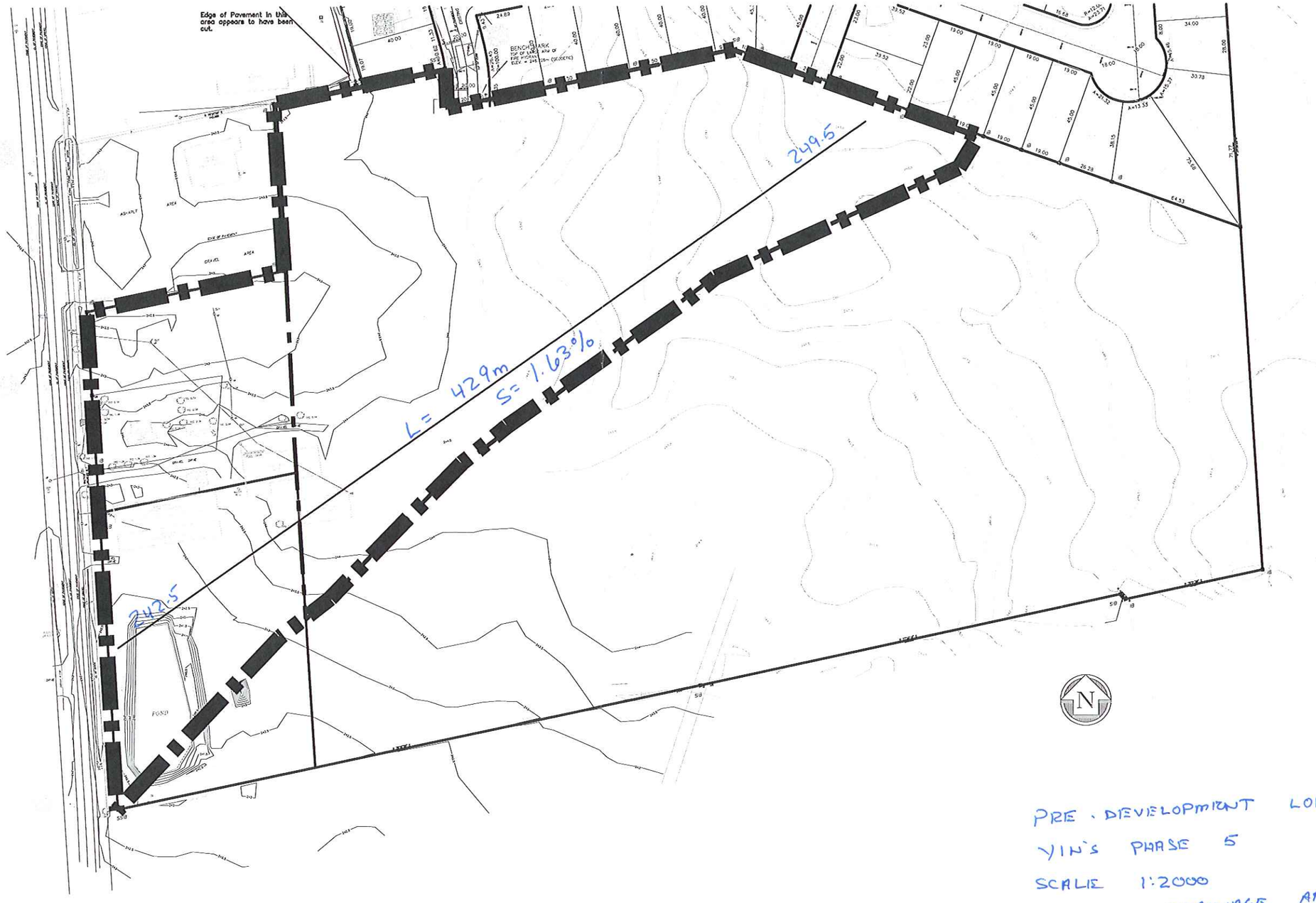
tc calc for upstream drainage area

tc = 3.26*(1.1-C)*L^(0.5)/S^0.333 (airport formula)

L as above	429 m
S as above but as percent	1.63 %
C, rational Runoff Coefficient (Pre dev)	0.2

tc = 52 min 0.86 hrs

tp = 0.6 *tc tp = 0.52 hrs



PRE - DEVELOPMENT LONGIEST FLOWPATH

YIN'S PHASE 5

SCALE 1:2000

PRE-DEV DRAINAGE AREA TO WATERFORD SOUTH MUNICIPAL DRAIN.

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   000        999    999  ==========
 S      W W W  MM MM  H   H   Y Y   MM MM  0   0      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  0   0  ##  9   9  9   9 Ver. 4.02
     S   W W   M   M  H   H    Y    M   M  0   0       9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   000            9      9 ==========
                                                      9   9  9   9 # 3568969
      StormWater Management HYdrologic Model           999    999  ==========

 ********************************************************************************
 ************************** SWMHYMO-99 Ver/4.02 *********************************
 *******  A single event and continuous hydrologic simulation model  ********
 *******     based on the principles of HYMO and its successors      ********
 *******                  OTTHYMO-83 and OTTHYMO-89.                  ********
 ********************************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.           ********
 *******                   Ottawa,  Ontario: (613) 727-5199          ********
 *******                   Gatineau, Quebec: (819) 243-6858          ********
 *******                   E-Mail: swmhymo@jfsa.Com                  ********
 ********************************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: G. Douglas Vallee Limited                        +++++++
 +++++++                Simcoe                 SERIAL#:3568969          +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++              ********
 *******          Maximum value for ID numbers  :     10             ********
 *******          Max. number of rainfall points:  15000             ********
 *******          Max. number of flow points    :  15000             ********
 ********************************************************************************


 ********************   D E T A I L E D   O U T P U T   ********************
 ********************************************************************************
 *       DATE: 2010-11-22     TIME: 14:14:54     RUN COUNTER: 001100       *
 ********************************************************************************
 * Input   filename: H:\SWMHYM~1\10034Y~1\PREDEV.DAT                            *
 * Output  filename: H:\SWMHYM~1\10034Y~1\PREDEV.out                            *
 * Summary filename: H:\SWMHYM~1\10034Y~1\PREDEV.sum                            *
 * User comments:                                                               *
 * 1:_____________________________________________________________________*
 * 2:_____________________________________________________________________*
 * 3:_____________________________________________________________________*
 ********************************************************************************

--------------------------------------------------------------------------------
001:0001----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [101034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#*****************************************************************************
--------------------
| START            |  Project dir.: H:\SWMHYM~1\10034Y~1\
--------------------  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
          #  1=CH2.STM
--------------------------------------------------------------------------------
001:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: H:\SWMHYM~1\10034Y~1\CH2.STM
| Ptotal=  39.39 mm|    Comments: 2 YEAR CHICAGO 4 HOUR DESIGN STORM DISTR
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .17   3.250 |   1.17   8.940 |   2.17   8.150 |   3.17   4.390
             .33   3.560 |   1.33  16.920 |   2.33   7.010 |   3.33   4.110
             .50   3.960 |   1.50  78.820 |   2.50   6.200 |   3.50   3.890
             .67   4.520 |   1.67  21.890 |   2.67   5.590 |   3.67   3.680
             .83   5.310 |   1.83  13.000 |   2.83   5.110 |   3.83   3.510
            1.00   6.550 |   2.00   9.880 |   3.00   4.720 |   4.00   3.350

--------------------------------------------------------------------------------
001:0003----------------------------------------------------------------------
********************************************************************************
*
*
*  PRE DEVELOPMENT MODEL - ENTIRE SITE
*
*
********************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=   14.00   Curve Number   (CN)=58.00
| 01:PREDEV DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .670

     Unit Hyd Qpeak  (cms)=     .798

     PEAK FLOW       (cms)=     .111 (i)
     TIME TO PEAK    (hrs)=    2.400
     RUNOFF VOLUME    (mm)=    6.471
     TOTAL RAINFALL   (mm)=   39.385
     RUNOFF COEFFICIENT   =     .164

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

--------------------------------------------------------------------------------
001:0004----------------------------------------------------------------------
********************************************************************************
*
*
*  PORTION OF SITE THAT DRAINS TO WSMD AND WILL DRAIN TO POND
*
*
********************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=    4.12   Curve Number   (CN)=58.00
| 02:WSMD   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .520

     Unit Hyd Qpeak  (cms)=     .303

     PEAK FLOW       (cms)=     .038 (i)
     TIME TO PEAK    (hrs)=    2.167
     RUNOFF VOLUME    (mm)=    6.471
     TOTAL RAINFALL   (mm)=   39.385
     RUNOFF COEFFICIENT   =     .164

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

--------------------------------------------------------------------------------
001:0005----------------------------------------------------------------------
********************************************************************************
*
*
* PRE DEVELOPMENT TO WSMD
*
*
********************************************************************************
----------------------
| DESIGN NASHYD      |   Area     (ha)=    6.02   Curve Number   (CN)=62.00
| 03:WSMD   DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .520

     Unit Hyd Qpeak  (cms)=     .442

     PEAK FLOW       (cms)=     .064 (i)
     TIME TO PEAK    (hrs)=    2.167
     RUNOFF VOLUME    (mm)=    7.415
     TOTAL RAINFALL   (mm)=   39.385
     RUNOFF COEFFICIENT   =     .188

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

--------------------------------------------------------------------------------
001:0006----------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2010-11-22     at 14:14:54
================================================================================
```

Appendix B: Pond Rating Curves

vallee
Consulting Engineers, Architects & Planners

Subject: Yins Phase 5
Date: Dec-10 By: TGS
Project #: 10034 Page

Orifgice Elevation 243.25 m
Orifice Dia 0.125 m
Orifice Area 0.012272 m2

Discharge Coeff 0.63

	Forebay m2	Main m2	Total m2	Incr Vol m3	Cum Vol m3	H above Orifice m	Orifice Q cms	Storage ha*m	Incr Time to Drain hr	Cum. Time to Drain hr
243.25	717	4485	5202	0	0	0	0	0	0	
243.35	778	4626	5404	530	530	0.0375	0.006632	0.05303		
243.45	841	4769	5610	551	1081	0.1375	0.012698	0.1081	15.8	15.8
243.55	906	4913	5819	571	1652	0.2375	0.016689	0.165245	10.8	26.6
243.65		6042	6042	593	2245	0.3375	0.019895	0.22455	9.0	35.6
243.75		6196	6196	612	2857	0.4375	0.022651	0.28574	8.0	43.6
243.85		6351	6351	627	3485	0.5375	0.025107	0.348475	7.3	50.9
243.95		6508	6508	643	4128	0.6375	0.027343	0.41277	6.8	57.7
244.05		6667	6667	659	4786	0.7375	0.029409	0.478645	6.4	64.2
244.15		6827	6827	675	5461	0.8375	0.03134	0.546115	6.2	70.4
244.25		6989	6989	691	6152	0.9375	0.033158	0.615195	6.0	76.3

244.15 0.5461
244.05 0.4786

244.09 0.5069 Elevation at 100-year storage

Appendix C: Post Development Model

vallee
Consulting Engineers, Architects & Planners

Subject: YIN PHASE 5
Date: NOV 2/10 By: TGS
Project #: 10034 Page

IMPERVIOUS AREA ASSUMPTIONS:

AVERAGE DWELLING ROOF AREA:	185	m2	
AVERAGE DWELLING DRIVEWAY AREA:	45	m2	
TOTAL IMPERVIOUS AREA PER DWELLING:	230	m2	0.023 ha
ROADWAY AND ONE SIDE SIDEWALK AREA PER METRE LENGTH OF ROAD:	11	m2	0.0011 ha

Area No.	Total Area (ha)	No. of Dwell	Dwellling Imp Area (ha)	Street Lenth (m)	Street Imp Area (ha)	Dir Conn Ratio	Total Imp Area (ha)	Imp Area Ratio
SFD	9.3	85	1.96	1380	1.52	0.16	3.47	0.37
BLOCK 1 TOWN HOUSES	0.57				0.21	0.38	0.43	0.75
BLOCK 2 APARTMENTS	0.69				0.26	0.38	0.52	0.75
BLOCK 3 COMMERCIAL	0.8				0.36	0.45	0.72	0.90
BLOCK 4 COMMERCIAL	1.4				0.63	0.45	1.26	0.90
BLOCK 5 SWM	1.26				0.57	0.45	1.13	0.90
	14.02				3.5475	0.25	7.532	0.54

1) IMPERVIOUS AREAS FOR BLOCKS 1 THOUGH 5 HAVE BEEN ASSUMED BASED ON RUNOFF COEFFICIENTS FOR APPLICABLE LAND USE PER NORFOLK COUNTY'S CURRENT DESIGN CRITERIA.
2) FOR DIRECTLY CONNECTED AREAS (IE DRIVES AND PARKING) OF BLOCKS 1 THROUGH 5, 50% OF THE TOTAL IMPERVIOUS AREA HAS BEEN ASSUMED.
3) TOTAL AREA DOES NOT EQUAL TOTAL SITE AREA AS APPROXIMATELY 0.2 HA OF STREET B WILL NOT FLOW TO SWM FACILITY.

TOTAL STREET LENGTH

580
150
80
370
50
150
1380m

1:2000

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

 SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999  =========
 S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
 SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9 Ver. 4.02
     S  W W W  M   M  H   H    Y    M   M  O   O       9999   9999 July 1999
 SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9 =========
                                                      9   9  9   9 # 3568969
      StormWater Management HYdrologic Model          999    999  =========

 ********************************************************************
 ************************ SWMHYMO-99 Ver/4.02 ***********************
 *******  A single event and continuous hydrologic simulation model  *******
 *******       based on the principles of HYMO and its successors    *******
 *******                  OTTHYMO-83 and OTTHYMO-89.                 *******
 ********************************************************************
 ******* Distributed by:  J.F. Sabourin and Associates Inc.          *******
 *******                   Ottawa,  Ontario: (613) 727-5199         *******
 *******                   Gatineau, Quebec: (819) 243-6858         *******
 *******                   E-Mail: swmhymo@jfsa.Com                 *******
 ********************************************************************

 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++ Licensed user: G. Douglas Vallee Limited                  +++++++
 +++++++                Simcoe                  SERIAL#:3568969   +++++++
 ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************
 *******          ++++++ PROGRAM ARRAY DIMENSIONS ++++++           *******
 *******          Maximum value for ID numbers  :     10          *******
 *******          Max. number of rainfall points:  15000          *******
 *******          Max. number of flow points    :  15000          *******
 ********************************************************************


 ******************  D E T A I L E D   O U T P U T  *****************
 ********************************************************************
 *       DATE: 2010-11-22     TIME: 14:15:43     RUN COUNTER: 001101   *
 ********************************************************************
 * Input   filename: H:\SWMHYM~1\10034Y~1\PSTDEV.DAT                  *
 * Output  filename: H:\SWMHYM~1\10034Y~1\PSTDEV.out                  *
 * Summary filename: H:\SWMHYM~1\10034Y~1\PSTDEV.sum                  *
 * User comments:                                                     *
 * 1:_____________________________________________________________    *
 * 2:_____________________________________________________________    *
 * 3:_____________________________________________________________    *
 ********************************************************************

-------------------------------------------------------------------------------
001:0001-------------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#*****************************************************************************
--------------------
| START            |  Project  dir.: H:\SWMHYM~1\10034Y~1\
--------------------  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 001
    NSTORM=   1
          #  1=CH2.STM
-------------------------------------------------------------------------------
001:0002-------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: H:\SWMHYM~1\10034Y~1\CH2.STM
| Ptotal=  39.39 mm|    Comments: 2 YEAR CHICAGO 4 HOUR DESIGN STORM DISTR
--------------------
            TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
             hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
             .17   3.250 |   1.17   8.940 |   2.17   8.150 |   3.17   4.390
             .33   3.560 |   1.33  16.920 |   2.33   7.010 |   3.33   4.110
             .50   3.960 |   1.50  78.820 |   2.50   6.200 |   3.50   3.890
             .67   4.520 |   1.67  21.890 |   2.67   5.590 |   3.67   3.680
             .83   5.310 |   1.83  13.000 |   2.83   5.110 |   3.83   3.510
            1.00   6.550 |   2.00   9.880 |   3.00   4.720 |   4.00   3.350

-------------------------------------------------------------------------------
001:0003-------------------------------------------------------------------------
*****************************************************************************
*
*
* SFD
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.44          5.86
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     249.00         40.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      78.82         11.25
               over (min)          5.00         26.00
     Storage Coeff.  (min)=       4.86 (ii)    25.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00         26.00
     Unit Hyd. peak  (cms)=        .23           .04
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .27           .11          .301 (iii)
     TIME TO PEAK    (hrs)=       1.52          1.92         1.517
     RUNOFF VOLUME    (mm)=      38.58          8.31        13.152
     TOTAL RAINFALL   (mm)=      39.38         39.38        39.385
     RUNOFF COEFFICIENT   =        .98           .21          .334

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0004-------------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .43           .14
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       1.00          1.00
     Length            (m)=      61.64         40.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      78.82         48.36
               over (min)          2.00         14.00
     Storage Coeff.  (min)=       2.10 (ii)    13.72 (ii)
     Unit Hyd. Tpeak (min)=       2.00         14.00
     Unit Hyd. peak  (cms)=        .54           .08
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .05           .01          .052 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.70         1.500
     RUNOFF VOLUME    (mm)=      38.58         13.32        22.918
     TOTAL RAINFALL   (mm)=      39.38         39.38        39.385
     RUNOFF COEFFICIENT   =        .98           .34          .582

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0005-------------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .52           .17
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       1.00          1.00
     Length            (m)=      67.82         40.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      78.82         48.36
               over (min)          2.00         14.00
     Storage Coeff.  (min)=       2.23 (ii)    13.85 (ii)
     Unit Hyd. Tpeak (min)=       2.00         14.00
     Unit Hyd. peak  (cms)=        .52           .08
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .06           .01          .063 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.70         1.500
     RUNOFF VOLUME    (mm)=      38.58         13.32        22.918
     TOTAL RAINFALL   (mm)=      39.38         39.38        39.385
     RUNOFF COEFFICIENT   =        .98           .34          .582

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0006-------------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 5 SWM
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.13           .13
     Dep. Storage     (mm)=        .80          1.50
     Average Slope     (%)=       1.00          1.00
     Length            (m)=      91.65         40.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      78.82          6.11
               over (min)          3.00         29.00
     Storage Coeff.  (min)=       2.67 (ii)    29.24 (ii)
     Unit Hyd. Tpeak (min)=       3.00         29.00
     Unit Hyd. peak  (cms)=        .40           .04
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .24           .00          .241 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.97         1.500
     RUNOFF VOLUME    (mm)=      38.58          6.47        35.374
     TOTAL RAINFALL   (mm)=      39.38         39.38        39.385
     RUNOFF COEFFICIENT   =        .98           .16          .898

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
001:0007-------------------------------------------------------------------------
*****************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
```

```
**********************************************************************
---------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
-------------------- ID1 01:SFD     (ha)     (cms)    (hrs)    (mm)     (cms)
                  ID1 01:SFD       9.30     .301     1.52    13.15     .000
                 +ID2 02:BLK1      .57      .052     1.50    22.92     .000
                 +ID3 03:BLK2      .69      .063     1.50    22.92     .000
                 +ID4 06:BLK5     1.26      .241     1.50    35.37     .000
                  ==========================================================
                  SUM 07:PSTDEV   11.82      .651     1.50    16.56     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0008----------------------------------------------------------------------
**********************************************************************
*
*
* ROUTE THROUGH POND
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07:(PSTDEV)    |
| OUT<08:(PNDOUT)    |    =========  OUTFLOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .025  .3535E+00
                            .007  .5520E-01    |     .027  .4178E+00
                            .013  .1118E+00    |     .029  .4837E+00
                            .017  .1700E+00    |     .031  .5512E+00
                            .020  .2296E+00    |     .033  .6203E+00
                            .023  .2908E+00    |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)       11.82      .651     1.500     16.562
     OUTFLOW<08: (PNDOUT)       11.82      .017     4.533     16.561
    OVERFLOW<09: (PNDOVR)         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.623
                  TIME SHIFT OF PEAK FLOW          (min)=   182.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.1768E+00

------------------------------------------------------------------------------
001:0009----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 3 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .80
| 04:BLK3    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      .72          .08
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    73.03        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=    78.82       230.54
               over (min)      2.00         9.00
     Storage Coeff.  (min)=    2.33 (ii)    8.55 (ii)
     Unit Hyd. Tpeak (min)=    2.00         9.00
     Unit Hyd. peak  (cms)=     .51          .13
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .08          .03        .102 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.60       1.500
     RUNOFF VOLUME    (mm)=   38.58        21.08      28.960
     TOTAL RAINFALL   (mm)=   39.38        39.38      39.385
     RUNOFF COEFFICIENT    =    .98          .54        .735

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0010----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )    |
| OUT<01:(B3CTRL)    |    =========  OUTFLOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )         .80      .102     1.500      28.960
     OUTFLOW<01: (B3CTRL)         .80      .015     1.233      28.960
    OVERFLOW<02: (3OVR  )         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   14.763
                  TIME SHIFT OF PEAK FLOW          (min)=  -16.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.9246E-02

------------------------------------------------------------------------------
001:0011----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 4 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.40
| 05:BLK4    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.26          .14
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    96.61        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=    78.82       230.54
               over (min)      3.00         9.00
     Storage Coeff.  (min)=    2.75 (ii)    8.97 (ii)
     Unit Hyd. Tpeak (min)=    3.00         9.00
     Unit Hyd. peak  (cms)=     .40          .13
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .13          .06        .174 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.60       1.500
     RUNOFF VOLUME    (mm)=   38.58        21.08      28.960
     TOTAL RAINFALL   (mm)=   39.38        39.38      39.385
     RUNOFF COEFFICIENT    =    .98          .54        .735

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
001:0012----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )    |
| OUT<03:(B4CTRL)    |    =========  OUTFLOW STORAGE TABLE  =========
--------------------     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >05: (BLK4  )        1.40      .174     1.500      28.960
     OUTFLOW<03: (B4CTRL)        1.40      .015     1.067      28.960
    OVERFLOW<04: (4OVR  )         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    8.616
                  TIME SHIFT OF PEAK FLOW          (min)=   -26.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.2211E-01

------------------------------------------------------------------------------
001:0013----------------------------------------------------------------------
**********************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
**********************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
-------------------- ID1 08:PNDOUT (ha)     (cms)    (hrs)    (mm)     (cms)
                  ID1 08:PNDOUT    11.82     .017     4.53    16.56     .000
                 +ID2 09:PNDOVR      .00     .000      .00      .00     .000 **DRY**
                 +ID3 01:B3CTRL      .80     .015     1.23    28.96     .000
                 +ID4 02:3OVR        .00     .000      .00      .00     .000 **DRY**
                 +ID5 03:B4CTRL     1.40     .015     1.07    28.96     .000
                 +ID6 04:4OVR        .00     .000      .00      .00     .000 **DRY**
                  ==========================================================
                  SUM 05:PSTDEV    14.02     .047     4.53    18.51     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
001:0014----------------------------------------------------------------------
  ** END OF RUN :   1

**********************************************************************




--------------------
| START            |  Project dir.: H:\SWMHYM~1\10034Y~1\
--------------------  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
            #  1=CH5.STM
------------------------------------------------------------------------------
002:0002----------------------------------------------------------------------
*#**********************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
```

```
*#  License #   :  3568969
*#*************************************************************************
-------------------------------------------------------------------------------
002:0002---------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: H:\SWMHYM-1\10034Y-1\CH5.STM
| Ptotal=  48.48 mm|    Comments: 5 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTIO
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   3.529 |   1.17  10.190 |   2.17   9.150 |   3.17   4.550
               .33   3.658 |   1.33  21.620 |   2.33   7.700 |   3.33   4.220
               .50   4.040 |   1.50 112.370 |   2.50   6.680 |   3.50   3.960
               .67   4.670 |   1.67  27.760 |   2.67   5.940 |   3.67   3.730
               .83   5.610 |   1.83  15.750 |   2.83   5.390 |   3.83   3.530
              1.00   7.110 |   2.00  11.430 |   3.00   4.930 |   4.00   3.350

-------------------------------------------------------------------------------
002:0003---------------------------------------------------------------------
*************************************************************************
*
*
* SFD
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      3.44          5.86
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=    249.00         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    112.37         22.33
               over (min)          4.00         20.00
     Storage Coeff.  (min)=      4.22 (ii)    20.04 (ii)
     Unit Hyd. Tpeak (min)=      4.00         20.00
     Unit Hyd. peak  (cms)=       .27           .06
                                              *TOTALS*
     PEAK FLOW       (cms)=       .41           .21          .475 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.50         1.517
     RUNOFF VOLUME    (mm)=     47.68         12.10        17.793
     TOTAL RAINFALL   (mm)=     48.48         48.48        48.478
     RUNOFF COEFFICIENT    =      .98           .25          .367

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0004---------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .43           .14
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     61.64         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    112.37         93.55
               over (min)          2.00         11.00
     Storage Coeff.  (min)=      1.82 (ii)    10.75 (ii)
     Unit Hyd. Tpeak (min)=      2.00         11.00
     Unit Hyd. peak  (cms)=       .59           .10
                                              *TOTALS*
     PEAK FLOW       (cms)=       .07           .02          .080 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.63         1.500
     RUNOFF VOLUME    (mm)=     47.68         18.78        29.761
     TOTAL RAINFALL   (mm)=     48.48         48.48        48.478
     RUNOFF COEFFICIENT    =      .98           .39          .614

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0005---------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .52           .17
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     67.82         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    112.37         93.55
               over (min)          2.00         11.00
     Storage Coeff.  (min)=      1.93 (ii)    10.86 (ii)
     Unit Hyd. Tpeak (min)=      2.00         11.00
     Unit Hyd. peak  (cms)=       .57           .10
                                              *TOTALS*
     PEAK FLOW       (cms)=       .08           .03          .097 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.63         1.500
     RUNOFF VOLUME    (mm)=     47.68         18.78        29.761
     TOTAL RAINFALL   (mm)=     48.48         48.48        48.478
     RUNOFF COEFFICIENT    =      .98           .39          .614

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0006---------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 5 SWM
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      1.13           .13
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     91.65         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    112.37         11.89
               over (min)          2.00         23.00
     Storage Coeff.  (min)=      2.31 (ii)    22.68 (ii)
     Unit Hyd. Tpeak (min)=      2.00         23.00
     Unit Hyd. peak  (cms)=       .51           .05
                                              *TOTALS*
     PEAK FLOW       (cms)=       .35           .00          .350 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.85         1.500
     RUNOFF VOLUME    (mm)=     47.68          9.56        43.866
     TOTAL RAINFALL   (mm)=     48.48         48.48        48.478
     RUNOFF COEFFICIENT    =      .98           .20          .905

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
002:0007---------------------------------------------------------------------
*************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
*************************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA      QPEAK    TPEAK    R.V.     DWF
-------------------                (ha)      (cms)    (hrs)    (mm)    (cms)
                  ID1 01:SFD       9.30      .475     1.52    17.79    .000
                 +ID2 02:BLK1      .57       .080     1.50    29.76    .000
                 +ID3 03:BLK2      .69       .097     1.50    29.76    .000
                 +ID4 06:BLK5      1.26      .350     1.50    43.87    .000
                  ==========================================================
                  SUM 07:PSTDEV    11.82     .995     1.50    21.85    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0008---------------------------------------------------------------------
*************************************************************************
*
*
* ROUTE THROUGH POND
*
*
*************************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07: (PSTDEV)   |
| OUT<08: (PNDOUT)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)     (ha.m.)   |    (cms)     (ha.m.)
                            .000  .0000E+00     |     .025  .3535E+00
                            .007  .5520E-01     |     .027  .4178E+00
                            .013  .1118E+00     |     .029  .4837E+00
                            .017  .1700E+00     |     .031  .5512E+00
                            .020  .2296E+00     |     .033  .6203E+00
                            .023  .2908E+00     |     .000  .0000E+00

     ROUTING RESULTS              AREA      QPEAK     TPEAK       R.V.
     ---------------              (ha)      (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)        11.82      .995     1.500      21.848
     OUTFLOW<08: (PNDOUT)        11.82      .020     4.400      21.847
    OVERFLOW<09: (PNDOVR)         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
                  PERCENTAGE OF TIME OVERFLOWING     (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.034
                  TIME SHIFT OF PEAK FLOW          (min)=   174.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.2367E+00

-------------------------------------------------------------------------------
002:0009---------------------------------------------------------------------
*************************************************************************
*
*
* BLOCK 3 COMMERCIAL
*
*
*************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .80
| 04:BLK3   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
```

```
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        .72           .08
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       1.00          1.00
     Length             (m)=      73.03         40.00
     Mannings n            =       .013          .250

     Max.eff.Inten.(mm/hr)=     112.37        389.75
               over (min)          2.00          7.00
     Storage Coeff.  (min)=       2.02 (ii)     7.06 (ii)
     Unit Hyd. Tpeak (min)=       2.00          7.00
     Unit Hyd. peak  (cms)=        .56           .16
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .11           .06       .160 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.57       1.500
     RUNOFF VOLUME    (mm)=      47.68         28.46      37.108
     TOTAL RAINFALL   (mm)=      48.48         48.48      48.478
     RUNOFF COEFFICIENT   =        .98           .59        .765

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

002:0010----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )   |
| OUT<01:(B3CTRL)   |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )        .80      .160     1.500     37.108
     OUTFLOW<01: (B3CTRL)        .80      .015     1.200     37.108
    OVERFLOW<02: (3OVR  )        .00      .000      .000      .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.363
                  TIME SHIFT OF PEAK FLOW          (min)=   -18.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.1520E-01

002:0011----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 4 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD   |    Area     (ha)=    1.40
| 05:BLK4   DT= 1.00 |    Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.26           .14
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       1.00          1.00
     Length             (m)=      96.61         40.00
     Mannings n            =       .013          .250

     Max.eff.Inten.(mm/hr)=     112.37        389.75
               over (min)          2.00          7.00
     Storage Coeff.  (min)=       2.39 (ii)     7.43 (ii)
     Unit Hyd. Tpeak (min)=       2.00          7.00
     Unit Hyd. peak  (cms)=        .50           .16
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .19           .10       .277 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.57       1.500
     RUNOFF VOLUME    (mm)=      47.68         28.46      37.108
     TOTAL RAINFALL   (mm)=      48.48         48.48      48.478
     RUNOFF COEFFICIENT   =        .98           .59        .765

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

002:0012----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STOPAGE ON 4 TO RELEASE AT CONTROLLED PATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )   |
| OUT<03:(B4CTRL)   |    =========  OUTFLOW STOPAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >05: (BLK4  )       1.40      .277     1.500     37.108
     OUTFLOW<03: (B4CTRL)       1.40      .015     1.017     37.108
    OVERFLOW<04: (4OVR  )        .00      .000      .000      .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.425
                  TIME SHIFT OF PEAK FLOW          (min)=   -29.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.3323E-01

002:0013----------------------------------------------------------------------
**********************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
**********************************************************************
---------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK   R.V.    DWF
---------------------             (ha)     (cms)    (hrs)   (mm)    (cms)
                    ID1 08:ENDOUT  11.82     .020    4.40  21.85    .000
                   +ID2 09:ENDOVR    .00     .000     .00    .00    .000 **DRY**
                   +ID3 01:B3CTRL    .80     .015    1.20  37.11    .000
                   +ID4 02:3OVR      .00     .000     .00    .00    .000 **DRY**
                   +ID5 03:B4CTRL   1.40     .015    1.02  37.11    .000
                   +ID6 04:4OVR      .00     .000     .00    .00    .000 **DRY**
                    ==========================================================
                    SUM 05:PSTDEV  14.02     .050    4.40  24.24    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

002:0014----------------------------------------------------------------------
002:0002----------------------------------------------------------------------
  ** END OF RUN :   2

**********************************************************************




---------------------
| START             |  Project  dir.: H:\SWMHYM-1\10034Y-1\
---------------------  Rainfall dir.: H:\SWMHYM-1\10034Y-1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 003
    NSTORM=   1
           #  1=CH10.STM
-------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
*#**********************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#**********************************************************************
-------------------------------------------------------------------------------
003:0002----------------------------------------------------------------------
---------------------
| READ STORM        |    Filename: H:\SWMHYM-1\10034Y-1\CH10.STM
| Ptotal=  56.08 mm |    Comments: 10 YEAR CHICAGO 4 HOURS DESIGN DISTRIBUT
---------------------
          TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
          .17   3.580 |  1.17  11.510 |  2.17  10.310 |  3.17   5.050
          .33   3.990 |  1.33  25.320 |  2.33   8.660 |  3.33   4.700
          .50   4.500 |  1.50 133.600 |  2.50   7.520 |  3.50   4.394
          .67   5.210 |  1.67  32.000 |  2.67   6.650 |  3.67   4.140
          .83   6.270 |  1.83  19.730 |  2.83   5.380 |  3.83   3.910
         1.00   8.000 |  2.00  12.954 |  3.00   5.490 |  4.00   3.632

-------------------------------------------------------------------------------
003:0003----------------------------------------------------------------------
**********************************************************************
*
*
* SFD
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD   |    Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |    Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
---------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       3.44          5.86
     Dep. Storage      (mm)=        .80          1.50
     Average Slope      (%)=       1.00          1.00
     Length             (m)=     249.00         40.00
     Mannings n            =       .013          .250

     Max.eff.Inten.(mm/hr)=     133.60         31.29
               over (min)          4.00         18.00
     Storage Coeff.  (min)=       3.93 (ii)    17.76 (ii)
     Unit Hyd. Tpeak (min)=       4.00         18.00
     Unit Hyd. peak  (cms)=        .29           .06
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .50           .31       .601 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.77      1.517
     RUNOFF VOLUME    (mm)=      55.28         15.66     21.998
     TOTAL RAINFALL   (mm)=      56.08         56.08     56.083
     RUNOFF COEFFICIENT   =        .99           .28       .392

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* = 58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0004----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 1 TOWNHOUSES
```

```
*
*
*******************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------

                        IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      .43          .14
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    61.64        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=   133.60       136.37
               over (min)        2.00         9.00
     Storage Coeff.  (min)=     1.70 (ii)    9.38 (ii)
     Unit Hyd. Tpeak (min)=     2.00         9.00
     Unit Hyd. peak  (cms)=      .62          .12
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .08          .03       .102 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.60      1.500
     RUNOFF VOLUME    (mm)=    55.28        23.74     35.727
     TOTAL RAINFALL   (mm)=    56.08        56.08     56.083
     RUNOFF COEFFICIENT    =    .99          .42       .637

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0005-------------------------------------------------------------------------
*******************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
*******************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------

                        IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      .52          .17
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    67.82        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=   133.60       131.26
               over (min)        2.00        10.00
     Storage Coeff.  (min)=     1.80 (ii)    9.60 (ii)
     Unit Hyd. Tpeak (min)=     2.00        10.00
     Unit Hyd. peak  (cms)=      .60          .12
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .10          .04       .121 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.62      1.500
     RUNOFF VOLUME    (mm)=    55.28        23.74     35.727
     TOTAL RAINFALL   (mm)=    56.08        56.08     56.083
     RUNOFF COEFFICIENT    =    .99          .42       .637

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0006-------------------------------------------------------------------------
*******************************************************************************
*
*
* BLOCK 5 SWM
*
*
*******************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
---------------------

                        IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     1.13          .13
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    91.65        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=   133.60        17.53
               over (min)        2.00        20.00
     Storage Coeff.  (min)=     2.16 (ii)   19.59 (ii)
     Unit Hyd. Tpeak (min)=     2.00        20.00
     Unit Hyd. peak  (cms)=      .53          .06
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .42          .00       .417 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.80      1.500
     RUNOFF VOLUME    (mm)=    55.28        12.49     51.004
     TOTAL RAINFALL   (mm)=    56.08        56.08     56.083
     RUNOFF COEFFICIENT    =    .99          .22       .909

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0007-------------------------------------------------------------------------
*******************************************************************************
*
*
* DETERMINE INFLOW TO POND
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*
*******************************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA      QPEAK     TPEAK     R.V.     DWF
--------------------                (ha)      (cms)     (hrs)     (mm)     (cms)
                    ID1 01:SFD      9.30      .601     1.52     22.00     .000
                   +ID2 02:BLK1      .57      .102     1.50     35.73     .000
                   +ID3 03:BLK2      .69      .121     1.50     35.73     .000
                   +ID4 06:BLK5     1.26      .417     1.50     51.00     .000
                    ==========================================================
                    SUM 07:PSTDEV  11.82     1.231     1.50     26.55     .000

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
003:0008-------------------------------------------------------------------------
*******************************************************************************
*
*
* ROUTE THPOUGH POND
*
*
*******************************************************************************
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07:(PSTDEV)    |
| OUT<08:(PNDOUT)    |    =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000  .0000E+00      |     .025  .3535E+00
                             .007  .5520E-01      |     .027  .4178E+00
                             .013  .1118E+00      |     .029  .4837E+00
                             .017  .1700E+00      |     .031  .5512E+00
                             .020  .2296E+00      |     .033  .6203E+00
                             .023  .2908E+00      |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)      11.82     1.231     1.500     26.553
     OUTFLOW<08: (PNDOUT)      11.82      .023     4.367     26.552
   OVERFLOW<09: (PNDOVR)         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =       0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=     .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=     .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.841
                  TIME SHIFT OF PEAK FLOW          (min)=   172.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.2900E+00

-------------------------------------------------------------------------------
003:0009-------------------------------------------------------------------------
*******************************************************************************
*
*
* BLOCK 3 COMMERCIAL
*
*
*******************************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .80
| 04:BLK3   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------

                        IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      .72          .08
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    73.03        40.00
     Mannings n            =    .013         .250

     Max.eff.Inten.(mm/hr)=   133.60       504.85
               over (min)        2.00         6.00
     Storage Coeff.  (min)=     1.88 (ii)    6.43 (ii)
     Unit Hyd. Tpeak (min)=     2.00         6.00
     Unit Hyd. peak  (cms)=      .58          .18
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .13          .08       .202 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.55      1.500
     RUNOFF VOLUME    (mm)=    55.28        34.90     44.072
     TOTAL RAINFALL   (mm)=    56.08        56.08     56.083
     RUNOFF COEFFICIENT    =    .99          .62       .786

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0010-------------------------------------------------------------------------
*******************************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
*******************************************************************************
--------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )    |
| OUT<01:(B3CTRL)    |    =========  OUTLFOW STORAGE TABLE  =========
--------------------      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                            (cms)      (ha.m.)   |    (cms)      (ha.m.)
                             .000  .0000E+00      |     .015  .1000E+01
                             .015  .1000E-03      |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )       .80      .202     1.500     44.072
     OUTFLOW<01: (B3CTRL)       .80      .015     1.183     44.072
   OVERFLOW<02: (3OVR  )        .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =       0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=     .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=     .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.411
                  TIME SHIFT OF PEAK FLOW          (min)=  -19.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.1986E-01

-------------------------------------------------------------------------------
003:0011-------------------------------------------------------------------------
*******************************************************************************
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*
*
* BLOCK 4 COMMERCIAL
*
*
*****************************************************************************
---------------------
| DESIGN STANDHYD     |   Area     (ha)=    1.40
| 05:BLK4    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      1.26          .14
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      1.00         1.00
     Length            (m)=     96.61        40.00
     Mannings n             =    .013         .250

     Max.eff.Inten.(mm/hr)=    133.60       494.86
               over (min)        2.00         7.00
     Storage Coeff.  (min)=    2.23 (ii)    6.81 (ii)
     Unit Hyd. Tpeak (min)=    2.00         7.00
     Unit Hyd. peak  (cms)=     .52          .16
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .23          .13        .342 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.57       1.500
     RUNOFF VOLUME    (mm)=   55.28        34.90      44.072
     TOTAL RAINFALL   (mm)=   56.08        56.08      56.083
     RUNOFF COEFFICIENT    =    .99          .62        .786

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
003:0012-------------------------------------------------------------------------
*****************************************************************************
*
*
* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE
*
*
*****************************************************************************
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )   |
| OUT<03:(B4CTRL)   |    ==========  OUTFLOW STORAGE TABLE  ==========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .015  .1000E+01
                            .015  .1000E-03    |     .000  .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK      R.V.
     ---------------             (ha)     (cms)     (hrs)      (mm)
     INFLOW >05: (BLK4  )        1.40      .342     1.500    44.072
     OUTFLOW<03: (B4CTRL)        1.40      .015      .917    44.072
    OVERFLOW<04: (4OVR  )         .00      .000      .000      .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.387
                  TIME SHIFT OF PEAK FLOW         (min)=   -35.00
                  MAXIMUM  STORAGE  USED       (ha.m.)=.4236E-01

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003:0013-------------------------------------------------------------------------
*****************************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
*****************************************************************************
---------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
---------------------             (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 08:ENDOUT   11.82      .023    4.37   26.55     .000
                 +ID2 09:ENDOVR     .00      .000     .00     .00     .000 **DRY**
                 +ID3 01:B3CTRL     .80      .015    1.18   44.07     .000
                 +ID4 02:3OVR       .00      .000     .00     .00     .000 **DRY**
                 +ID5 03:B4CTRL    1.40      .015     .92   44.07     .000
                 +ID6 04:4OVR       .00      .000     .00     .00     .000 **DRY**
                  ==========================================================
                  SUM 05:PSTDEV    14.02      .053    4.37   29.30     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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003:0014-------------------------------------------------------------------------
-------------------------------------------------------------------------------
003:0002-------------------------------------------------------------------------
-------------------------------------------------------------------------------
003:0002-------------------------------------------------------------------------
  ** END OF RUN :   3

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---------------------
| START             |  Project dir.: H:\SWMHYM-1\10034Y-1\
---------------------  Rainfall dir.: H:\SWMHYM-1\10034Y-1\
    TZERO =   .00 hrs on      0
    METOUT=   2 (output = METRIC)
    NRUN  = 004
    NSTORM=   1
          #  1=CHZ5.STM
-------------------------------------------------------------------------------
004:0002-------------------------------------------------------------------------
*#*************************************************************************
*#  Project Name: [YINS PHASE 5]    Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   : 3568969
*#*************************************************************************
-------------------------------------------------------------------------------
004:0002-------------------------------------------------------------------------
---------------------
| READ STORM        |    Filename: H:\SWMHYM-1\10034Y-1\CH25.STM
| Ptotal=  66.02 mm |    Comments: 25 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTI
---------------------
            TIME     RAIN |   TIME     RAIN |   TIME     RAIN |   TIME     RAIN
            hrs      mm/hr |   hrs      mm/hr |   hrs      mm/hr |   hrs      mm/hr
            .17      4.500 |  1.17     13.670 |  2.17     12.320 |  3.17      6.270
            .33      4.980 |  1.33     27.690 |  2.33     10.440 |  3.33      5.000
            .50      5.613 |  1.50    158.850 |  2.50      9.144 |  3.50      5.840
            .67      6.450 |  1.67     35.080 |  2.67      8.150 |  3.67      5.180
            .83      7.700 |  1.83     20.600 |  2.83      7.390 |  3.83      4.900
           1.00      9.700 |  2.00     15.240 |  3.00      6.780 |  4.00      4.650

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004:0003-------------------------------------------------------------------------
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*
*
* SFD
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*
*****************************************************************************
---------------------
| DESIGN STANDHYD     |   Area     (ha)=    9.30
| 01:SFD     DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      3.44         5.86
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      1.00         1.00
     Length            (m)=   249.00        40.00
     Mannings n             =    .013         .250

     Max.eff.Inten.(mm/hr)=    158.85        44.51
               over (min)        4.00        16.00
     Storage Coeff.  (min)=    3.67 (ii)   15.68 (ii)
     Unit Hyd. Tpeak (min)=    4.00        16.00
     Unit Hyd. peak  (cms)=     .30          .07
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .60          .44        .775 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.73       1.517
     RUNOFF VOLUME    (mm)=   65.22        20.76      27.877
     TOTAL RAINFALL   (mm)=   66.02        66.02      66.023
     RUNOFF COEFFICIENT    =    .99          .31        .422

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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004:0004-------------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
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*****************************************************************************
---------------------
| DESIGN STANDHYD     |   Area     (ha)=     .57
| 02:BLK1    DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .43          .14
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      1.00         1.00
     Length            (m)=    61.64        40.00
     Mannings n             =    .013         .250

     Max.eff.Inten.(mm/hr)=    158.85       186.82
               over (min)        2.00         8.00
     Storage Coeff.  (min)=    1.59 (ii)    8.36 (ii)
     Unit Hyd. Tpeak (min)=    2.00         8.00
     Unit Hyd. peak  (cms)=     .64          .14
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .10          .05        .130 (iii)
     TIME TO PEAK    (hrs)=    1.50         1.58       1.500
     RUNOFF VOLUME    (mm)=   65.22        30.66      43.793
     TOTAL RAINFALL   (mm)=   66.02        66.02      66.023
     RUNOFF COEFFICIENT    =    .99          .46        .663

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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004:0005-------------------------------------------------------------------------
*****************************************************************************
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*
* BLOCK 2 APARTMENTS
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---------------------
| DESIGN STANDHYD     |   Area     (ha)=     .69
| 03:BLK2    DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .52          .17
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      1.00         1.00
     Length            (m)=    67.82        40.00
     Mannings n             =    .013         .250

     Max.eff.Inten.(mm/hr)=    158.85       186.82
               over (min)        2.00         8.00
     Storage Coeff.  (min)=    1.68 (ii)    8.45 (ii)
     Unit Hyd. Tpeak (min)=    2.00         8.00
     Unit Hyd. peak  (cms)=     .62          .14
                                                    *TOTALS*
     PEAK FLOW       (cms)=     .12          .05        .157 (iii)
```

TIME TO PEAK	(hrs)=	1.50	1.58	1.500
RUNOFF VOLUME	(mm)=	65.22	30.66	43.793
TOTAL RAINFALL	(mm)=	66.02	66.02	66.023
RUNOFF COEFFICIENT	=	.99	.46	.663

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0006

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* BLOCK 5 SWM

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| DESIGN STANDHYD | Area (ha)= 1.26
| 06:BLK5 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.13	.13
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	91.65	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		158.85	25.55
over (min)		2.00	17.00
Storage Coeff. (min)=		2.01 (ii)	17.01 (ii)
Unit Hyd. Tpeak (min)=		2.00	17.00
Unit Hyd. peak (cms)=		.56	.07

			TOTALS
PEAK FLOW	(cms)=	.50	.01 .498 (iii)
TIME TO PEAK	(hrs)=	1.50	1.75 1.500
RUNOFF VOLUME	(mm)=	65.22	16.76 60.376
TOTAL RAINFALL	(mm)=	66.02	66.02 66.023
RUNOFF COEFFICIENT	=	.99	.25 .914

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0007

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* DETERMINE INFLOW TO POND

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ADD HYD (PSTDEV)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)
ID1	01:SFD	9.30	.775	1.52	27.88	.000
+ID2	02:BLK1	.57	.130	1.50	43.79	.000
+ID3	03:BLK2	.69	.157	1.50	43.79	.000
+ID4	06:BLK5	1.26	.498	1.50	60.38	.000
SUM	07:PSTDEV	11.82	1.542	1.50	33.04	.000

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

004:0008

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* ROUTE THROUGH POND

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| ROUTE RESERVOIR | IN>07:(PSTDEV) | OUT<08:(PNDOUT) |

Requested routing time step = 1.0 min.

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.025	.3535E+00
.007	.5520E-01	.027	.4178E+00
.013	.1118E+00	.029	.4837E+00
.017	.1700E+00	.031	.5512E+00
.020	.2296E+00	.033	.6203E+00
.023	.2908E+00	.000	.0000E+00

ROUTING RESULTS		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >07:	(PSTDEV)	11.82	1.542	1.500	33.038
OUTFLOW<08:	(PNDOUT)	11.82	.025	4.383	33.036
OVERFLOW<09:	(PNDOVR)	.00	.000	.000	.000

TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
CUMULATIVE TIME OF OVERFLOWS (hours)= .00
PERCENTAGE OF TIME OVERFLOWING (%)= .00

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.651
TIME SHIFT OF PEAK FLOW (min)= 173.00
MAXIMUM STORAGE USED (ha.m.)=.3637E+00

004:0009

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* BLOCK 3 COMMERCIAL

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| DESIGN STANDHYD | Area (ha)= .80
| 04:BLK3 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.72	.08
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	73.03	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		158.85	639.53
over (min)		2.00	6.00
Storage Coeff. (min)=		1.76 (ii)	5.89 (ii)
Unit Hyd. Tpeak (min)=		2.00	6.00
Unit Hyd. peak (cms)=		.61	.19

			TOTALS
PEAK FLOW	(cms)=	.16	.10 .251 (iii)
TIME TO PEAK	(hrs)=	1.50	1.53 1.500
RUNOFF VOLUME	(mm)=	65.22	43.58 53.321
TOTAL RAINFALL	(mm)=	66.02	66.02 66.023
RUNOFF COEFFICIENT	=	.99	.66 .808

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0010

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* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE

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| ROUTE RESERVOIR | IN>04:(BLK3) | OUT<01:(B3CTRL) |

Requested routing time step = 1.0 min.

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.015	.1000E+01
.015	.1000E-03	.000	.0000E+00

ROUTING RESULTS		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >04:	(BLK3)	.80	.251	1.500	53.321
OUTFLOW<01:	(B3CTRL)	.80	.015	1.067	53.321
OVERFLOW<02:	(3OVR)	.00	.000	.000	.000

TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
CUMULATIVE TIME OF OVERFLOWS (hours)= .00
PERCENTAGE OF TIME OVERFLOWING (%)= .00

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.978
TIME SHIFT OF PEAK FLOW (min)= -26.00
MAXIMUM STORAGE USED (ha.m.)=.2536E-01

004:0011

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* BLOCK 4 COMMERCIAL

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| DESIGN STANDHYD | Area (ha)= 1.40
| 05:BLK4 DT= 1.00 | Total Imp(%)= 90.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.26	.14
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	96.61	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		158.85	639.53
over (min)		2.00	6.00
Storage Coeff. (min)=		2.08 (ii)	6.22 (ii)
Unit Hyd. Tpeak (min)=		2.00	6.00
Unit Hyd. peak (cms)=		.54	.18

			TOTALS
PEAK FLOW	(cms)=	.28	.17 .434 (iii)
TIME TO PEAK	(hrs)=	1.50	1.55 1.500
RUNOFF VOLUME	(mm)=	65.22	43.58 53.321
TOTAL RAINFALL	(mm)=	66.02	66.02 66.023
RUNOFF COEFFICIENT	=	.99	.66 .808

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

004:0012

****

*

*

* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE

*

*

****

| ROUTE RESERVOIR | IN>05:(BLK4) | OUT<03:(B4CTRL) |

Requested routing time step = 1.0 min.

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
.000	.0000E+00	.015	.1000E+01
.015	.1000E-03	.000	.0000E+00

ROUTING RESULTS		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW >05:	(BLK4)	1.40	.434	1.500	53.321
OUTFLOW<03:	(B4CTRL)	1.40	.015	.750	53.321
OVERFLOW<04:	(4OVR)	.00	.000	.000	.000

```
                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    3.459
                    TIME SHIFT OF PEAK FLOW          (min)=   -45.00
                    MAXIMUM  STORAGE  USED        (ha.m.)=.5446E-01
```

004:0013

```
*****************************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
*****************************************************************************
```

ADD HYD (PSTDEV)	ID: NHYD	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	DWF (cms)	
	ID1 08:ENDOUT	11.82	.025	4.38	33.04	.000	
	+ID2 09:ENDOVR	.00	.000	.00	.00	.000	**DRY**
	+ID3 01:B3CTRL	.80	.015	1.07	53.32	.000	
	+ID4 02:3OVR	.00	.000	.00	.00	.000	**DRY**
	+ID5 03:B4CTRL	1.40	.015	.75	53.32	.000	
	+ID6 04:4OVR	.00	.000	.00	.00	.000	**DRY**
	SUM 05:PSTDEV	14.02	.055	4.38	36.22	.000	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

004:0014

004:0002

004:0002

004:0002

```
  ** END OF RUN :   4

*****************************************************************************
```

```
| START              |  Project  dir.: H:\SWMHYM~1\10034Y~1\
|--------------------|  Rainfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
          #  1=CH50.STM
```

005:0002

```
*#*****************************************************************************
*#  Project Name: [YINS PHASE 5]     Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#*****************************************************************************
```

005:0002

```
| READ STORM       |    Filename: H:\SWMHYM~1\10034Y~1\CH50.STM
| Ptotal=  72.96 mm|    Comments: 50 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTI
```

TIME hrs	PAIN mm/hr	TIME hrs	PAIN mm/hr	TIME hrs	PAIN mm/hr	TIME hrs	PAIN mm/hr
.17	3.990	1.17	14.270	2.17	12.620	3.17	5.790
.33	4.450	1.33	33.900	2.33	10.390	3.33	5.330
.50	5.080	1.50	186.560	2.50	8.890	3.50	4.980
.67	5.970	1.67	44.810	2.67	7.800	3.67	4.650
.83	7.290	1.83	23.440	2.83	6.960	3.83	4.370
1.00	9.530	2.00	16.260	3.00	6.300	4.00	4.140

005:0003

```
*****************************************************************************
*
*
* SFD
*
*
*****************************************************************************
```

```
| DESIGN STANDHYD    |   Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.44	5.86
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	249.00	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		186.56	61.99
over (min)		3.00	14.00
Storage Coeff. (min)=		3.44 (ii)	13.96 (ii)
Unit Hyd. Tpeak (min)=		3.00	14.00
Unit Hyd. peak (cms)=		.34	.08
			TOTALS
PEAK FLOW	(cms)=	.72	.62 .987 (iii)
TIME TO PEAK	(hrs)=	1.50	1.70 1.517
RUNOFF VOLUME	(mm)=	72.16	24.60 32.209
TOTAL RAINFALL	(mm)=	72.96	72.96 72.962
RUNOFF COEFFICIENT	=	.99	.34 .441

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0004

```
*****************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
*
*
*****************************************************************************
```

```
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.43	.14
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	61.64	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		186.56	234.31
over (min)		1.00	8.00
Storage Coeff. (min)=		1.49 (ii)	7.67 (ii)
Unit Hyd. Tpeak (min)=		1.00	8.00
Unit Hyd. peak (cms)=		.83	.15
			TOTALS
PEAK FLOW	(cms)=	.11	.06 .157 (iii)
TIME TO PEAK	(hrs)=	1.50	1.58 1.500
RUNOFF VOLUME	(mm)=	72.16	35.73 49.575
TOTAL RAINFALL	(mm)=	72.96	72.96 72.962
RUNOFF COEFFICIENT	=	.99	.49 .679

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0005

```
*****************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
*****************************************************************************
```

```
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	.52	.17
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	67.82	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		186.56	234.31
over (min)		2.00	8.00
Storage Coeff. (min)=		1.58 (ii)	7.76 (ii)
Unit Hyd. Tpeak (min)=		2.00	8.00
Unit Hyd. peak (cms)=		.65	.14
			TOTALS
PEAK FLOW	(cms)=	.14	.07 .190 (iii)
TIME TO PEAK	(hrs)=	1.50	1.58 1.500
RUNOFF VOLUME	(mm)=	72.16	35.73 49.575
TOTAL RAINFALL	(mm)=	72.96	72.96 72.962
RUNOFF COEFFICIENT	=	.99	.49 .679

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0006

```
*****************************************************************************
*
*
* BLOCK 5 SWM
*
*
*****************************************************************************
```

```
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.13	.13
Dep. Storage	(mm)=	.80	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	91.65	40.00
Mannings n	=	.013	.250
Max.eff.Inten.(mm/hr)=		186.56	35.64
over (min)		2.00	15.00
Storage Coeff. (min)=		1.89 (ii)	15.02 (ii)
Unit Hyd. Tpeak (min)=		2.00	15.00
Unit Hyd. peak (cms)=		.58	.08
			TOTALS
PEAK FLOW	(cms)=	.58	.01 .587 (iii)
TIME TO PEAK	(hrs)=	1.50	1.72 1.500
RUNOFF VOLUME	(mm)=	72.16	20.00 66.945
TOTAL RAINFALL	(mm)=	72.96	72.96 72.962
RUNOFF COEFFICIENT	=	.99	.27 .918

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 58.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

005:0007

```
*****************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
```

```
**********************************************************************
---------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
---------------------             (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 01:SFD       9.30     .987     1.52   32.21     .000
                 +ID2 02:BLK1      .57      .157     1.50   49.58     .000
                 +ID3 03:BLK2      .69      .190     1.50   49.58     .000
                 +ID4 06:BLK5     1.26      .587     1.50   66.95     .000
                  ==========================================================
                  SUM 07:PSTDEV   11.82     1.905    1.50   37.76     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0008----------------------------------------------------------------------
**********************************************************************
*
*
* ROUTE THROUGH POND
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07:(PSTDEV)    |
| OUT<08:(PNDOUT)    |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)   |    (cms)     (ha.m.)
                            .000  .0000E+00     |     .025  .3535E+00
                            .007  .5520E-01     |     .027  .4178E+00
                            .013  .1118E+00     |     .029  .4837E+00
                            .017  .1700E+00     |     .031  .5512E+00
                            .020  .2296E+00     |     .033  .6203E+00
                            .023  .2908E+00     |     .000  .0000E+00

     ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
     ---------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)        11.82     1.905     1.500     37.763
     OUTFLOW<08: (PNDOUT)        11.82      .027     4.300     37.761
    OVERFLOW<09: (PNDOVR)          .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                  PERCENTAGE OF TIME OVERFLOWING     (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=      1.434
                  TIME SHIFT OF PEAK FLOW          (min)=    168.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.4182E+00

------------------------------------------------------------------------------
005:0009----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 3 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     .80
| 04:BLK3   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      .72          .08
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    73.03        40.00
     Mannings n             =   .013         .250

     Max.eff.Inten.(mm/hr)=   186.56       792.82
           over      (min)      2.00         5.00
     Storage Coeff.  (min)=     1.65 (ii)    5.44 (ii)
     Unit Hyd. Tpeak (min)=     2.00         5.00
     Unit Hyd. peak  (cms)=      .63          .21
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .19          .13        .310 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.53       1.500
     RUNOFF VOLUME    (mm)=   72.16        49.78      59.854
     TOTAL RAINFALL   (mm)=   72.96        72.96      72.962
     RUNOFF COEFFICIENT    =     .99          .68        .820

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
005:0010----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )    |
| OUT<01:(B3CTRL)    |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)   |    (cms)     (ha.m.)
                            .000  .0000E+00     |     .015  .1000E+01
                            .015  .1000E-03     |     .000  .0000E+00

     ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
     ---------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )          .80      .310     1.500     59.854
     OUTFLOW<01: (B3CTRL)          .80      .015     1.067     59.854
    OVERFLOW<02: (3OVR  )          .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                  PERCENTAGE OF TIME OVERFLOWING     (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=     4.840
                  TIME SHIFT OF PEAK FLOW          (min)=   -26.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.3117E-01

------------------------------------------------------------------------------
005:0011----------------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 4 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD    |   Area     (ha)=     1.40
| 05:BLK4   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     1.26          .14
     Dep. Storage     (mm)=      .80         1.50
     Average Slope     (%)=     1.00         1.00
     Length            (m)=    96.61        40.00
     Mannings n             =   .013         .250

     Max.eff.Inten.(mm/hr)=   186.56       780.67
           over      (min)      2.00         6.00
     Storage Coeff.  (min)=     1.95 (ii)    5.77 (ii)
     Unit Hyd. Tpeak (min)=     2.00         6.00
     Unit Hyd. peak  (cms)=      .57          .19
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .32          .22        .525 (iii)
     TIME TO PEAK    (hrs)=     1.50         1.53       1.500
     RUNOFF VOLUME    (mm)=   72.16        49.78      59.854
     TOTAL RAINFALL   (mm)=   72.96        72.96      72.962
     RUNOFF COEFFICIENT    =     .99          .68        .820

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
005:0012----------------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )    |
| OUT<03:(B4CTRL)    |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
                           (cms)      (ha.m.)   |    (cms)     (ha.m.)
                            .000  .0000E+00     |     .015  .1000E+01
                            .015  .1000E-03     |     .000  .0000E+00

     ROUTING RESULTS              AREA     QPEAK     TPEAK       R.V.
     ---------------------         (ha)     (cms)     (hrs)       (mm)
     INFLOW >05: (BLK4  )          1.40      .525     1.500     59.854
     OUTFLOW<03: (B4CTRL)          1.40      .015      .833     59.854
    OVERFLOW<04: (4OVR  )          .00       .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =          0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=        .00
                  PERCENTAGE OF TIME OVERFLOWING     (%)=       .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=      2.859
                  TIME SHIFT OF PEAK FLOW          (min)=    -40.00
                  MAXIMUM  STORAGE  USED        (ha.m.)=.6394E-01

------------------------------------------------------------------------------
005:0013----------------------------------------------------------------------
**********************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
**********************************************************************
---------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
---------------------             (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 08:PNDOUT    11.82     .027     4.30   37.76     .000
                 +ID2 09:PNDOVR      .00     .000      .00     .00     .000 **DRY**
                 +ID3 01:B3CTRL      .80     .015     1.07   59.85     .000
                 +ID4 02:3OVR        .00     .000      .00     .00     .000 **DRY**
                 +ID5 03:B4CTRL     1.40     .015      .83   59.85     .000
                 +ID6 04:4OVR        .00     .000      .00     .00     .000 **DRY**
                  ==========================================================
                  SUM 05:PSTDEV    14.02     .057     4.30   41.23     .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
005:0014----------------------------------------------------------------------
------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
  ** END OF RUN :   5

**********************************************************************




---------------------
| START              |  Project  dir.: H:\SWMHYM~1\10034Y~1\
---------------------  Painfall dir.: H:\SWMHYM~1\10034Y~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 006
    NSTORM=   1
```

```
          #  1=CH100.STM
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [YINS PHASE 5]     Project Number: [10034]
*#  Date        : 02-11-2010
*#  Modeller    : [TGS]
*#  Company     : G. Douglas Vallee Limited
*#  License #   :  3568969
*#*****************************************************************************
--------------------------------------------------------------------------------
006:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: H:\SWMHYM-1\10034Y-1\CH100.STM
| Ptotal=  83.90 mm|    Comments: 100 YEAR CHICAGO 4 HOUR DESIGN STORM DIS
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   4.500 |   1.17  16.860 |   2.17  14.830 |   3.17   6.600
               .33   5.050 |   1.33  41.070 |   2.33  12.120 |   3.33   6.100
               .50   5.820 |   1.50 205.920 |   2.50  10.310 |   3.50   5.660
               .67   6.830 |   1.67  54.560 |   2.67   9.020 |   3.67   5.280
               .83   8.410 |   1.83  29.170 |   2.83   8.030 |   3.83   4.980
              1.00  11.070 |   2.00  19.280 |   3.00   7.240 |   4.00   4.700

--------------------------------------------------------------------------------
006:0003----------------------------------------------------------------------
*****************************************************************************
*
*
* SFD
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=    9.30
| 01:SFD    DT= 1.00 |   Total Imp(%)=   37.00   Dir. Conn.(%)=   16.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.44          5.86
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=    249.00         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    205.92         79.53
               over (min)        3.00         13.00
     Storage Coeff.  (min)=      3.31 (ii)    12.83 (ii)
     Unit Hyd. Tpeak (min)=      3.00         13.00
     Unit Hyd. peak  (cms)=       .35           .09
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .80           .80      1.192 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.68      1.517
     RUNOFF VOLUME    (mm)=     83.10         31.04     39.372
     TOTAL RAINFALL   (mm)=     83.90         83.90     83.902
     RUNOFF COEFFICIENT    =      .99           .37       .469

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0004----------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 1 TOWNHOUSES
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .57
| 02:BLK1   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .43           .14
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     61.64         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    205.92        286.05
               over (min)        1.00          7.00
     Storage Coeff.  (min)=      1.43 (ii)     7.14 (ii)
     Unit Hyd. Tpeak (min)=      1.00          7.00
     Unit Hyd. peak  (cms)=       .85           .16
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .12           .07       .185 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.57      1.500
     RUNOFF VOLUME    (mm)=     83.10         44.06     58.898
     TOTAL RAINFALL   (mm)=     83.90         83.90     83.902
     RUNOFF COEFFICIENT    =      .99           .53       .702

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0005----------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 2 APARTMENTS
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=     .69
| 03:BLK2   DT= 1.00 |   Total Imp(%)=   75.00   Dir. Conn.(%)=   38.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .52           .17
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     67.82         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    205.92        286.05
               over (min)        2.00          7.00
     Storage Coeff.  (min)=      1.52 (ii)     7.22 (ii)
     Unit Hyd. Tpeak (min)=      2.00          7.00
     Unit Hyd. peak  (cms)=       .66           .16
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .15           .09       .224 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.57      1.500
     RUNOFF VOLUME    (mm)=     83.10         44.06     58.898
     TOTAL RAINFALL   (mm)=     83.90         83.90     83.902
     RUNOFF COEFFICIENT    =      .99           .53       .702

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0006----------------------------------------------------------------------
*****************************************************************************
*
*
* BLOCK 5 SWM
*
*
*****************************************************************************
----------------------
| DESIGN STANDHYD    |   Area     (ha)=    1.26
| 06:BLK5   DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.13           .13
     Dep. Storage     (mm)=       .80          1.50
     Average Slope     (%)=      1.00          1.00
     Length            (m)=     91.65         40.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=    205.92         46.00
               over (min)        2.00         14.00
     Storage Coeff.  (min)=      1.82 (ii)    13.67 (ii)
     Unit Hyd. Tpeak (min)=      2.00         14.00
     Unit Hyd. peak  (cms)=       .59           .08
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .65           .01       .650 (iii)
     TIME TO PEAK    (hrs)=      1.50          1.70      1.500
     RUNOFF VOLUME    (mm)=     83.10         25.49     77.341
     TOTAL RAINFALL   (mm)=     83.90         83.90     83.902
     RUNOFF COEFFICIENT    =      .99           .30       .922

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0     Ia = Dep. Storage   (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
006:0007----------------------------------------------------------------------
*****************************************************************************
*
*
* DETERMINE INFLOW TO POND
*
*
*****************************************************************************
--------------------
| ADD HYD (PSTDEV) | ID: NHYD     AREA     QPEAK    TPEAK    R.V.     DWF
--------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                  ID1 01:SFD       9.30     1.192     1.52   39.37    .000
                 +ID2 02:BLK1      .57      .185      1.50   58.90    .000
                 +ID3 03:BLK2      .69      .224      1.50   58.90    .000
                 +ID4 06:BLK5     1.26      .650      1.50   77.34    .000
                  ==========================================================
                  SUM 07:PSTDEV   11.82     2.221     1.50   45.50    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
006:0008----------------------------------------------------------------------
*****************************************************************************
*
*
* ROUTE THROUGH POND
*
*
*****************************************************************************
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07:(PSTDEV)    |
| OUT<08:(PNDOUT)    |    ========  OUTFLOW STORAGE TABLE  ==========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)  |    (cms)    (ha.m.)
                             .000  .0000E+00    |     .025  .3535E+00
                             .007  .5520E-01    |     .027  .4178E+00
                             .013  .1118E+00    |     .029  .4837E+00
                             .017  .1700E+00    |     .031  .5512E+00
                             .020  .2296E+00    |     .033  .6203E+00
                             .023  .2908E+00    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (PSTDEV)      11.82     2.221     1.500     45.501
     OUTFLOW<08: (PNDOUT)      11.82      .030     4.300     45.500
    OVERFLOW<09: (PNDOVR)       .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.353
                  TIME SHIFT OF PEAK FLOW          (min)=   168.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=.5069E+00

--------------------------------------------------------------------------------
006:0009----------------------------------------------------------------------
*****************************************************************************
*
*
```

```
* BLOCK 3 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD     |   Area     (ha)=     .80
| 04:BLK3   DT= 1.00  |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=       .72          .08
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      1.00         1.00
     Length            (m)=     73.03        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    205.92       907.51
               over (min)        2.00         5.00
     Storage Coeff.  (min)=      1.58 (ii)    5.18 (ii)
     Unit Hyd. Tpeak (min)=      2.00         5.00
     Unit Hyd. peak  (cms)=       .64          .22
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .21          .15        .353 (iii)
     TIME TO PEAK    (hrs)=      1.50         1.53       1.500
     RUNOFF VOLUME    (mm)=     83.10        59.74      70.253
     TOTAL RAINFALL   (mm)=     83.90        83.90      83.902
     RUNOFF COEFFICIENT   =       .99          .71        .837

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
006:0010---------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON BLOCK 3 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR     |    Requested routing time step =  1.0 min.
|  IN>04:(BLK3  )     |
| OUT<01:(B3CTRL)     |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)    |    (cms)    (ha.m.)
                           .000   .0000E+00     |     .015   .1000E+01
                           .015   .1000E-03     |     .000   .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (BLK3  )         .80      .353     1.500     70.253
     OUTFLOW<01: (B3CTRL)         .80      .015     1.033     70.253
    OVERFLOW<02: (3OVR  )         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.253
                  TIME SHIFT OF PEAK FLOW          (min)=   -28.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3841E-01

------------------------------------------------------------------------
006:0011---------------------------------------------------------------
**********************************************************************
*
*
* BLOCK 4 COMMERCIAL
*
*
**********************************************************************
---------------------
| DESIGN STANDHYD     |   Area     (ha)=    1.40
| 05:BLK4   DT= 1.00  |   Total Imp(%)=   90.00   Dir. Conn.(%)=   45.00
---------------------
                          IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      1.26          .14
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      1.00         1.00
     Length            (m)=     96.61        40.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    205.92       907.51
               over (min)        2.00         5.00
     Storage Coeff.  (min)=      1.87 (ii)    5.47 (ii)
     Unit Hyd. Tpeak (min)=      2.00         5.00
     Unit Hyd. peak  (cms)=       .58          .21
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .36          .27        .610 (iii)
     TIME TO PEAK    (hrs)=      1.50         1.53       1.500
     RUNOFF VOLUME    (mm)=     83.10        59.74      70.253
     TOTAL RAINFALL   (mm)=     83.90        83.90      83.902
     RUNOFF COEFFICIENT   =       .99          .71        .837

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  58.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------
006:0012---------------------------------------------------------------
**********************************************************************
*
*
* SIMULATE STORAGE ON 4 TO RELEASE AT CONTROLLED RATE
*
*
**********************************************************************
---------------------
| ROUTE RESERVOIR     |    Requested routing time step =  1.0 min.
|  IN>05:(BLK4  )     |
| OUT<03:(B4CTRL)     |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)    |    (cms)    (ha.m.)
                           .000   .0000E+00     |     .015   .1000E+01
                           .015   .1000E-03     |     .000   .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------             (ha)     (cms)     (hrs)       (mm)
     INFLOW >05: (BLK4  )        1.40      .610     1.500     70.253
     OUTFLOW<03: (B4CTRL)        1.40      .015      .717     70.253
    OVERFLOW<04: (4OVR  )         .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.457
                  TIME SHIFT OF PEAK FLOW          (min)=   -47.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.7812E-01

------------------------------------------------------------------------
006:0013---------------------------------------------------------------
**********************************************************************
*
*
* TOTAL POST DEVELOPMENT FROM SITE
*
*
**********************************************************************
---------------------
| ADD HYD (PSTDEV)  | ID: NHYD     AREA     QPEAK    TPEAK    R.V.    DWF
---------------------                (ha)     (cms)    (hrs)    (mm)    (cms)
                    ID1 08:ENDOUT   11.82      .030    4.30   45.50    .000
                  +ID2 09:ENDOVR      .00      .000     .00     .00    .000 **DRY**
                  +ID3 01:B3CTRL      .80      .015    1.03   70.25    .000
                  +ID4 02:3OVR        .00      .000     .00     .00    .000 **DRY**
                  +ID5 03:B4CTRL     1.40      .015     .72   70.25    .000
                  +ID6 04:4OVR        .00      .000     .00     .00    .000 **DRY**
                   ================================================
                   SUM 05:PSTDEV    14.02      .060    4.30   49.38    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------
006:0014---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
------------------------------------------------------------------------
006:0002---------------------------------------------------------------
      FINISH
------------------------------------------------------------------------
**********************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2010-11-22     at 14:15:45
======================================================================
```

Appendix D: Miscellaneous Pond Design Calculations

vallee
Consulting Engineers, Architects & Planners

Subject: Yin's Phase 5
Date: Nov 4/10 By: TGS
Project #: 10034 Page

Water Quality Sizing

35% Impervious	90
55% Impervious	150
54% Impervious	147
Contributing Area	11.82
Volume Req.	1738

1) Forebay Design: Settling

Equation 4.5 Dist= sqrt(r*Qp/Vs)

Dist = forebay length
r = length to width of forebay
Qp = peak flow rate from pond during quality storm
Vs= target settling velocity, recommended at 0.0003 m/s

Given	r=	2	Target 2:1
	Qp =	0.017	
	Vs=	0.0003	
	Dist=	11	

2) Forebary Design: Dispersion Length

Equation 4.6 Dist = 8*Q/(d*Vf)

Dist = forebay length
Q= inlet flow rate for quality storm
d= depth of perm pool
Vf = desired velocity in forebay (<0.5m/s)

Given	Q=	0.651	SYMHYMO results to pond for 2-year event
	d=	1.25	
	Vf=	0.5	
	dist=	8	

3) Forebay Design: Bottom Width

Equation 4.7 Width=Dist/8

Given Dist= 11

width= 1.375

4) Forebay Design: Cleanout Frequency

Table 6.3 of SWM Planning and Design Manual

35% Impervious	0.6	m3/ha, annual sediment loading
55% Impervious	1.9	m3/ha, annual sediment loading

Reference Calculation of Impervious areas spreadsheet for this development==> 39% impervious
Therefore extrapolate

54%	1.835	m3/ha

Total site area, including external contributing area 11.82 ha

Sediment Accummulation	21.6897	m3/year
Target Removal eff. For basic protection	60%	
Anticipate Accumulation	13.01382	m3/year
Clean Frequency	10	year
Total Anticipated Accumulation	130.1382	m3

Contour	Area	Incr V	Volume
242	73	0	
242.45	187	59	59
242.65	380	57	115
243.25	717	329	444

Appendix E: Main Street Storm Sewer Design Calculations (Existing and Proposed)

vallee
Consulting Engineers, Architects & Planners

Subject: Yins Phase 5 Main Street Ex Storm
Date: Dec-10 By: TGS
Project #: 10034 Page

Existing storm services drainage area from Thompson Road to Area 4-3.

	Area	Runoff C	C*A
1-ex	1.26	0.45	0.567
2-1	1.71	0.45	0.7695
3-2	1.81	0.9	1.629
4-3	2.09	0.9	1.881
			4.8465

WSMD Designed for 2-year storm

Norfolk County Design criteria for 2-year storm, I = A/(t+B)^C

A	529.711
B	4.501
C	0.745

Assume and inlet time of 10 min to account for initial estimate of 5.0min per design criteria for commercial areas and some transit time in system

I	72.243	mm/hr
Q	973	L/s

Existing storm sewer along Main Street is all 525mm at 0.4%

Dia	0.525	m
n	0.013	
Hyd R	0.13125	m
Slope	0.4%	
C/S A	0.21647537	m2
Q	272	L/s

Therefore insufficient capacity to service drainage area for the 2-year event.

REV. No.	DATE	REVISION
0	DEC 8/10	SUBMIT TO COUNTY FOR REVIEW

(10) STORM MANHOLE AND NUMBER

10-10A
0.69 0.75
AREA NUMBER
RUNOFF COEFF.
AREA (Ha)

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
YIN PHASE 5
NORFOLK COUNTY - WATERFORD

Drawing Title
STORM DRAINAGE AREAS

Designed by : DJB	Drawn By : TJC
Checked by : TGS	Date Started : SEPTEMBER 2010
Drawing Scale : 1:100	Drawing No. ST1
Project No. 10-034	

DATE LAST PLOTTED :

STORM SEWER DESIGN SHEET

Storm 2-year Simcoe
A= 529.71 B= 4.501 C= 0.745
Pipe Material PVC<=450, Concrete >450
n 0.013

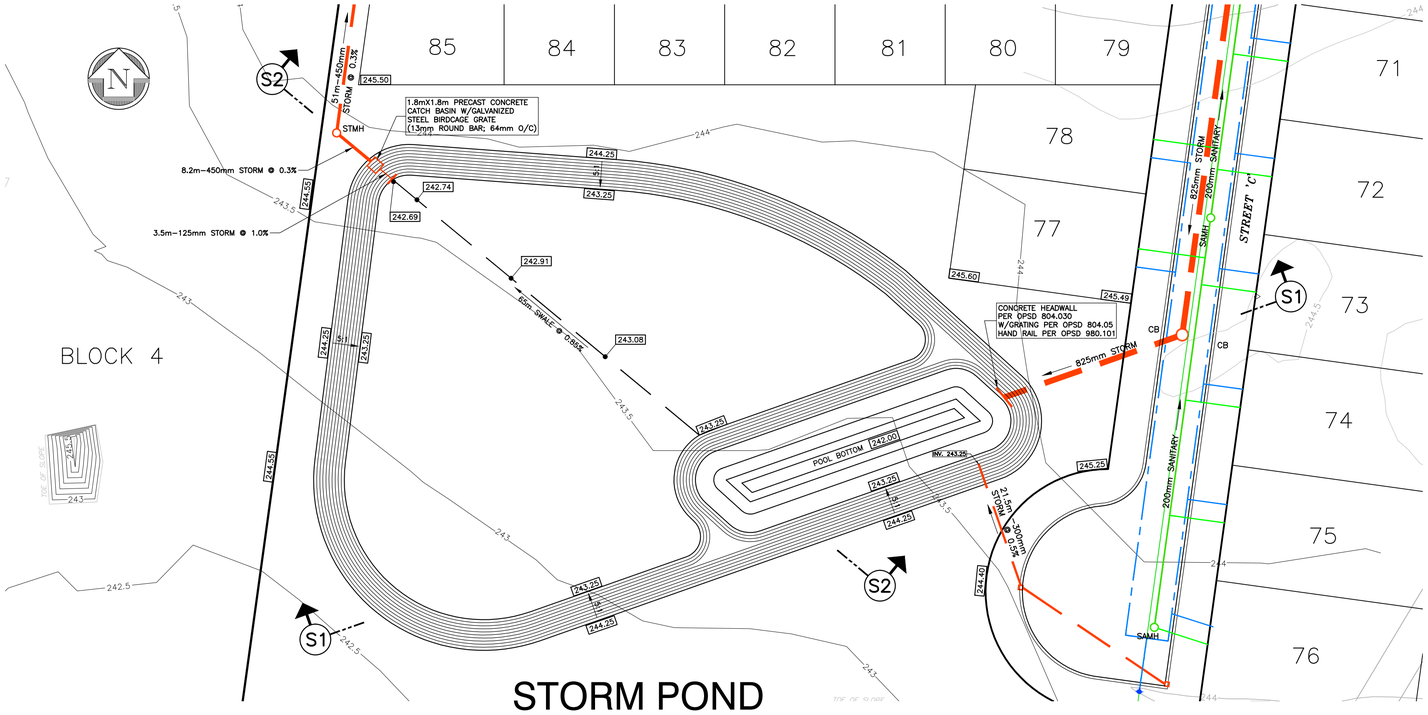
Project 10034 Yin's Phase 5 - Main Street Storm
Town/County Waterford - Norfolk County

Date Nov 24/10
Designed by TGS
Checked by JDV
Sheet of : 1 of

Location			Area			Cumlative	Time	Rainfall	Flow	Sewer Design					
Area	From	To			TOTAL	R*A	of		2.78*I*A*R	Size	Slope	Cap	Vel	Length	Time
			Ha	Ha	Ha		Concentration	mm/hr							
			0.45	0.9			min		L/s	mm	%	L/s	m/s	m	min
Pond	Pond	7	0		0.00	0	0.00	N/A	30.0	450	0.30%	156.2	0.982	59.2	1
7-6	7	6	0.37		0.17	0.17	15.00	57.94	56.8	450	0.40%	180.3	1.134	104.5	1.54
6-5	6	5	0		0.00	0.17	16.54	54.75	85.3	600	0.20%	274.6	0.971	114	1.96
5-4	5	4		1.34	1.21	1.37	18.49	51.24	255.5	600	0.20%	274.6	0.971	119	2.04
4-3	4	3		2.09	1.88	3.25	20.53	48.10	495.0	750	0.25%	556.6	1.26	119.4	1.58
3-2	3	2		1.81	1.63	4.88	22.11	45.95	683.7	825	0.25%	717.7	1.343	84	1.04
2-1	2	1	1.71		0.77	5.65	23.16	44.66	761.7	825	0.30%	786.2	1.471	29.9	0.34
1-EX	1	EX	1.26		0.57	6.22	23.50	44.25	825.1	825	0.35%	849.2	1.589	107	1.12

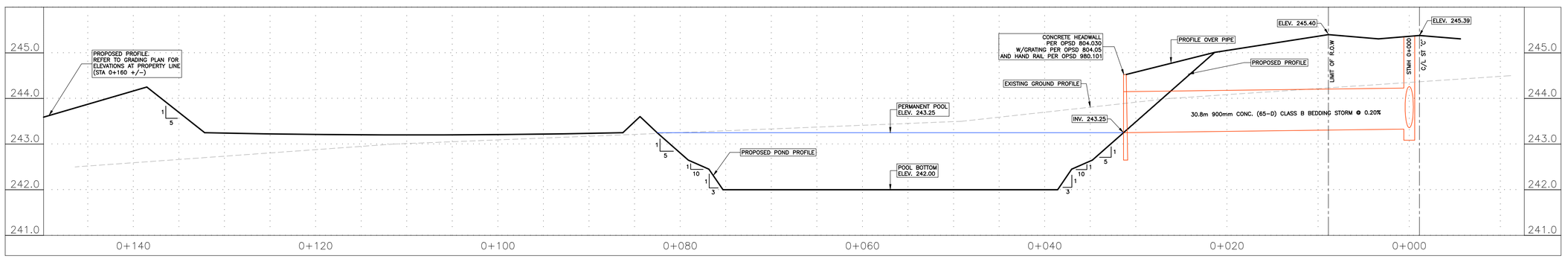
Note:

Peak Discharge from Pond (100-yr storm)	0.03	Applied at Area POND
Peak Dischare from Block 3	0.015	Applied at Area 6-5
Peak Discharge from Block 4	0.015	Applied at Area 6-6



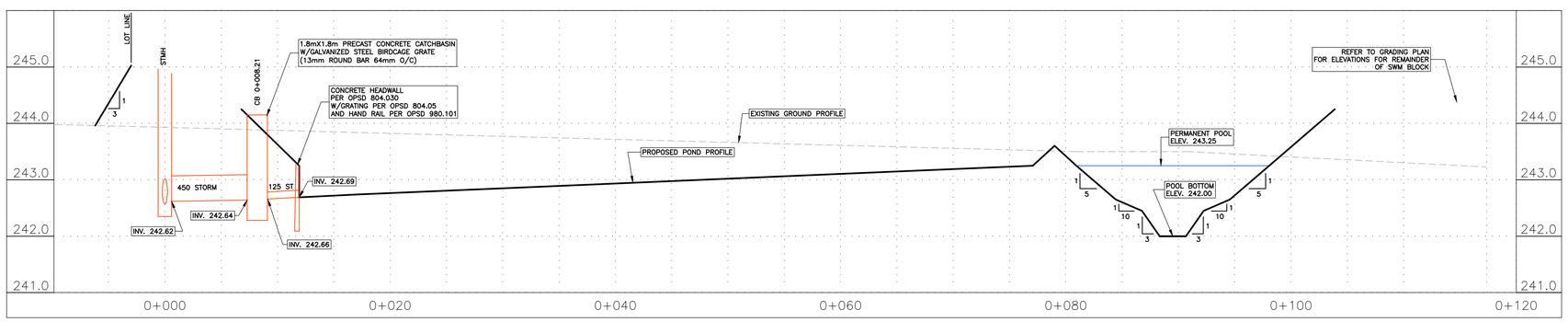
STORM POND

SCALE 1:500



SECTION S1-S1

SCALE HORIZONTAL=1:250
VERTICAL=1:50



SECTION S2-S2

SCALE HORIZONTAL=1:250
VERTICAL=1:50

REV. No.	DATE	REVISION
0	DEC 8/10	SUBMIT TO COUNTY FOR REVIEW

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project Title
YIN PHASE 5
NORFOLK COUNTY - WATERFORD

Drawing Title
PLAN AND SECTION DETAILS

Designed by : GRB	Drawn By : TJC
Checked by : TGS	Date Started : NOVEMBER 2010
Drawing Scale : AS NOTED	Drawing No. SWM1
Project No. 10-034	

DATE LAST PLOTTED :

Orchard Square

SIMCOE, NORFOLK COUNTY

Estimated Cost and Securities

Rev0 - 2024-03-08 Project #20-128

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	A. SANITARY SEWERS						
1	Connect New 200mm sanitary to EX MH On Property Line Along Lam Blvrd, including backfill and restoration.(Phase 1 Connection)	L.S.	1	$3,000	$3,000	100%	$3,000
3	Supply and install 200mm PVC sanitary sewers.						
	a) EX.MH To Proposed Commercial Building	metre	14.2	$250.00	$3,550	10%	$355
	b) Ex MH to SAMH1	metre	52.9	$250.00	$13,225	10%	$1,323
	c) SAMH1 To SAMH2	metre	23.9	$250.00	$5,975	10%	$598
	d) SAMH2 To Proposed Restaurant	metre	5.2	$250.00	$1,300	10%	$130
5	Supply and install 1200mm dia. precast concrete maintenance holes complete with benching.						
	a) SAMH1	L.S.	1	$10,000	$10,000	10%	$1,000
	b) SAMH2	L.S.	1	$10,000	$10,000	10%	$1,000
6	Flush and CCTV Video Sanitary System.	L.S.	1	$673	$673	10%	$67
	TOTAL SANITARY SEWERS				**$47,723**		**$7,472**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	B. WATERMAINS						
1	Connect new 50mm watermain To Ex Water Valve (Phase 1 Connection)	L.S.	1	$3,000	$3,000	100%	$3,000
2	Supply and install 150mm dia. water main including all fittings and anodes within development site.	metre	12	$140.00	$1,680	10%	$168
3	Supply and install private fire hydrant set complete with valve	each	1	$5,000.00	$5,000	10%	$500
4	Supply and install 50mm water services including all fittings and anodes within development site.	metre	95	$75.00	$7,125	10%	$713
5	Supply and install 50mm water Chamber within development site.	each	1	$25,000.00	$25,000	10%	$2,500
	TOTAL WATERMAIN				**$16,805**		**$6,881**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	C. STORM SEWERS						
1	Supply and install 200mm dia. storm sewers.						
	a) CBMH1 To Proposed Commercial Building	metre	19.6	$100.00	$1,960	10%	$196
	b) Proposed Resturant Connection	metre	2.0	$100.00	$200	10%	$20
	c) Stub to Future Residential	metre	4.0	$100.00	$400	10%	$40
2	Supply and install 300mm dia. storm sewers.						
	a) CB5 To CBMH5	metre	34.3	$130.00	$4,459	10%	$446
	b) CB4 To CBMH4	metre	23.1	$130.00	$3,003	10%	$300
	c) CB3 To CBMH3	metre	32.4	$130.00	$4,212	10%	$421
	d) CB1 To CBMH1	metre	28.0	$130.00	$3,640	10%	$364
	e) CBMH2 To CBMH3	metre	38.4	$130.00	$4,992	10%	$499
	f) STMH4 To CBMH4	metre	8.0	$130.00	$1,040	10%	$104
	g) CBMH2 TO STMH4	metre	40.0	$130.00	$5,200	10%	$520
3	Supply and install 375mm dia. storm sewers.						
	a) STMH2 To STMH1	metre	32.8	$200.00	$6,560	10%	$656
	b) STMH1 To EX.MH	metre	19.8	$200.00	$3,960	100%	$3,960
4	Supply and install 600mm dia. storm sewers.						
	a) CBMH5 To CBMH2	metre	10.1	$325.00	$3,283	10%	$328
	b) STMH3 To CBMH2	metre	4.8	$325.00	$1,560	10%	$156
5	Supply and install 1200mm dia. precast concrete maintenance holes complete with benching.						
	a) CBMH1	L.S.	1	$7,000	$7,000	10%	$700
	b) CBMH2	L.S.	1	$7,000	$7,000	10%	$700
	c) CBMH3	L.S.	1	$7,000	$7,000	10%	$700
	d) CBMH4	L.S.	1	$7,000	$7,000	10%	$700
	e) CBMH5	L.S.	1	$7,000	$7,000	10%	$700
	f) STMH1	L.S.	1	$7,000	$7,000	10%	$700
	g) STMH2	L.S.	1	$7,000	$7,000	10%	$700
	h) STMH3	L.S.	1	$7,000	$7,000	10%	$700
	i) STMH4	L.S.	1	$7,000	$7,000	10%	$700
6	Supply and install 600x600 precast concrete catch basins complete with grate, connections, and subdrains.						
	a) Within Development	each	3	$2,500	$7,500	10%	$750
7	Construct proposed stormwater management Tank.	L.S.	1	$200,000.00	$200,000	10%	$20,000
8	Flush and CCTV video storm system	L.S.	1	$1,902	$1,902	10%	$190
	TOTAL STORM SEWER				**$314,310**		**$34,995**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT
	D. ROAD CONSTRUCTION						
	DEVELOPMENT SITE						
1	Sub-excavation to a depth of 540mm below finish grade for proposed asphalt areas.	L.S.	1	$28,080	$28,080	10%	$2,808
2	Supply, place and compact 300mm Granular 'B' Type 2 100% crushed limestone for asphalt area.	tonne	2527	$15.00	$37,908	10%	$3,791
3	Supply, place and compact 150mm Granular 'A'	tonne	1369	$20.00	$27,378	10%	$2,738
4	Supply, place and compact 50mm of HL8 base asphalt pavement for asphalt area.	tonne	702	$100.00	$70,200	10%	$7,020
5	Supply, place and compact 40mm of HL3 top asphalt pavement for asphalt area.	tonne	351	$110.00	$38,610	10%	$3,861
6	Construct Concrete Drive aisles and Garbage area	sqm	487	$100.00	$48,700	10%	$4,870
7	Construct Internal Concrete sidewalk	sqm	489	$50.00	$24,450	10%	$2,445
8	Construct Barrier curb	m	708	$40.00	$28,320	10%	$2,832
9	Adjust manholes to base asphalt.	each	10	$350.00	$3,500	10%	$350
10	Adjust manholes And Catch Basins to surface asphalt.	each	12	$350.00	$4,200	10%	$420
	COUNTY ROW						
1	Sub-excavation to a depth of 540mm below finish grade for proposed asphalt areas.	L.S.	1	$1,600	$1,600	100%	$1,600
2	Supply, place and compact 300mm Granular 'B' Type 2 100% crushed limestone for asphalt area.	tonne	144	$15.00	$2,160	100%	$2,160
3	Supply, place and compact 150mm Granular 'A' 100% crushed limestone for asphalt area.	tonne	78	$20.00	$1,560	100%	$1,560
4	Supply, place and compact 50mm of HL8 base asphalt pavement for asphalt area.	tonne	80	$100.00	$8,000	100%	$8,000
5	Supply, place and compact 40mm of HL3 top asphalt pavement for asphalt area.	tonne	20	$110.00	$2,200	100%	$2,200
6	Construct Concrete sidewalk	sqm	165	$50.00	$8,250	100%	$8,250
7	Construct curb and gutter.	m	130	$40.00	$5,200	100%	$5,200
	TOTAL ROAD CONSTRUCTION				**$340,316**		**$60,105**
	E. LANDSCAPING						
1	Landscaping Allowance	L.S.	1	$50,000.00	$50,000	100%	$50,000
	TOTAL LANDSCAPING				**$50,000**		**$50,000**
	F. RECORD DRAWINGS						
1	Complete record drawings for development site and work within county ROW.	L.S.	1	$4,000.00	$4,000	100%	$4,000
	TOTAL RECORD DRAWINGS				**$4,000**		**$4,000**

ITEM	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT	SECURITY %	SECURITY AMOUNT

SECURITY SUMMARY

A.	SANITARY SEWERS	$7,472
B.	WATERMAIN	$6,881
C.	STORM SEWERS	$34,995
D.	ROAD CONSTRUCTION	$60,105
E.	LANDSCAPING	$50,000
F.	RECORD DRAWINGS	$4,000
	GRAND TOTAL	**$163,452**

NOTES:

1. PROPOSED SEWERS TO ADHERE TO THE FOLLOWING OPSD:

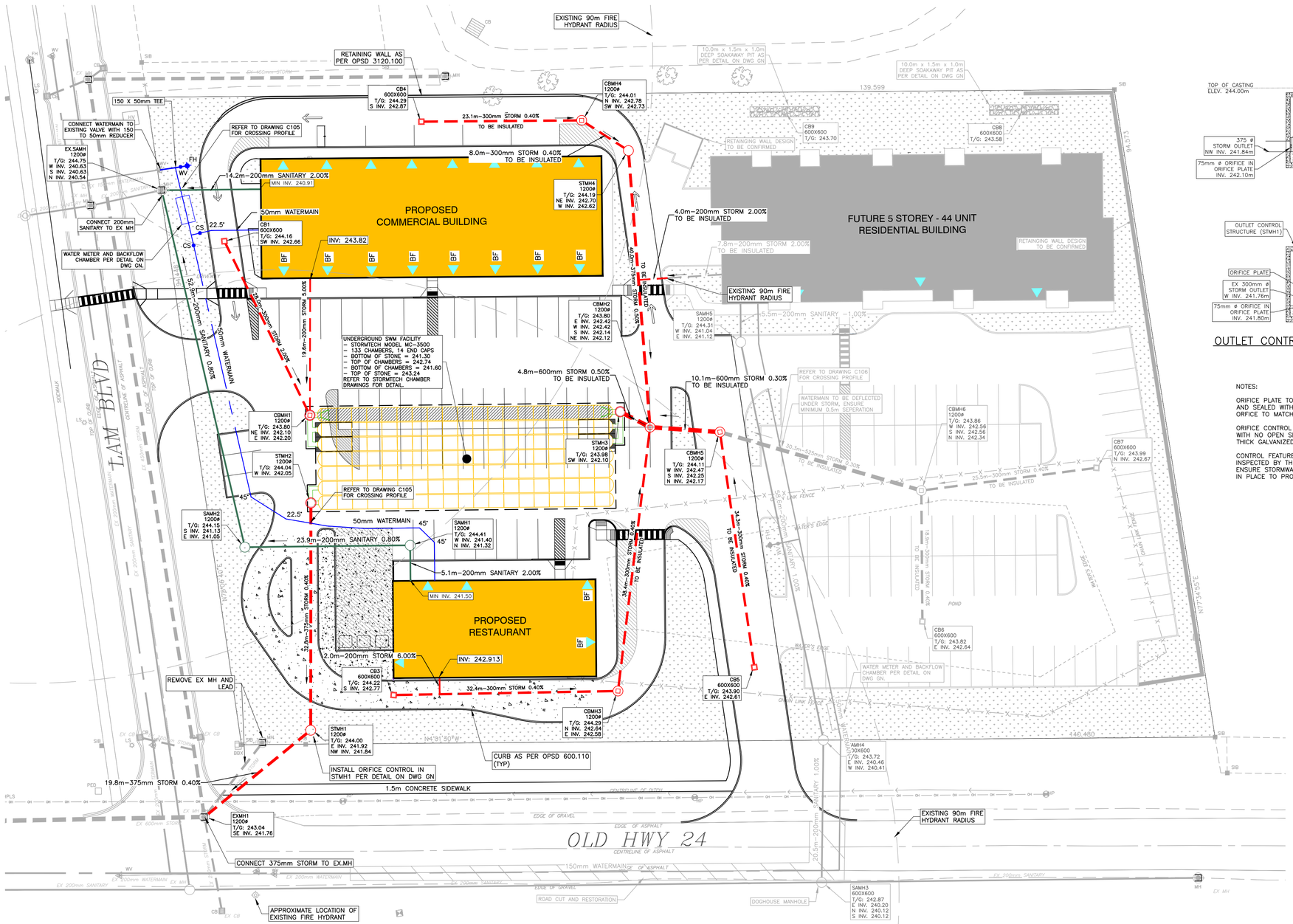
1200mm MAINTENANCE HOLE STRUCTURE	OPSD 701.010
1200mm CATCH BASIN MAINTENANCE HOLE GRATE	OPSD 400.010

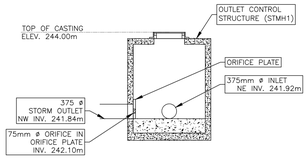
ALL COMPONENTS OF THE PROPOSED STORM SEWERS ARE TO ADHERE TO DIVISION 700 OF THE OPSD.

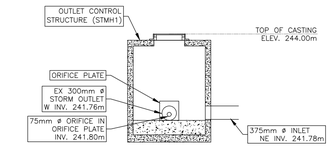
2. RESTORE EXISTING COUNTY INFRASTRUCTURE TO COUNTY STANDARDS:
   - REFER TO TRENCHING RESTORATION DETAIL ON DRAWING GN.
   - CONCRETE CURB TO MATCH EXISTING.
   - CONCRETE SIDEWALK TO MATCH EXISTING WIDTH.
   - CONSTRUCTION PER OPSS AND OPSD.
4. ALL WATERMAIN TO BE RESTRAINED AT ALL BENDS, TEES, REDUCERS, DEAD-ENDS, AND VALVES AS PER DETAILS ON DWG. GN.

LEGEND

- PROPOSED STORM MANHOLE & SEWER
- PROPOSED SANITARY MANHOLE & SEWER
- PROPOSED SANITARY SERVICE
- PROPOSED WATERMAIN
- PROPOSED WATER SERVICE
- PROPERTY LINE
- FUTURE PROPOSED STORM MANHOLE & SEWER
- FUTURE PROPOSED SANITARY MANHOLE & SEWER
- FUTURE PROPOSED SANITARY SERVICE
- FUTURE PROPOSED WATERMAIN
- FUTURE PROPOSED WATER SERVICE







OUTLET CONTROL STRUCTURE DETAIL DETAIL
N.T.S.

NOTES:

ORIFICE PLATE TO BE BOLTED TO MANHOLE FACE AND SEALED WITH NON-SHRINK GROUT. INVERT OF ORIFICE TO MATCH OUTLET PIPES.

ORIFICE CONTROL TO BE UNIFORM STEEL SECTION WITH NO OPEN SEAMS. MATERIAL TO BE MIN. 3mm THICK GALVANIZED STEEL OR ALUMINUM.

CONTROL FEATURE MUST BE INSTALLED AND INSPECTED BY THE ENGINEER PRIOR TO PAVING TO ENSURE STORMWATER RUNOFF FLOW CONTROLS ARE IN PLACE TO PROTECT DOWNSTREAM SYSTEM.

REV. No.	DATE	REVISION
0	MAR 8/24	ISSUED FOR SPA
1	APR 16/24	REVISED SPA SUBMISSION

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ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #28 LAM BOULEVARD.
ELEV. 245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EROSION AND SEDIMENT CONTROL PLAN
20-128-C104	SITE SECTION PLAN
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20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
5 10 15
HORIZONTAL : 1:300

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(519) 426-6270

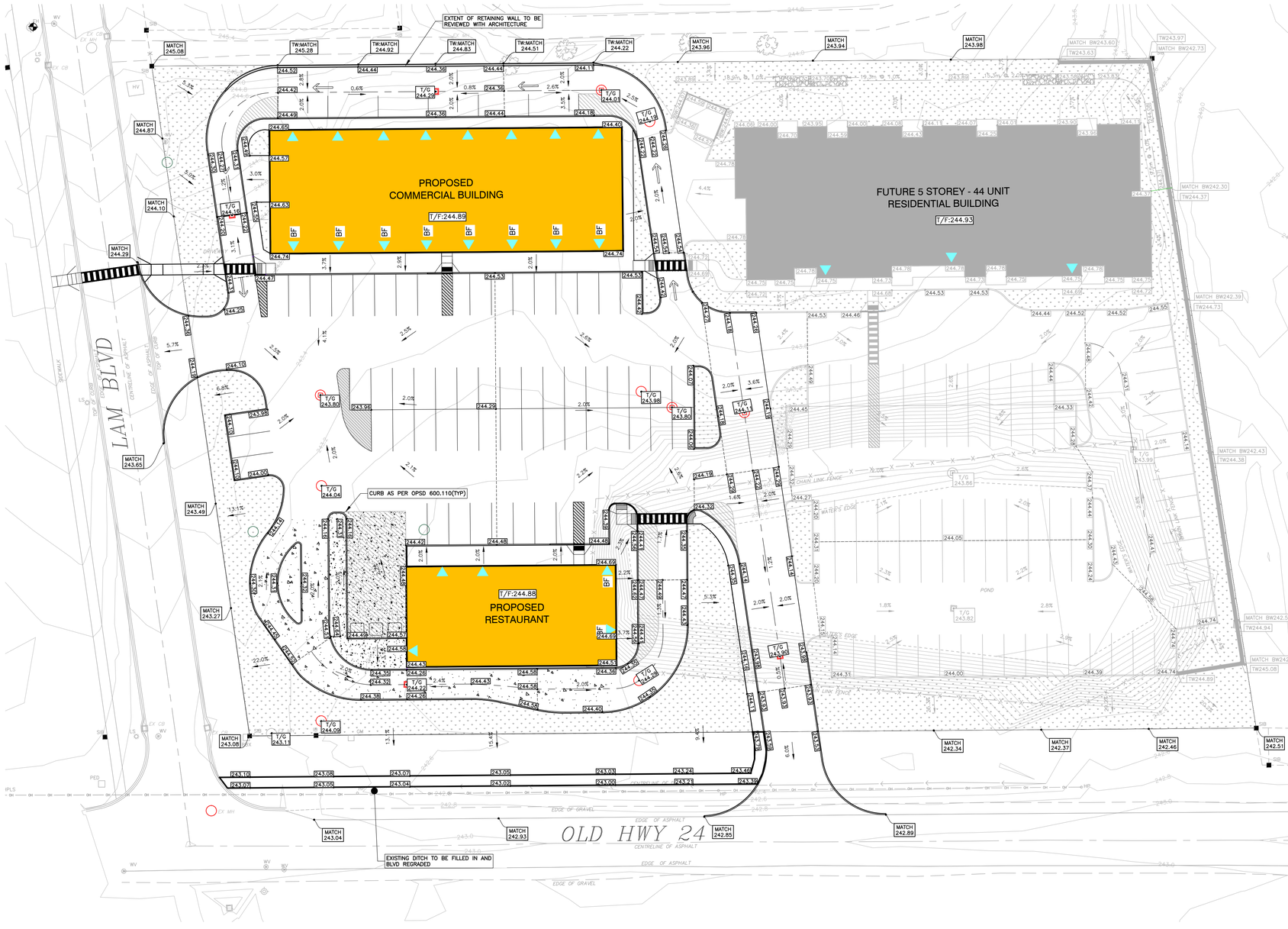
Stamp
LICENSED PROFESSIONAL ENGINEER
2024-04-19
J. T. IEZZI
100109485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
SERVICING PLAN

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 4/16/2024
Drawing Scale : 1:300	Drawing No. C101
Project No. 20-128	

DATE LAST PLOTTED : April 18, 2024


EXTENT OF RETAINING WALL TO BE REVIEWED WITH ARCHITECTURE
PROPOSED
COMMERCIAL BUILDING
T/F:244.89
FUTURE 5 STOREY - 44 UNIT
RESIDENTIAL BUILDING
T/F:244.93
T/F:244.88
PROPOSED
RESTAURANT
CURB AS PER OPSD 600.110(TYP)
EXISTING DITCH TO BE FILLED IN AND BLVD REGRADED
LAM BLVD
OLD HWY 24
CENTRELINE OF ASPHALT
EDGE OF ASPHALT
EDGE OF GRAVEL
POND
WATER'S EDGE
CHAIN LINK FENCE
MATCH 245.08
TW:MATCH 245.28
TW:MATCH 244.92
TW:MATCH 244.83
TW:MATCH 244.51
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MATCH 243.96
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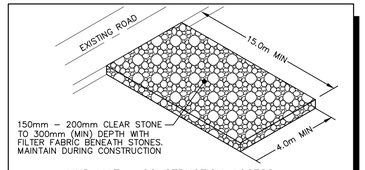
EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR DESIGN AND PROVISION OF ALL SEDIMENT CONTROL MEASURES AS MAY BE REQUIRED TO PROTECT THE WORK SITE OR THE ADJACENT LANDS, REGARDLESS OF THE SOURCE OR ORIGIN OF EROSION OR SEDIMENTS. IF THE ENGINEER IS NOT SATISFIED WITH THE EXTENT OF THE MEASURES TAKEN, THE ENGINEER MAY DIRECT THAT ADDITIONAL CONTROLS BE PUT IN PLACE.

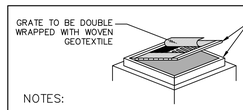
   THE ENGINEER'S REQUIREMENTS FOR SEDIMENT AND EROSION CONTROL SHALL BE CONSIDERED ABSOLUTE MINIMUMS. THE ULTIMATE RESPONSIBILITY TO ENSURE THAT THE MEASURES ARE ADEQUATE SHALL LIE SOLELY ON THE CONTRACTOR. ANY DAMAGE RESULTING FROM FAILURE OF THESE MEASURES SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
2. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION.
3. ALL EROSION CONTROL MEASURES TO BE IN PLACE UNTIL RESTORATION IS COMPLETE.
4. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION.
5. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION.
6. MINIMIZE AREA DISTURBED DURING CONSTRUCTION.
7. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN.
8. PROTECT ALL CATCH BASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE AND MAINTAIN IN FREE FLOWING STATE (TERRAFIX 270R OR APPROVED EQUIVALENT). REFER TO DETAIL THIS PAGE.
9. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION INCLUDING OIL GRIT SEPARATOR.
10. PREVENT WIND-BLOWN DUST.
11. CONTRACTOR TO PROVIDE MUD MAT AT ALL CONSTRUCTION ENTRANCES.



MUD MAT – CONSTRUCTION ACCESS
N.T.S.

LEGEND

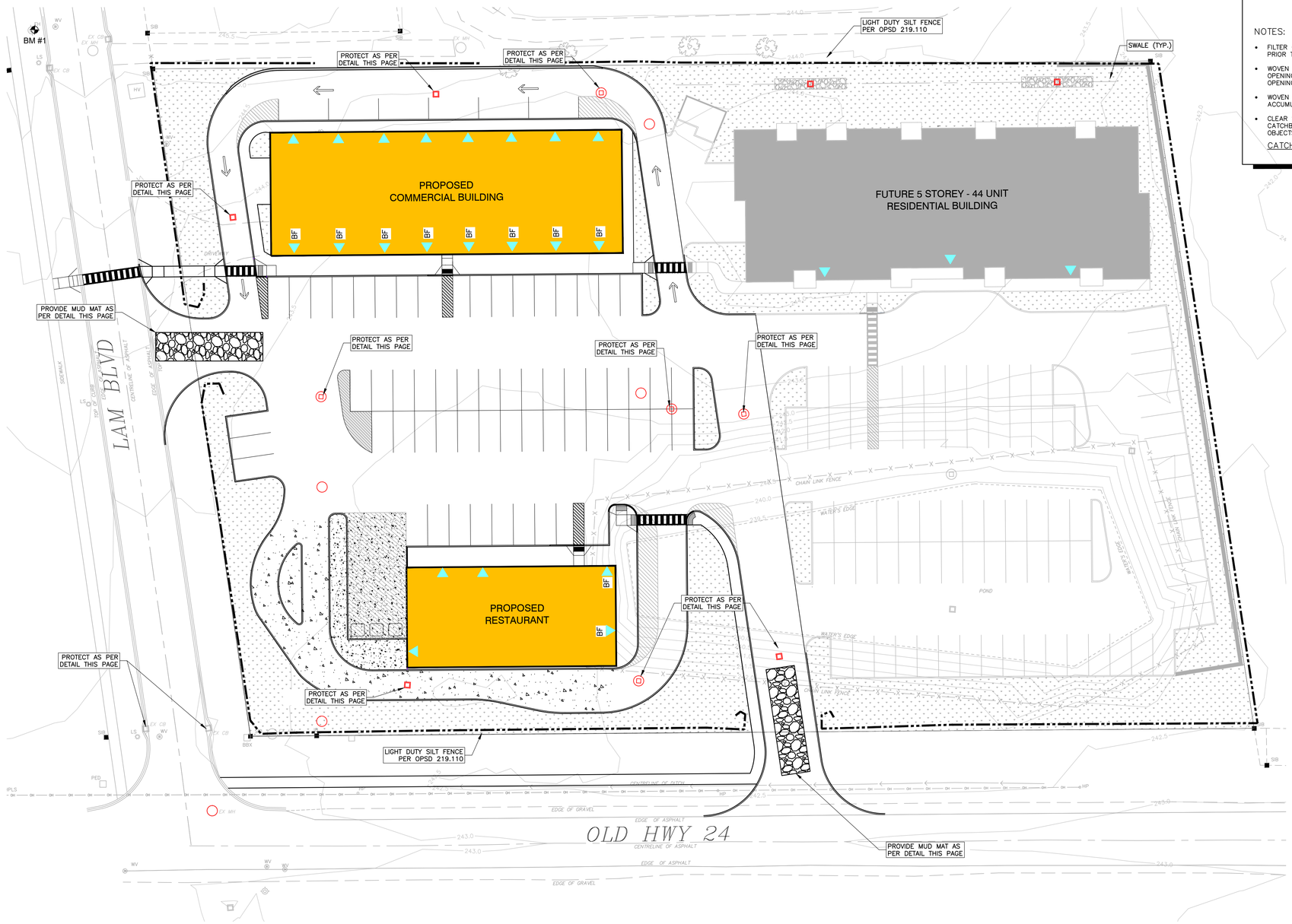
- EXISTING GROUND CONTOUR
- PROPOSED SWALE
- PROPOSED LIGHT DUTY SILT FENCE AS PER OPSD 219.110



NOTES:

- FILTER CLOTH WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
- WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm.
- WOVEN GEOTEXTILE TO BE REPLACED PERIODICALLY WHEN ACCUMULATED SEDIMENTS INTERFERES WITH DRAINAGE.
- CLEAR STONE TO BE PLACED ON TOP OF WRAPPED CATCHBASIN TO PROTECT GEOTEXTILE FROM LARGE OBJECTS.

CATCHBASIN SEDIMENT PROTECTION DETAIL
N.T.S.



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LEGAL DESCRIPTION

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APPLICANT INFORMATION

APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #28 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EROSION AND SEDIMENT CONTROL PLAN
20-128-C104	SITE SECTION PLAN
20-128-C105	PLAN AND PROFILE PHASE 1 SERVICING
20-128-C106	PLAN AND PROFILE PHASE 2 SERVICING
20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
HORIZONTAL : 1:300 (5, 10, 15)

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Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
2 TALBOT STREET NORTH
SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

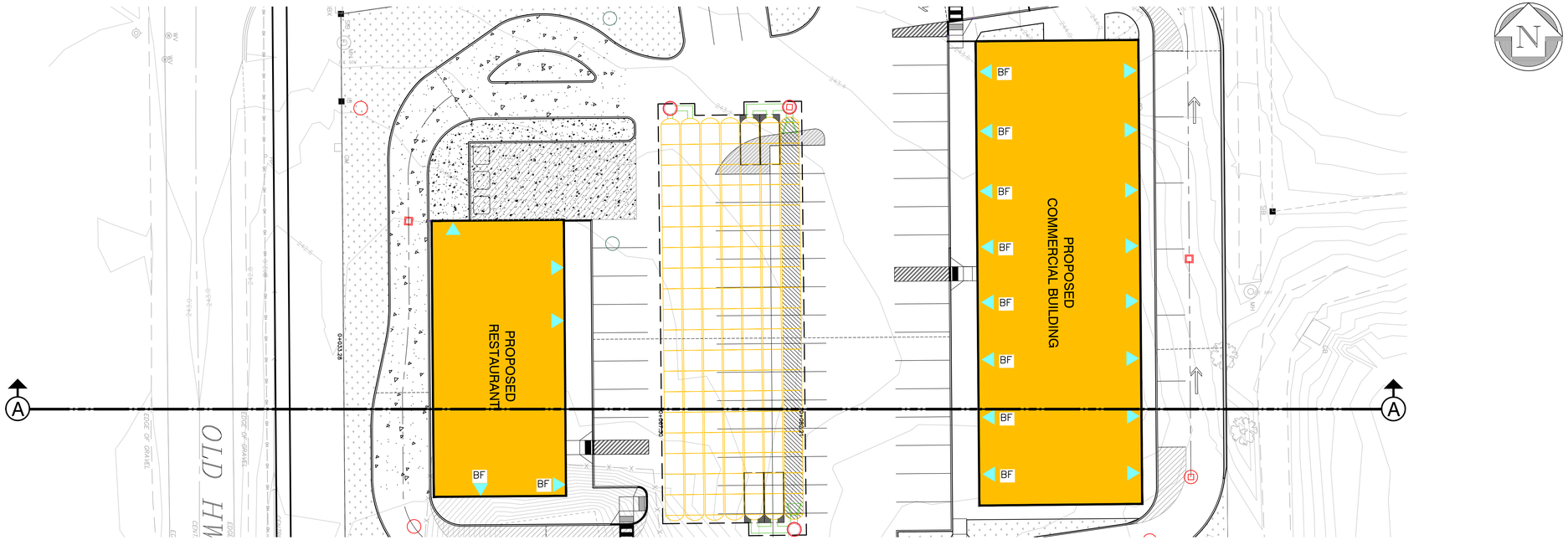
Stamp
LICENSED PROFESSIONAL ENGINEER
2024-04-19
J. T. IEZZI
100109485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

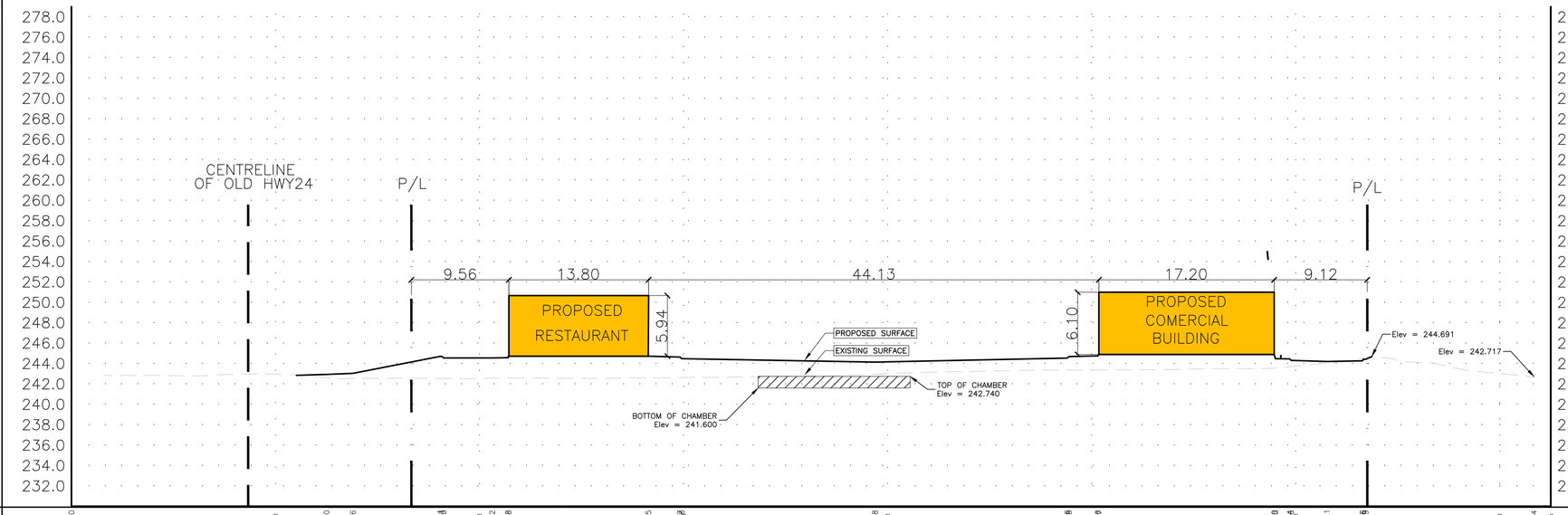
Drawing Title
EROSION AND SEDIMENT CONTROL PLAN

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 3/8/2024
Drawing Scale : 1:300	Drawing No. C103
Project No. 20-128	

DATE LAST PLOTTED : April 19, 2024



SECTION A-A



CHAINAGE	0+000.0	0+020	0+025.0	0+027.6	0+033.3	0+040	0+041.2	0+042.8	0+056.5	0+059.3	0+078.8	0+080	0+097.6	0+100.9	0+118.0	0+119.5	0+123.1	0+128.9	0+140	0+143.4	0+145
FINAL CENTRE LINE ROAD ELEVATIONS			242.93	243.04	244.30	244.55	244.55	244.52	244.72	244.68	244.14	244.17	244.68	244.73	244.89	244.98	244.20	244.82			

DATE LAST PLOTTED : April 19, 2024

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APPLICANT INFORMATION

APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EROSION AND SEDIMENT CONTROL PLAN
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20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

SCALE:
HORIZONTAL : 1 : 250
VERTICAL : 1 : 250

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SIMCOE, ONTARIO N3Y 3W4
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Stamp
LICENSED PROFESSIONAL ENGINEER
2024-04-19
J. T. IEZZI
100179485
PROVINCE OF ONTARIO

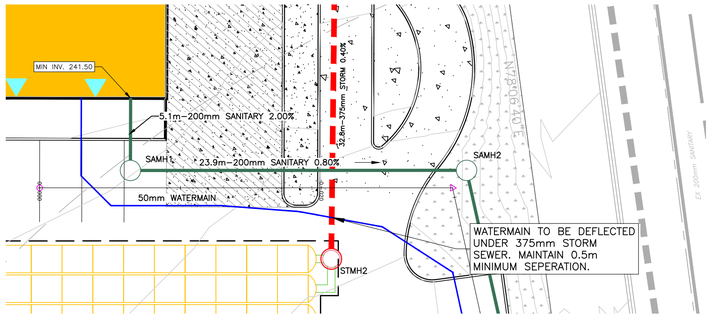
Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

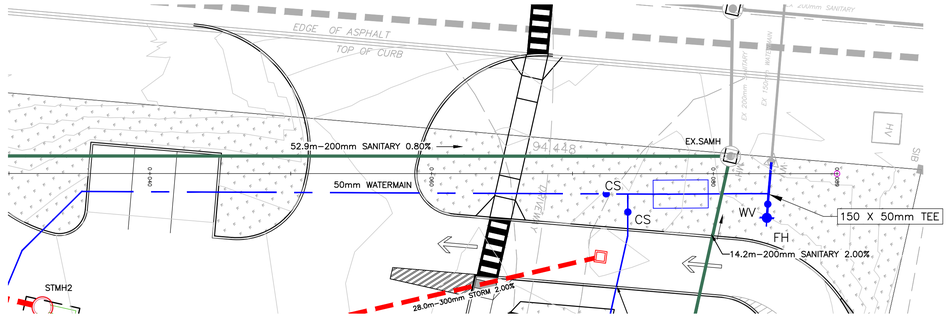
Drawing Title
SITE SECTION PLAN

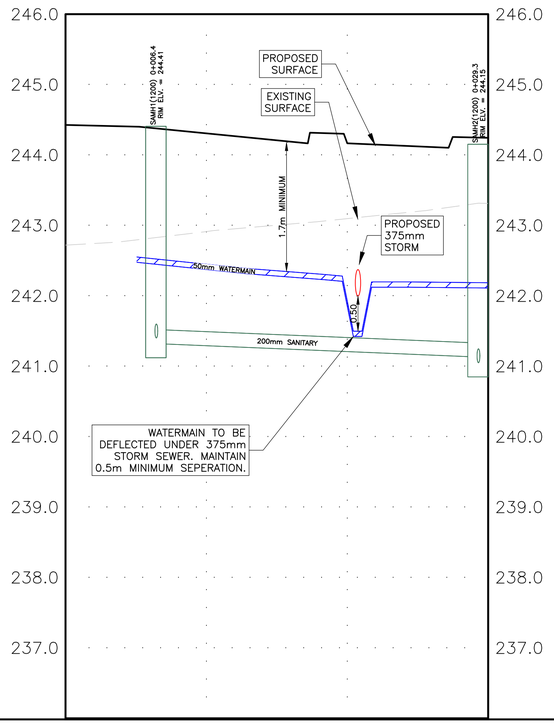
Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 4/8/2024
Drawing Scale : AS NOTED	Drawing No. C104
Project No. 20-128	

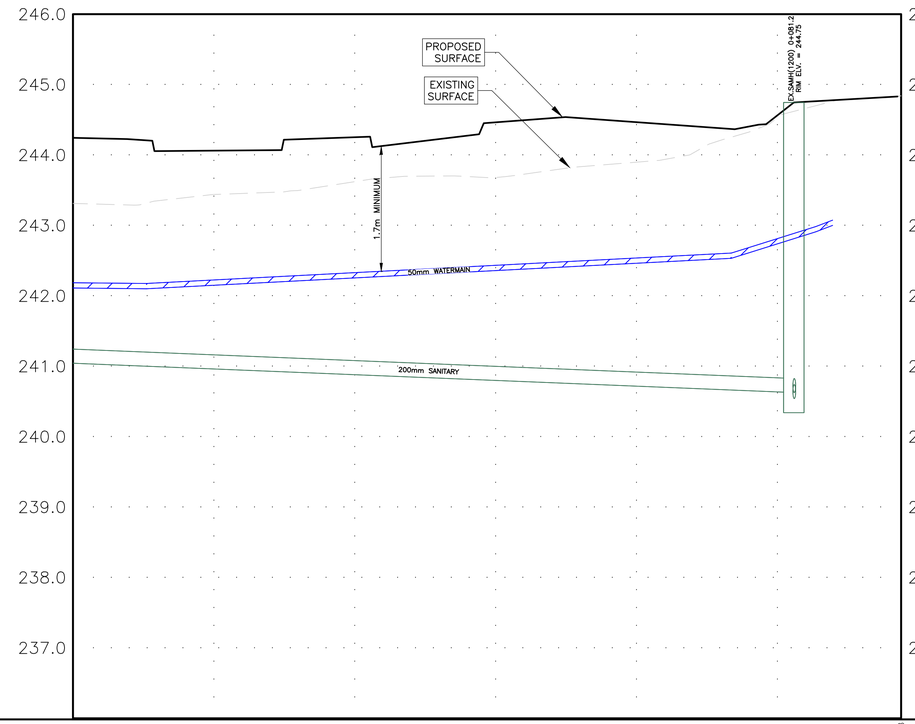
LEGEND

PROPOSED STORM MANHOLE & SEWER	FUTURE PROPOSED STORM MANHOLE & SEWER
PROPOSED SANITARY MANHOLE & SEWER	FUTURE PROPOSED SANITARY MANHOLE & SEWER
PROPOSED SANITARY SERVICE	FUTURE PROPOSED SANITARY SERVICE
PROPOSED WATERMAIN	FUTURE PROPOSED WATERMAIN
PROPOSED WATER SERVICE	FUTURE PROPOSED WATER SERVICE
PROPERTY LINE	









CHAINAGE	0+000	0+010	0+020	0+030	0+030	0+040	0+050	0+060	0+070	0+080	0+088.8	CHAINAGE
PROPOSED ELEVATIONS	244.43	244.31	244.17	244.24	244.24	244.06	244.25	244.46	244.47	244.56		PROPOSED ELEVATIONS
STORM SEWER												STORM SEWER
SANITARY SEWER	241.40W 241.32N	23.9m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ 0.80%			241.15S 241.05E	52.9m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ 0.80%				240.63W 240.55S 240.43N4		SANITARY SEWER

DATE LAST PLOTTED : April 19, 2024

REV. No.	DATE	REVISION
0	MAR 8/24	ISSUED FOR SPA
1	APR 16/24	REVISED SPA SUBMISSION

NOTE:
THE CONTRACTOR IS CAUTIONED THAT ALL OF THE EXISTING UTILITIES ARE NOT INDICATED ON THIS DRAWING. THE CONTRACTOR MUST ARRANGE FOR LOCATES FROM EACH AREA UTILITY COMPANY PRIOR TO ANY CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF ALL UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. CANNOT ACCEPT RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV.....245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

20-128-C101	SERVICING PLAN
20-128-C102	GRADING PLAN
20-128-C103	EROSION AND SEDIMENT CONTROL PLAN
20-128-C104	SITE SECTION PLAN
20-128-C105	PLAN AND PROFILE PHASE 1 SERVICING
20-128-C106	PLAN AND PROFILE PHASE 2 SERVICING
20-128-GN	GENERAL NOTES AND DETAILS
20-128-SAN	SANITARY DRAINAGE AREAS PLAN
20-128-STM	STORM DRAINAGE AREAS PLAN

SCALE:
HORIZONTAL : 1 : 200
VERTICAL : 1 : 40

vallee
Consulting Engineers, Architects & Planners
G. DOUGLAS VALLEE LIMITED
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SIMCOE, ONTARIO N3Y 3W4
(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
2024-04-19
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

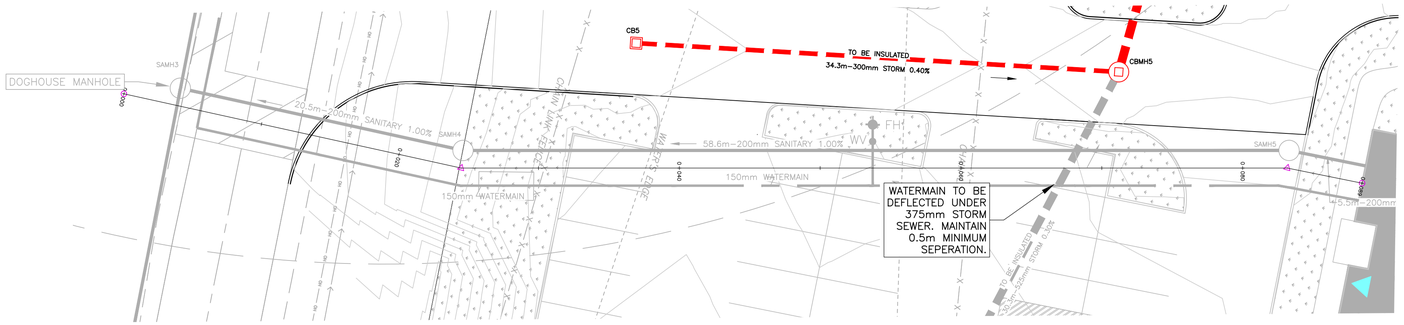
Project Title
ORCHARD SQUARE
WATERFORD - NORFOLK COUNTY

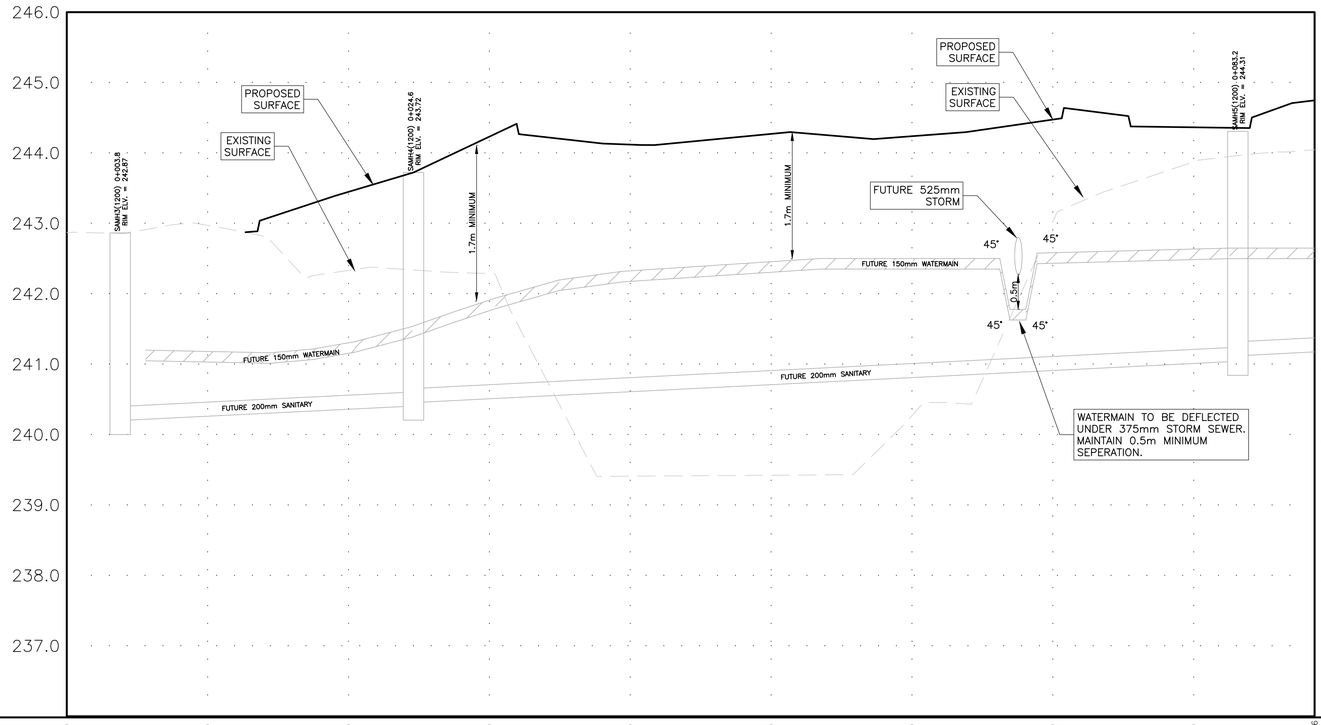
Drawing Title
PLAN AND PROFILE
PHASE 1 SERVICES

Designed by : NBN/NLO	Drawn By : NBN
Checked by : JTI	Date Started : 4/16/24
Drawing Scale : AS SHOWN	Drawing No. C105
Project No. 20-128	

LEGEND

STMH5 — PROPOSED STORM MANHOLE & SEWER	STMH5 — FUTURE PROPOSED STORM MANHOLE & SEWER
SAMH3 — PROPOSED SANITARY MANHOLE & SEWER	SAMH3 — FUTURE PROPOSED SANITARY MANHOLE & SEWER
PROPOSED SANITARY SERVICE	FUTURE PROPOSED SANITARY SERVICE
PROPOSED WATERMAIN	FUTURE PROPOSED WATERMAIN
PROPOSED WATER SERVICE	FUTURE PROPOSED WATER SERVICE
PROPERTY LINE	





CHAINAGE	0+000	0+010	0+020	0+030	0+040	0+050	0+060	0+070	0+080	0+088.6
PROPOSED ELEVATIONS			243.45	244.23	244.12	244.27	244.24	244.47	244.36	244.75
STORM SEWER									5.5m OF 200mm PVC SANITARY WITH CLASS B BEDDING @ −1.00%	
SANITARY SEWER	240.20E		20.5m OF 200mm PVC SANITARY WITH CLASS B BEDDING @ 1.00%	240.44W 240.46E		58.6m OF 200mm PVC SDR 35 SANITARY WITH CLASS B BEDDING @ 1.00%			241.04W 241.61E	

REV. No.	DATE	REVISION
0	MAR 8/24	ISSUED FOR SPA
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LICENSED PROFESSIONAL ENGINEER
2024-04-19
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PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD - NORFOLK COUNTY

Drawing Title
PLAN AND PROFILE
PHASE 2 SERVICES

Designed by : NBN/NLO	Drawn By : NBN
Checked by : JTI	Date Started : 4/16/24
Drawing Scale : AS SHOWN	Drawing No. C106
Project No. 20-128	

DATE : April 19, 2024

LICENSED PROFESSIONAL ENGINEER
J. T. IEZZI
100179485
PROVINCE OF ONTARIO

GENERAL NOTES

1. PRIOR TO CLOSING ANY STREET, THE CONTRACTOR SHALL OBTAIN CLEARANCE BY FILLING OUT THE COUNTY'S NOTICE OF ROAD CLOSURE FORM AND NOTIFY SCHOOL BUS OPERATORS OF STREETS USED FOR DETOUR AND THE DURATION OF THE DETOUR. THE CONTRACTOR MUST SUPPLY AND MAINTAIN ADEQUATE LOCAL DETOUR SIGNS AND LIGHTS. THE CONTRACTOR MUST MAINTAIN MAXIMUM ACCESS TO ALL PROPERTIES AS DIRECTED BY THE ENGINEER.
2. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY MEASURES TO CONTROL SILT ENTERING THE STORM DRAINAGE SYSTEM TO THE SPECIFICATIONS OUTLINED IN THE GUIDELINES ON EROSION AND SEDIMENT CONTROL FOR URBAN CONSTRUCTION SITES PREPARED BY THE MINISTRY OF NATURAL RESOURCES. THESE MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCING ANY CONSTRUCTION FOR THIS STREET AND ARE TO REMAIN IN PLACE UNTIL CONSTRUCTION HAS BEEN COMPLETED TO THE SPECIFICATIONS OF THE ENGINEER.
3. THE CONTRACTOR IS TO MEET ALL THE REQUIREMENTS OF THE OWNERS OF THE UTILITIES ON THIS PLAN, AND MUST MAKE SATISFACTORY ARRANGEMENTS WITH THE UTILITY COMPANIES FOR CROSSING THEIR INSTALLATIONS AND FOR PROVIDING ADEQUATE PROTECTION DURING CONSTRUCTION.
4. PRIOR TO COMMENCING ANY CONSTRUCTION, ALL EXISTING UNDERGROUND UTILITIES SHALL BE LOCATED AND MARKED. ANY UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER AT THE CONTRACTORS EXPENSE.
5. ALL ORGANIC, SUITABLE OR UNSUITABLE MATERIALS BENEATH THE ROAD ALLOWANCES MUST BE REMOVED AND THESE AREAS BACKFILLED WITH AN APPROVED FILL MATERIAL, ALL TO THE SATISFACTION OF THE ENGINEER.
6. PRIOR TO COMMENCING ANY CONSTRUCTION, ALL EXISTING SEWER OUTLET INFORMATION, BENCHMARKS, DIMENSIONS, ELEVATIONS AND GRADES MUST BE CHECKED AND VERIFIED AND ANY DISCREPANCIES REPORTED TO THE ENGINEER IMMEDIATELY.
7. ALL CATCH BASIN LEADS FOR SINGLE CATCH BASINS SHALL BE 250mm ø PVC SDR35 WITH CLASS 'B' BEDDING. ALL CATCH BASIN LEADS FOR TWIN INLET CATCH BASINS SHALL BE 300mm ø PVC SDR35 WITH CLASS 'B' BEDDING.
8. ALL PVC WATERMAIN SHALL HAVE TWU 10 COPPER TRACING WIRE LAID ALONG ENTIRE LENGTH. WATERMAIN SHALL HAVE 1.7m TO 1.9m COVER WITH CLASS 'B' BEDDING.
9. ALL 50mm WATER SERVICE TO BE BLUE904 SDR9 PEX AND ALL 150mm WATERMAIN TO BE PVC DR18 BLUE BRUTE WITH MANUFACTURED FITTINGS.
10. WATERMAIN FITTINGS SHALL BE MECHANICAL JOINT OR PUSH-ON JOINT INSTALLED WITH APPROVED MECHANICAL THRUST RESTRAINTS.
11. ALL MECHANICAL THRUST RESTRAINTS SHALL CONFORM TO CONTRACT DOCUMENT SPECIFICATIONS.
12. WHERE A WATERMAIN OR WATER SERVICE CROSSES ABOVE A STORM OR SANITARY SEWER, A MINIMUM VERTICAL CLEARANCE OF 0.15m SHALL BE PROVIDED. WHERE THE WATERMAIN OR WATER SERVICE IS UNABLE TO CROSS ABOVE THE SEWER, IT SHALL CROSS UNDERNEATH WHILE PROVIDING A MINIMUM SEPARATION OF 0.5m BETWEEN THE SEWER INVERT AND THE CROWN OF THE WATERMAIN OR WATER SERVICE. WHERE A STORM OR SANITARY SEWER CROSSES ANOTHER STORM OR SANITARY SEWER, A MINIMUM VERTICAL CLEARANCE BETWEEN PIPE BARRELS OF 0.15m SHALL BE PROVIDED.
13. PROPOSED SEWERS TO ADHERE TO THE FOLLOWING OPSD:

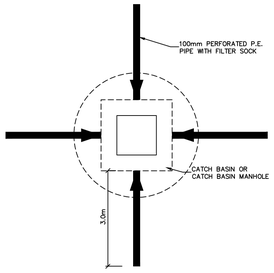
MAINTENANCE HOLE STRUCTURES	OPSD 701.01X
BENCHING	OPSD 701.021
SINGLE CATCH BASIN STRUCTURE 600mm X 600mm	OPSD 705.010
1200mm MAINTENANCE HOLE GRATE	OPSD 401.010
1200mm CATCH BASIN MAINTENANCE HOLE GRATE	OPSD 400.020
SINGLE CATCH BASIN GRATE 600mm X 600mm	OPSD 400.020

ALL COMPONENTS OF THE PROPOSED SEWERS ARE TO ADHERE TO DIVISION 700 OF THE OPSD.

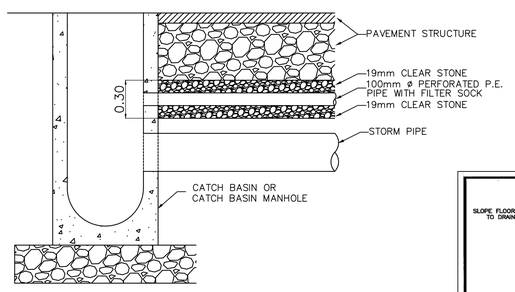
14. ALL STORM SEWERS TO BE PVC DR35 WITH CLASS B BEDDING.
15. PROPOSED SANITARY TO BE PVC DR28 WITH CLASS 'B' BEDDING.
16. FIRE HYDRANTS TO BE AWWA G509 COMPLIANT, NON-DRAINING, OPEN LEFT.
17. MUNICIPALITY WATERMAIN PROCEDURES TO BE ADHERED TO FOR INSTALLATION OF WATERMAINS OR SERVICES.
18. WATERMAINS AND WATER SERVICES SHALL MAINTAIN A MINIMUM COVER OF 1.7m.
19. PROVIDE 2.5m MINIMUM HORIZONTAL CLEARANCE BETWEEN THE PROPOSED WATERMAIN AND ANY STORM OR SANITARY SEWERS OR MAINTENANCE HOLES.

LEGEND

- EX. STORM SEWER
- PROPOSED STORM SEWER
- EX. SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED STORM MANHOLE
- PROPOSED SANITARY MANHOLE
- EX. MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED TWIN INLET CATCHBASIN
- PROPOSED CATCHBASIN MANHOLE
- EX. CATCHBASIN
- PROPOSED WATERMAIN
- EX. WATERMAIN
- PROPOSED 3-WAY FIRE HYDRANT C/W STORZ CONNECTION
- EX. FIRE HYDRANT
- PROPOSED WATERVALVE
- EX. WATERVALVE
- EX. BURIED GAS LINE
- EX. BURIED BELL LINE
- EX. BURIED CABLE LINE
- EX. UNDERGROUND HYDRO LINE



SUBDRAIN PLAN DETAIL
N.T.S.



SUBDRAIN SECTION DETAIL
N.T.S.

GENERAL SEDIMENT CONTROL MEASURES

1. PROTECT ALL EXPOSED SURFACES AND CONTROL ALL RUNOFF DURING CONSTRUCTION
2. ALL EROSION CONTROL MEASURES TO BE IN PLACE BEFORE STARTING CONSTRUCTION AND REMAIN IN PLACE UNTIL RESTORATION IS COMPLETE
3. MAINTAIN EROSION CONTROL MEASURES DURING CONSTRUCTION
4. ALL COLLECTED SEDIMENT TO BE DISPOSED OF AT AN APPROVED LOCATION
5. MINIMIZE AREA DISTURBED DURING CONSTRUCTION
6. ALL DEWATERING TO BE DISPOSED OF IN AN APPROVED SEDIMENTATION BASIN
7. PROTECT ALL CATCHBASINS, MANHOLES AND PIPE ENDS FROM SEDIMENT INTRUSION WITH GEOTEXTILE (TERRAFIX 270R OR APPROVED EQUIVALENT)
8. KEEP ALL SUMPS CLEAN DURING CONSTRUCTION
9. PREVENT WIND-BLOWN DUST
10. STRAW BALES TO BE USED IN LOCALIZED AREAS AS SHOWN AND AND AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION

ROAD & BOULEVARD RESTORATION

ALL DISTURBED AREAS SHALL BE RESTORED AS FOLLOWS:

i. ALL ROAD CUTS SHALL BE RESTORED WITH
- -40mm HL3 SURFACE ASPHALT (97% MARSHALL)
- -50mm HLB BASE ASPHALT (97% MARSHALL)
- -150mm GRANULAR "A" BASE (100% SPMDD)
- -300mm GRANULAR "B" TYPE 2 SUBBASE (100% SPMDD)

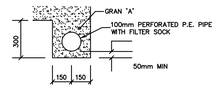
GRANULAR "B" TO BE EXTENDED 0.3m BEHIND EDGE OF THE PAVEMENT

ii. BOULEVARDS SHALL BE RESTORED WITH SOD OVER 100mm TOPSOIL (min) UNLESS OTHERWISE NOTED

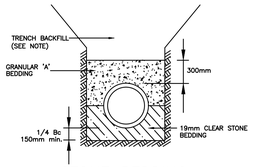
iii. ASPHALT DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD) WITH 50mm OF HL3A ASPHALT (97% MARSHALL)

iv. GRAVEL DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD)

v. CONCRETE DRIVEWAYS SHALL BE RESTORED WITH 150mm OF GRANULAR "A" (100% SPMDD) WITH 150mm OF CONCRETE (OPSS MIX. 30MPa MINIMUM)

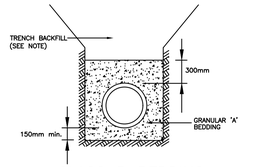


SUBDRAIN DETAIL



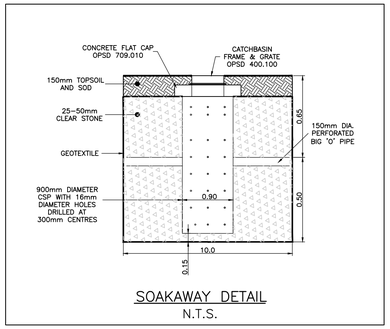
STONE BEDDING

NOTES:
1. 19mm CLEAR STONE STONE BEDDING SHALL BE USED IN PLACE OF THE STANDARD BEDDING WHERE HIGH HYDRAULIC GRADIENT CONDITIONS ARE ENCOUNTERED DURING CONSTRUCTION.

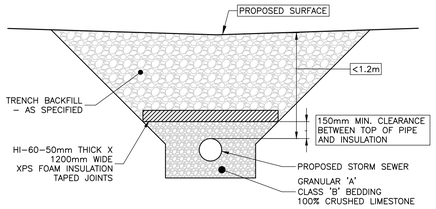


CLASS B BEDDING

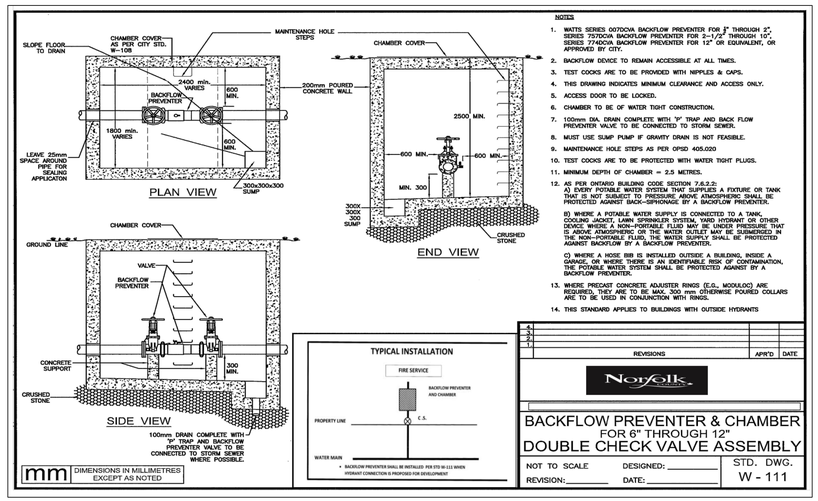
NOTES:
1. PIPE BEDDING AS SPECIFIED ON PLAN AND PROFILE DRAWINGS COMPACTED TO 95% SPMDD IN LAYERS NOT EXCEEDING 150mm, TO 300mm ABOVE TOP OF PIPE.
2. TRENCH BACKFILL FROM TOP OF PIPE BEDDING TO UNDERSIDE OF GRANULAR "B" SUBBASE SHALL CONSIST OF APPROVED NATIVE MATERIALS COMPACTED TO 95% SPMDD IN LAYERS NOT EXCEEDING 300mm.
3. PRIOR TO PLACING THE GRANULAR SUBBASE MATERIAL ALL TOPSOIL, SOFT OR OTHERWISE COMPRESSIBLE MATERIAL MUST BE REMOVED FROM THE SUBGRADE AREA AND THE SUBGRADE SHALL BE PROOF-ROLLED TO COMPACT ANY LOOSE SURFACE ZONES. ALL EXCAVATED AREAS MUST BE BACKFILLED WITH APPROVED ON-SITE NATIVE MATERIALS OR IMPORTED



SOAKAWAY DETAIL
N.T.S.



TYPICAL STORM INSULATION FOR STORM WITH <1.2m COVER
N.T.S.



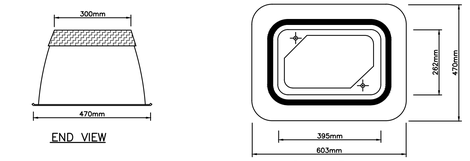
NOTES
1. WATTS SERIES 007QCVA BACKFLOW PREVENTER FOR 3" THROUGH 2", SERIES 757QCVA BACKFLOW PREVENTER FOR 2-1/2" THROUGH 10", SERIES 774QCVA BACKFLOW PREVENTER FOR 12" OR EQUIVALENT, OR APPROVED BY CITY.
2. BACKFLOW DEVICE TO REMAIN ACCESSIBLE AT ALL TIMES.
3. TEST COCKS ARE TO BE PROVIDED WITH NIPPLES & CAPS.
4. THIS DRAWING INDICATES MINIMUM CLEARANCE AND ACCESS ONLY.
5. ACCESS DOOR TO BE LOCKED.
6. CHAMBER TO BE OF WATER TIGHT CONSTRUCTION.
7. 100mm DIA. DRAIN COMPLETE WITH "P" TRAP AND BACK FLOW PREVENTER VALVE TO BE CONNECTED TO STORM SEWER.
8. MUST USE SUMP PUMP IF GRAVITY DRAIN IS NOT FEASIBLE.
9. MAINTENANCE HOLE STEPS AS PER OPSD 405.020
10. TEST COCKS ARE TO BE PROTECTED WITH WATER TIGHT PLUGS.
11. MINIMUM DEPTH OF CHAMBER = 2.5 METRES.
12. AS PER ONTARIO BUILDING CODE SECTION 7.6.2.2:
A) EVERY POTABLE WATER SYSTEM THAT SUPPLIES A FIXTURE OR TANK THAT IS NOT SUBJECT TO PRESSURE ABOVE ATMOSPHERIC SHALL BE PROTECTED AGAINST BACK-SIPHONAGE BY A BACKFLOW PREVENTER.
B) WHERE A POTABLE WATER SUPPLY IS CONNECTED TO A TANK, COOLING JACKET, LAWN SPRINKLER SYSTEM, YARD HYDRANT OR OTHER EQUIPMENT OR PIPING SYSTEM THAT IS NOT UNDER PRESSURE, THAT IS ABOVE STANDARD NON-POTABLE WATER OUTLETS OR SUBMERGED IN THE NON-POTABLE FLUID, THE WATER SUPPLY SHALL BE PROTECTED AGAINST BACKFLOW BY A BACKFLOW PREVENTER.
C) WHERE A HOSE BIB IS INSTALLED OUTSIDE A BUILDING, INSIDE A GARAGE OR A HOUSE, THERE IS AN IDENTIFIABLE RISK OF CONTAMINATION, THE POTABLE WATER SYSTEM SHALL BE PROTECTED AGAINST BY A BACKFLOW PREVENTER.
13. WHERE PRECAST CONCRETE ADJUSTER RINGS (E.G., MODULOC) ARE REQUIRED, THEY ARE TO BE MAX. 300 mm OTHERWISE POURED COLLARS ARE TO BE USED IN CONJUNCTION WITH RINGS.
14. THIS STANDARD APPLIES TO BUILDINGS WITH OUTSIDE HYDRANTS

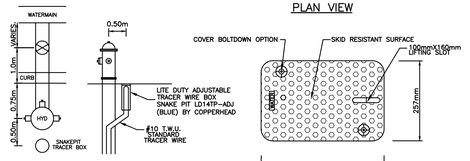
REVISIONS	APR'D	DATE
4		
3		
2		
1		

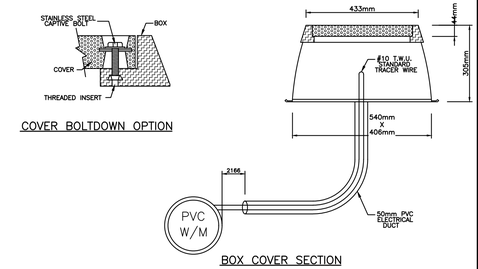
Norfolk

BACKFLOW PREVENTER & CHAMBER FOR 6" THROUGH 12" DOUBLE CHECK VALVE ASSEMBLY

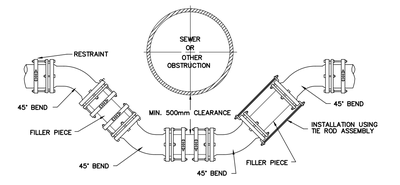
NOT TO SCALE | DESIGNED: | REVISION: | DATE: | STD. DWG. W - 111







TRACER WIRE HAND HOLE DETAIL
N.T.S.



WATERMAIN DEFLECTION DETAIL

WATERMAIN RESTRAINTS TABLE						
DIAMETER (mm)	MINIMUM LENGTH TO BE RESTRAINED ON EACH SIDE OF FITTINGS (m)					
	11-1/4°	22-1/2°	45°	90° BENDS AND TEES	REDUCER (IN DIRECTION OF LARGER PIPE)	DEAD END AND VALVES
150	2			9	N/A	12

NOTES;
1. ALL JOINTS WITHIN DISTANCES SHOWN SHALL BE RESTRAINED WITH A MEG-A-LUG JOINT RESTRAINT.
2. ALL TEES SHALL HAVE A MINIMUM OF 1.0m SOLID PIPE OUT EACH SIDE OF THE MAIN RUN OF THE TEE.
3. ALL DISTANCES TO BE CONFIRMED TO THE MANUFACTURERS STANDARDS FOR ALTERNATE RESTRAINTS TO MEGALUG.

REV. No.	DATE	REVISION
0	MAR 8/24	ISSUED FOR SPA
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ALL WORK, MATERIALS AND PROCESSES TO ABIDE TO NORFOLK COUNTY STANDARDS AND SPECIFICATIONS

LEGAL DESCRIPTION

PLAN 37M-57, BLOCK 61, ROLL NUMBER 33605062868 IN THE TOWN OF WATERFORD IN NORFOLK COUNTY.

APPLICANT INFORMATION

APPLICANT: VERLINDA HOMES
TELEPHONE: 1-705-205-3235
ADDRESS: 99 MAPLE STREET, PORT CARLING ONTARIO, P0B 1J0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV. 245.91m

DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS

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(519) 426-6270

Stamp
LICENSED PROFESSIONAL ENGINEER
2024-04-19
J. T. IEZZI
100189485
PROVINCE OF ONTARIO

Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
GENERAL NOTES

Designed by : NLO/NBN	Drawn By : NBN
Checked by : JTI	Date Started : 3/8/2024
Drawing Scale : AS NOTED	Drawing No. GN
Project No. 20-128	

DATE LAST PLOTTED : April 19, 2024

SANITARY SEWER DESIGN SHEET

Date: 2/29/2024
Project: 20-128 Orchard Sqaure
Town/County: Simcoe, Norfolk County

Pipe Material: PVC
N 0.013

Designed by: NLO
Checked by: JTI
Sheet: 1 of 1

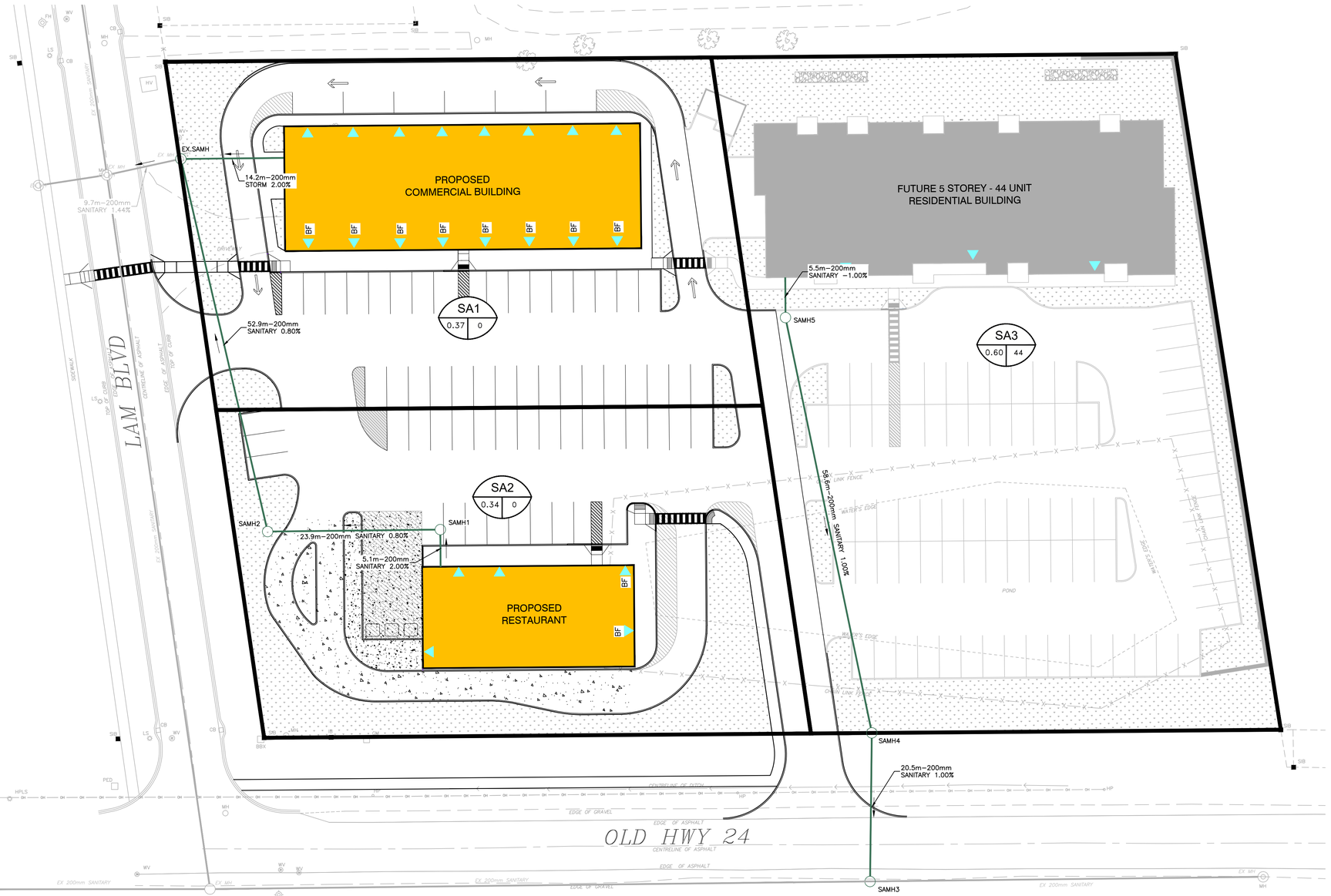
Location			Residential Area		Commercial Area		Total	Residential Services		Population			Flow			Sewer Design							
Area	From	To	Section	Cumul.	Section	Cumul.	Area	Section	Cumul.	Cumul.	KAV	M=Peak	Q(i)	Q(s)	Q(d)	Material	Size	Length	N	Slope	Cap	Q(d)/Cap	Full V
	MH	MH	Ha	Ha	Ha	Ha	Ha	Services	Services	Pop.	Factor	Factor	L/s	L/s	L/s		mm	m		%	L/s	%	m/s
SA1	COMMERICAL BUILDING	EX MH	0.00	0.00	0.37	0.37	0.370	0	0	33	0.800	3.478	0.10	0.60	0.71	PVC	200	14.2	0.013	2.00%	46.4	✔ 1.5%	1.48
SA2	RESTAURANT	SAMH1	0.00	0.00	0.34	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	5.1	0.013	0.80%	29.3	✔ 2.2%	0.93
-	SAMH1	SAMH2	0.00	0.00	0.00	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	23.9	0.013	0.80%	29.3	✔ 2.2%	0.93
-	SAMH2	EX MH	0.00	0.00	0.00	0.34	0.340	0	0	31	0.800	3.483	0.10	0.56	0.65	PVC	200	52.9	0.013	0.80%	29.3	✔ 2.2%	0.93
-	EX MH	EX MH	0.00	0.00	0.00	0.71	0.710	0	0	64	0.800	3.434	0.20	1.14	1.34	PVC	200	9.7	0.013	1.44%	39.4	✔ 3.4%	1.25
SA3	RESIDENTIAL BUILDING	SAMH5	0.60	0.60	0.00	0.00	0.600	44	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	5.5	0.013	1.00%	32.8	✔ 8.6%	1.04
-	SAMH5	SAMH4	0.00	0.60	0.00	0.00	0.600	0	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	58.6	0.013	1.00%	32.8	✔ 8.6%	1.04
-	SAMH4	SAMH3	0.00	0.60	0.00	0.00	0.600	0	44	121	1.000	4.220	0.17	2.66	2.83	PVC	200	20.6	0.013	1.00%	32.8	✔ 8.6%	1.04

Design Information:
Q(s) = Sewage Flow = P q M / 86.4
Q(i) = Infiltration Flow = I A
Q(d) = Peak Design Flow = Q(s) + Q(i)

Notes:
= Existring Pipes

P = Population in thousands
A = Tributary Area
Residential M = Peaking Factor = 1 + 14 / (4 + P^.5)
Commerical M = Peaking Factor = 0.8 (1 + 14 / (4 + P^.5)
Combined M = KAV (1 + 14 / (4 + P^.5)
KAV = (AR + (0.8*AC))/(AR+AC)

Residential q = Per Capita Flow=	450	L/cap/d
Commercial q = Per Capita Flow=	40000	L/ha/d
I = Peak Extraneous Flow =	0.28	L/s/ha
Residential Population Density =	2.75	persons /unit
Commercial Population Density =	90	persons /ha



LEGEND

SA1 (0.99 / 4) — SANITARY DRAINAGE AREA NUMBER; AREA (ha); NUMBER OF UNITS

SANITARY SEWER FLOW

SAMH5 — PROPOSED SANITARY SEWER

SANITARY DRAINAGE BOUNDARY

REV. No.	DATE	REVISION
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LEGAL DESCRIPTION

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APPLICANT INFORMATION

APPLICANT: VILLAGES OF WATERFORD
TELEPHONE: 1-866-781-7653
ADDRESS: BOX 1152, 26 MAIN STREET, WATERFORD, N0E 1Y0

BENCHMARKS

BM #1: TOP OF LARGE PUMPER NOZZLE OF FIRE HYDRANT ON NORTH SIDE OF LAM BOULEVARD ACROSS FROM PROPERTY #26 LAM BOULEVARD.
ELEV.....245.91m

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PRELIMINARY
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SCALE:
5 10 15
HORIZONTAL : 1:300

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Stamp
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2024-04-19
J. T. JEZZI
100109485
PROVINCE OF ONTARIO

Project
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
SANITARY DRAINAGE AREAS

Designed by : NLO	Drawn By : NLO
Checked by : JTI	Date Started : 2/29/2024
Drawing Scale : 1:300	Drawing No. SAN
Project No. 20-128	

DATE LAST PLOTTED : April 19, 2024

STORM SEWER DESIGN SHEET

Date: 2/29/2024
Project: 20-128 Orchard Square
Town/County: Waterford, Norfolk County

Return: 100-year
A 801.041
B 1.501
C 0.657

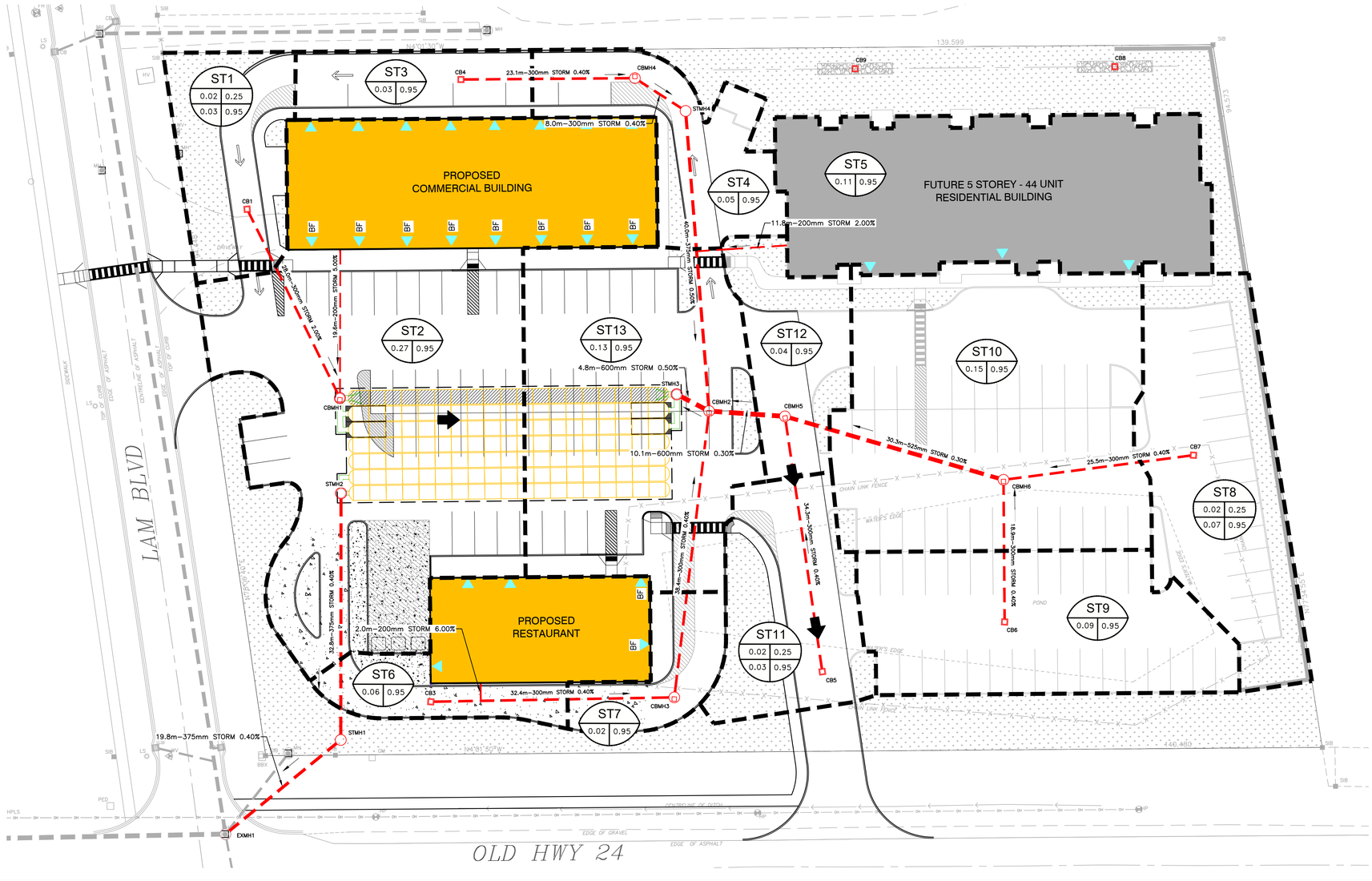
Pipe Material: PVC<=450, Concrete >450
n 0.013

Designed by: NBN/NLO
Checked by: JTI

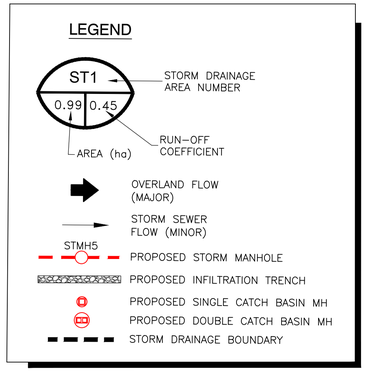
Sheet: 1 of 1

Location			Area			Total	Individual	Cumulative	Time of	Rainfall	Flow	Sewer Design						
			Ha	Ha	Ha	Area	C*A	C*A	Concentration	mm/hr	2.78*I*A*C	Size	Slope	Capacity (Full)	Vel (Full)	Length	Time	Cap
Area	From	To	0.25	0.45	0.95	Ha			min		L/s	mm	%	L/s	m/s	m	min	%
ST1	CB1	CBMH1	0.02		0.03	0.05	0.03	0.03	5.00	234.17	21.8	300	2.00%	136.8	1.93	28.0	0.24	✔ 16%
ST2	CBMH1	CHAMBERS			0.27	0.27	0.26	0.29	5.00	234.17	188.8							
ST3	CB4	CBMH4			0.030	0.03	0.03	0.03	5.00	234.17	18.6	300	0.40%	61.2	0.87	23.1	0.44	✔ 30%
ST4	CBMH4	STMH4			0.050	0.05	0.05	0.08	5.44	224.20	47.4	300	0.40%	61.2	0.87	8.0	0.15	✔ 77%
ST5	STMH4	CBMH2			0.11	0.11	0.10	0.18	5.60	220.99	110.9	375	0.50%	124.0	1.12	40.0	0.59	✔ 89%
ST6	CB3	CBMH3			0.06	0.06	0.06	0.06	5.00	234.17	37.1	300	0.40%	61.2	0.87	32.4	0.62	✔ 61%
ST7	CBMH3	CBMH2			0.02	0.02	0.02	0.02	5.62	220.48	11.6	300	0.40%	61.2	0.87	38.4	0.74	✔ 19%
ST8	CB7	CBMH6	0.02		0.07	0.09	0.07	0.07	5.00	234.17	46.5	300	0.40%	61.2	0.87	25.5	0.49	✔ 76%
ST9	CB6	CBMH6			0.09	0.09	0.09	0.09	5.00	234.17	55.7	300	0.40%	61.2	0.87	18.9	0.36	✔ 91%
ST10	CBMH6	CBMH5			0.15	0.15	0.14	0.30	5.49	223.23	185.9	525	0.30%	235.6	1.09	30.3	0.46	✔ 79%
ST11	CB5	CBMH5	0.02		0.03	0.05	0.03	0.03	5.00	234.17	21.8	300	0.40%	61.2	0.87	34.3	0.66	✔ 36%
ST12	CBMH5	STMH3			0.04	0.04	0.04	0.37	5.96	214.00	220.7	600	0.30%	336.3	1.19	10.1	0.14	✔ 66%
ST13	CBMH4	STMH3			0.13	0.13	0.12	0.69	6.36	206.63	398.6	600	0.50%	434.2	1.54	4.8	0.05	✔ 92%
-	STMH2	STMH1									15.0	375	0.40%	110.9	1.00	32.8	0.54	✔ 14%
-	STMH1	EX MH1									15.0	375	0.40%	110.9	1.00	19.8	0.33	✔ 14%

LEGEND:
15 L/s = Allowable 100-year flow from from SWM Chamber Facility



LEGEND



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Project Title
ORCHARD SQUARE
WATERFORD, NORFOLK COUNTY

Drawing Title
STORM DRAINAGE AREAS

Designed by : NLB	Drawn By : NLB
Checked by : JI	Date Started : 3/8/2024
Drawing Scale : 1:300_XREF	Drawing No. STM
Project No. 20-128	

DATE LAST PLOTTED : April 19, 2024