



vallee

*Consulting Engineers,
Architects & Planners*

June 30th, 2021

Norfolk County
Robinson Administration Building
185 Robinson Street, Suite 200
Simcoe, ON N3Y 5L6

Attention: **Nicole Goodbrand, MA, MCIP, RPP**
Senior Planner, Norfolk County

Reference: **SPA**
Toyotetsu Canada Inc.
88 Park Road, Simcoe, Norfolk County
Our Project #20-102

G. Douglas Vallee Limited has been retained by Toyotetsu Canada Inc. to make an application for Site Plan Approval to facilitate an expansion to the of operations at the operating industrial business located at the corner of Park Road and Fourteenth Street West in Simcoe Ontario. The scope of the proposed work is to provide approximately 701m² of additional training facility, 455m² of additional office space, 11,135m² of plant space, and an additional 66 asphalt parking spaces. A minor Site Plan Application is required as the lands are within a site plan control area.

Please accept this package as our complete submission to Norfolk County. The fee for the application is \$3,594.00.

The following items are attached for your reference:

1. Development Application Form
2. Revised Fire Underwriters Survey Fire Flow Calculations (prepared by G. Douglas Vallee Limited, dated June 30th, 2021)
3. Historical and Projected Water Demands
4. Storm Water Management Report (prepared by G. Douglas Vallee Limited, dated June 30th, 2021)
5. Site Plan Drawings (prepared by G. Douglas Vallee Limited, dated June 30th, 2021) including:
 - a. Site Plan and Erosion & Sediment Control Plan – C100
 - b. Grading and Servicing Plan – C101
6. Parking Assessment – Refer to Associated Minor Variance
7. Traffic Impact Study – Pending Report (County agreed to receive this mid-July)
8. A copy of the cheque submitted to Norfolk County in the amount of \$3,594.00.

Thank you for your time to review this file. As always, please feel free to contact us with any questions or comments that you may have.

Yours truly,



Jamie L.S. Smith, P.Eng. M.Sc.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

\server02\DATA\Projects\2020\20-102 TTCA Office Expansion Phase 9\Agency\Submissions\Site Plan Application\Working Files\00 - Cover Letter.docx

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

For Office Use Only:	
File Number	SPPL2021226
Related File Number	
Pre-consultation Meeting	June 2, 2021
Application Submitted	July 6, 2021
Complete Application	July 20, 2021
Public Notice Sign	
Application Fee	3,594.00
Conservation Authority Fee	
Well & Septic Info Provided	
Planner	N. Goodbrand

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

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

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

Building expansions and 66 additional parking spaces for employment of 100 new employees.

Property Assessment Roll Number: 403 025 02715

A. Applicant Information

Name of Owner Toyotetsu Canada Inc. c/o Ed Bilopavlovic

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

Address 88 Park Road
Town and Postal Code Simcoe, N3Y 4J9
Phone Number 519 428 6502
Cell Number 519 428 6502
Email ebilopavlovic@ttna.com

Name of Applicant Toyotetsu Canada Inc.
Address 88 Park Road
Town and Postal Code Simcoe
Phone Number 519 428 6502
Cell Number 519 428 6502
Email ebilopavlovic@ttna.com

Name of Agent G. Douglas Vallee Ltd.
Address 2 Talbot St. N.
Town and Postal Code Simcoe, N3Y 3W4
Phone Number 519 426 6270
Cell Number
Email JAMIESMITH@GDVALLEE.CA

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

Owner Agent Applicant

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

B. Location, Legal Description and Property Information

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

WINDHAM CON 14 PT LOTS 3 AND 4 RP 37R9427 PARTS 1 AND 2 PT PARTS 3 AND 4

Municipal Civic Address: 88 PARK ROAD SIMCOE

Present Official Plan Designation(s): PROTECTED INDUSTRIAL

Present Zoning: GENERAL INDUSTRIAL ZONE (MG)

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

Yes No If yes, please specify corresponding number:

3. Present use of the subject lands:

MANUFACTURING

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

Refer to application drawing set.

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

6. Please describe **all proposed** buildings or structures/additions on the subject lands. Describe the type of buildings or structures/additions, and illustrate the setback, in metric units, from front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:

Refer to application drawing set.

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:

2007

9. Existing use of abutting properties:

Industrial

10. Are there any easements or restrictive covenants affecting the subject lands?

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

C. Purpose of Development Application

Note: Please complete all that apply.

1. Please explain what you propose to do on the subject lands/premises which makes this development application necessary:

Manufacturing and Office expansion

2. Please explain why it is not possible to comply with the provision(s) of the Zoning By-law/and or Official Plan:

Refer to minor variance application.

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, m² or %

Lot frontage		398
Lot depth		409
Lot width		305
Lot area		16.2 ha
Lot coverage		37%
Front yard	6m	82m
Rear yard	9m	56m
Left Interior side yard	3m	33m
Right Interior side yard	3m	25.8m
Exterior side yard (corner lot)	6m	95m
Landscaped open space	NA	NA
Entrance access width		no change
Exit access width		no change
Size of fencing or screening		no change
Type of fencing		no change

10. Building Size

Number of storeys		No Change
Building height		No Change
Total ground floor area		62,611 m ²
Total gross floor area		
Total useable floor area		

11. Off Street Parking and Loading Facilities

Number of off street parking spaces		See minor variance
Number of visitor parking spaces		See minor variance
Number of accessible parking spaces		See minor variance
Number of off street loading facilities		See minor variance

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 m ²
Single Detached	_____	_____
Semi-Detached	_____	_____
Duplex	_____	_____
Triplex	_____	_____
Four-plex	_____	_____
Street Townhouse	_____	_____
Stacked Townhouse	_____	_____
Apartment - Bachelor	_____	_____
Apartment - One bedroom	_____	_____
Apartment - Two bedroom	_____	_____
Apartment - Three bedroom	_____	_____

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

13. Commercial/Industrial Uses (if applicable)

Number of buildings existing: 1 _____

Number of buildings proposed: 1 _____

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

If yes, describe:

Office and manufacturing expansion

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

Proposed Training Area: 701 sq.m.

Proposed Office Area: 455 sq.m.

Plant Expansion: 11,135 sq.m.

Seating Capacity (for assembly halls or similar): _____

Total number of fixed seats: _____

Describe the type of business(es) proposed: manufacturing

Total number of staff proposed initially: 1123 + 100 after expansion

Total number of staff proposed in five years: 1223

Maximum number of staff on the largest shift: approx. 400

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):

Existing manufacturing plant

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:

Active industrial lands and operations.

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:

Building expansion development will capture storm water and direct it to the JUDD PARK SWM facility

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 150

Wooded area

On the subject lands or within 500 meters – distance 21

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 140

Floodplain

On the subject lands or within 500 meters – distance

Rehabilitated mine site

On the subject lands or within 500 meters – distance

Non-operating mine site within one kilometre

On the subject lands or within 500 meters – distance

Active mine site within one kilometre

On the subject lands or within 500 meters – distance

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

On the subject lands or within 500 meters – distance

Active railway line

On the subject lands or within 500 meters – distance

Seasonal wetness of lands

On the subject lands or within 500 meters – distance

Erosion

On the subject lands or within 500 meters – distance

Abandoned gas wells

On the subject lands or within 500 meters – distance

F. Servicing and Access

1. Indicate what services are available or proposed:

Water Supply

Municipal piped water Communal wells
 Individual wells Other (describe below)
existing

Sewage Treatment

Municipal sewers Communal system
 Septic tank and tile bed in good working order Other (describe below)
existing municipal sewer service

Storm Drainage

Storm sewers Open ditches
 Other (describe below)

2. Existing or proposed access to subject lands:

Municipal road Provincial highway
 Unopened road Other (describe below)

Name of road/street: existing

G. Other Information

1. Does the application involve a local business? Yes No

If yes, how many people are employed on the subject lands?

1123 in three shifts

2. Is there any other information that you think may be useful in the review of this application? If so, explain below or attach on a separate page.

H. Supporting Material to be submitted by Applicant

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

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

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

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

- Zoning Deficiency Form
- On-Site Sewage Disposal System Evaluation Form (to verify location and condition)
- Architectural Plan
- Buildings Elevation Plan
- Cut and Fill Plan
- Erosion and Sediment Control Plan
- Grading and Drainage Control Plan (around perimeter and within site) (existing and proposed)
- Landscape Plan
- Photometric (Lighting) Plan
- Plan and Profile Drawings
- Site Servicing Plan
- Storm water Management Plan
- Street Sign and Traffic Plan
- Street Tree Planting Plan
- Tree Preservation Plan
- Archaeological Assessment
- Environmental Impact Study

- Functional Servicing Report
- Geotechnical Study / Hydrogeological Review
- Minimum Distance Separation Schedule
- Noise or Vibration Study
- Record of Site Condition
- Storm water Management Report
- Traffic Impact Study – please contact the Planner to verify the scope required

Site Plan applications will require the following supporting materials:

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

Standard condominium exemptions will require the following supporting materials:

- Plan of standard condominium (2 paper copies and 1 electronic copy)
- Draft condominium declaration
- Property Identification Number (PIN) printout

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

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

I. Development Agreements

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

J. Transfers, Easements and Postponement of Interest

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

K. Permission to Enter Subject Lands

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

L. Freedom of Information

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



Owner/Applicant Signature



June 30/2021

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 TOYOTETSU CANADA INC. am/are the registered owner(s) of the lands that is the subject of this application.

I/We authorize G. DOUGLAS VALLEE LTD. 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



June 30/2021

Date

Owner

Date

N. Declaration

I, EDWARD BILOPAVLOVIC of SIMCOE, NORFOLK COUNTY

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:

THE REGION OF NIAGARA



Owner/Applicant Signature

In THE CITY OF NIAGARA FALLS

This 30th day of JUNE

A.D., 20 21



A Commissioner, etc.

**ELDON FRASER DARBYSON, a commissioner, etc.,
Province of Ontario, for G. Douglas Valley Limited.
Expires March 28, 2022.**

Fire Flow Review

Project: TTCA Phase 7,8 Expansion
 File No: 20-102
 Date: 14-Jun-21
 Sheet By: JI
 Checked By: JV

Required Fire Flow

Formula $F = 220 * C \sqrt{A}$ (Part II, Fire Underwriters Survey, 1999)

TTCA Facility		Total GFA, including proposed expansion
Subject Floor Area	60,105	
Floor Area Above		m ²
Floor Area Below		m ²
Shared Walls	0	ea.
North Separation*	45+	m
North Adjustment	0%	
East Separation*	45+	m
East Adjustment	0%	
South Separation*	45+	m
South Adjustment	0%	
West Separation*	45+	m
West Adjustment	0%	
Occupancy Fire Hazard Adjustment	-25%	
A =	60,105	m ²
C =	0.8	Non-Combustible Construction
F =	43,149	l/min
Rounded F =	43,000	l/min
Adjusted due to Occupancy Fire Hazard F =	32,250	l/min
Interior Firewall Adjustment	0	(10% per unpeirced party wall)
Exposure Adjustment	0	(see Separation Table)
Sprinkler Adjustment	(16,125)	(50% reduction, Sprinkler System comforming to NFPA 13 and other NFPA Standards, monitored)
Adjusted F =	16,000	l/min
Required Fire Flow =	266.7	L/s

Notes:

1 All calculations and factors from "Water Supply for Public Fire Protection" by the Fire Underwriters Survey, 1999

2 45+ denotes nearest building > 45m away,

Separation Table

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



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*Consulting Engineers,
Architects & Planners*

June 30, 2021

Toyotetsu Canada Inc.
88 Park Road
Simcoe, Ontario
N3Y 4J9

Attention: Mr. Ed Bilopavlovic

Dear Mr. Bilopavlovic:

Reference: Storm Water Management Report
Toyotetsu Office and Plant Expansion Phase 7-9
Simcoe – Norfolk County
Our File 20-102

1.0 Introduction

This Storm Water Management Report has been prepared in support of the site plan approval application to accommodate the expansion of operations at the operating industrial business located at the corner of Park Road and Fourteenth Street West in Simcoe Ontario. The scope of the proposed work is to provide approximately 701m² of additional training facility, 455m² of additional office space, 11,135m² of plant space, and an additional 66 asphalt parking spaces.

It is critical to ensure that the proposed construction can be accommodated by the originally designed stormwater management system. This report demonstrates that the designed system can indeed accommodate the proposed changes.

2.0 Pre-Development

Review of our 2006 stormwater management (SWM) model for Toyotetsu Canada Inc. original Site Plan Application reveals that the stormwater pond was designed with the parameters provided in Table 1 and 2 below. The SWMHYMO output from the 2006 SWM report for this model is included in Appendix A.

Table 1

2006 SWMHYMO Model Input – Pre-Development

Parameter	Toyotetsu	Undeveloped
Area (ha)	16.2 ha	8.3 ha
Total Impervious (TIMP)	80%	44%
Cross-Connected (XIMP)	50%	36%

Table 2 Visual Otthymo Model Input – Pre-Development	
Parameter	Building Site Parking Site
Area (ha)	24.5ha
Hydrologic Soil Group	AB
Curve Number	70
IA (mm)	7.2
Time of Concentration (Airport)	95 minutes
Average Slope (%)	0.3%

The pre-development target release rates, and the pond's design volume, established in the original 2006 SWM report, are provided in Table 3 below. All future development within Judd Industrial Park will need to ensure that the SWM facility can continue to accommodate these original target discharge rates.

Table 3 - Judd Industrial Park Storm Pond Targets	
Storm Event	Pond Peak Discharge (cms)
2	0.177
5	0.265
10	0.344
25	0.450
50	0.548
100	0.690
Storage Provided (ha.m.)	1.516

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3.0 Post-Development

The proposed work includes a training facility addition, a concrete pad, an office addition, and a plant expansion. As a result, the rear swale on the property is proposed to be rerouted and box culverts are proposed to facilitate driveway crossings. The proposed swale is sized to convey the 100-year storm at a 0.76 m flow depth. The box culverts provide a 0.9 m high opening and are demonstrated to allow the 100-year storm event pass at a peak depth of 0.76 m flow depth. Flow calculations for these are provided in Appendix B. This calculation is also provided in a Storm Sewer Design Sheet Format in Appendix B to satisfy the site plan application requirements.

Once the storm water has been conveyed from the site, it will enter the Judd Industrial Park's SWM facility. The 100-year design flow from the TTCA portion of the park to the SWM pond was 5.69 m³/s. In the proposed development the flow remains below this designed peak flow, reaching only 4.04 m³/s in the 100-year event.

Additionally, the post-development conditions of the SWM facility cannot exceed the pre-development release rates, or the available storage in the existing pond as outlined in Table 3.

A Visual Ottymo computer model was used to simulate the sub-watershed under post-development conditions. The simulations were conducted using the 4-hour Chicago Distribution Norfolk County design storm of the 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year storm events. The output of the Visual OTTHYMO simulation is provided in Appendix C.

The Toyotetsu site was originally modelled at 80% impervious (see Table 1 and Appendix A) with 50% directly connected. The proposed development will bring the Toyotetsu site up to 69% impervious and 51% directly connected.

Table 4 summarizes the results of the post-development simulation and demonstrates that the Judd Industrial Park SWM facility will remain within its pre-development release conditions and not exceed available storage under the proposed Toyotetsu development.

Table 4 - Judd Industrial Park Storm Pond Impact				
Storm Event	Pre-Development Target*		Post-Development	
	Pond Peak Out Flow (cms)	Pond Storage Provided (ham)	Pond Peak Out Flow (cms)	Pond Storage Required (ham)
2	0.177	1.5159	0.048	0.4631
5	0.265	1.5159	0.065	0.7096
10	0.344	1.5159	0.140	0.8494
25	0.450	1.5159	0.264	0.9971
50	0.548	1.5159	0.366	1.0987
100	0.690	1.5159	0.468	1.1919

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** As per Judd Industrial Park / Toyotetsu Site SWM Report dated May 30, 2006*

In the post-development condition, all 2-year through 100-year storm events have release rates from the pond that are below the established pre-development rates. The pond also provides a storage volume well in excess of what will be utilized in the 100-year storm event: 1.19 ha.m. required compared to 1.52 ha.m provided.

4.0 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 at completion of the development and once all vegetation is established. Shown on Drawing 20-102 C100 are measures that are to be put into place as an absolute minimum, these include silt fence, mud mat, and filter cloth on catch basins.

9.0 Proposed SWM Plan Summary

The following summarizes the proposed SWM Plan for the proposed development as analyzed by this report:

- Impervious area remains below original modelling parameters.
- Directly connected is nominally inline with original modeling parameters.
- SWM facility is shown to continue to operate within the pre-development targets.
- Swale and box culvert sizing shows adequate capacity for conveyance to the SWM facility.
- Erosion Control Measures as shown on the Drawing 20-102 C102 must remain in place until the development of the site is complete.

G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

10.0 Recommendations

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

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,



Jamie L.S. Smith, P.Eng. M.Sc.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners



John T. Iezzi, P.Eng.
G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects and Planners

H:\Projects\2020\20-102 TTCA Office Expansion Phase 9\Design\Civil\20-102 Stormwater Report.docx

List of Figures – Submitted Site Plan Drawing Set

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G. DOUGLAS VALLEE LIMITED
Consulting Engineers, Architects & Planners

Appendix A

2006 Pre-Development and Designed SWMHYMO Model Output


```

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 3.980 1.33 25.320 2.33 8.660 3.33 4.700
.50 4.500 1.50 151.600 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 5.580 3.83 3.910
1.00 8.000 2.00 12.954 3.00 5.490 4.00 3.632

003:0003-
*****
** DETERMINE PREDEVELOPMENT HYDROGRAPH
**
*****
```

DESIGN RASHYD	Area (ha)=	24.50	Curve Number (CN)=	70.00	
01:PREDEV DT=	1.00	Ia (mm)=	1.500	N of Linear Res.(N)=	3.00
U.H. Tp(hrs)= 1.500					

Unit Hyd Peak (cms)= .592

PEAK FLOW (cms)= .344 (1)

TIME TO PEAK (hrs)= 3.533

RUNOFF VOLUME (mm)= 18.229

TOTAL RAINFALL (mm)= 56.083

RUNOFF COEFFICIENT = .325

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

```

003:0004-
*****
** RUN MODEL FOR ALL OTHER STORM EVENTS
**
*****
```

```

003:0005-
*****
** END OF RUN : 3
**
*****
```

```

| START | Project dir.: D:\DATA\Projects\06-046-2\
Rainfall dir.: D:\DATA\Projects\06-046-2\
TZERO = .00 hrs on 0
NETOUT= 2 (output = METRIC)
NRUN= 005
NSTORM= 1
# 1=CH50.STH
```

```

005:0002-
*****
# Project Name: [JUDD PARK TOYOTETSU] Project Number: [06-046]
# Date : 04-27-2006
# Modeler : [TOSI]
# Company : G. Douglas Vallee Limited
# License # : 3560969
#
#
** PREDEVELOPMENT
**
*****
```

```

005:0003-
*****
# READ STORM | Filename: D:\DATA\Projects\06-046-2\CH50.STH
Ptotal= 72.96 mm
Comments: 50 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 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 8.090	3.50 4.980
.67 5.970	1.67 44.810	2.67 7.800	3.67 4.650
.83 7.290	1.83 23.140	2.83 6.960	3.83 4.370
1.00 9.530	2.00 16.260	3.00 6.300	4.00 4.140

```

005:0004-
*****
** DETERMINE PREDEVELOPMENT HYDROGRAPH
**
*****
```

DESIGN RASHYD	Area (ha)=	24.50	Curve Number (CN)=	70.00	
01:PREDEV DT=	1.00	Ia (mm)=	1.500	N of Linear Res.(N)=	3.00
U.H. Tp(hrs)= 1.500					

Unit Hyd Peak (cms)= .592

PEAK FLOW (cms)= .548 (1)

TIME TO PEAK (hrs)= 3.450

RUNOFF VOLUME (mm)= 26.321

TOTAL RAINFALL (mm)= 72.962

RUNOFF COEFFICIENT = .388

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

```

004:0002-
*****
** RUN MODEL FOR ALL OTHER STORM EVENTS
**
*****
```

```

004:0003-
*****
** DETERMINE PREDEVELOPMENT HYDROGRAPH
**
*****
```

```

004:0004-
*****
** END OF RUN : 5
**
*****
```

```

| START | Project dir.: D:\DATA\Projects\06-046-2\
Rainfall dir.: D:\DATA\Projects\06-046-2\
TZERO = .00 hrs on 0
NETOUT= 2 (output = METRIC)
NRUN= 006
NSTORM= 1
# 1=CH25.STH
```

```

006:0002-
*****
# Project Name: [JUDD PARK TOYOTETSU] Project Number: [06-046]
# Date : 04-27-2006
# Modeler : [TOSI]
# Company : G. Douglas Vallee Limited
# License # : 3560969
#
#
** PREDEVELOPMENT
**
*****
```

```

006:0003-
*****
# READ STORM | Filename: D:\DATA\Projects\06-046-2\CH25.STH
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 32.320	3.17 6.270
.33 4.980	1.33 27.690	2.33 10.440	3.33 5.000
.50 5.613	1.50 150.850	2.50 9.144	3.50 5.040
.67 6.450	1.67 35.000	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

```

004:0004-
*****
** DETERMINE PREDEVELOPMENT HYDROGRAPH
**
*****
```

```

004:0005-
*****
** END OF RUN : 5
**
*****
```

```

| START | Project dir.: D:\DATA\Projects\06-046-2\
Rainfall dir.: D:\DATA\Projects\06-046-2\
TZERO = .00 hrs on 0
NETOUT= 2 (output = METRIC)
NRUN= 006
NSTORM= 1
# 1=CH100.STH
```

```

006:0002-
*****
# Project Name: [JUDD PARK TOYOTETSU] Project Number: [06-046]
```

```

# Date : 04-27-2006
# Modeler : [TGS]
# Company : G. Douglas Valles Limited
# License # : 3568369
#*****#
#*
#*
# PREDEVELOPMENT
#*
#*
006:0002

| READ STORM | Filename: D:\DATA\Projects\06-04-02\CH100.STH
| Ftotal= 03.90 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 16.060 | 2.17 14.830 | 3.17 6.500
.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 5.560
.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

```

```

0061 0003-----  

**  

* DETERMINE PREDEVELOPMENT HYDROGRAPH  

**  

**  

| DESIGN HATCHDYP | Area (ha)= 24.50 Curve Number (CH)=70.00  

| 01:PREDEV DT= 1.00 | In (mm)= 1.500 # of Linear Res. (N)= 3.00  

| U.H. Tp(hrs)= 1.500  

Unit Hyd Openk (cms)= .592  

PEAK FLOW (cms)= .690 (1)  

TIME TO PEAK (hrs)= 3.433  

RUNOFF VOLUME (mm)= 35.502  

TOTAL RAINFALL (mm)= 83.902  

RUNOFF COEFFICIENT = .423  

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

```

```

2 Metric units
* Project Name: [JUDD PARK TOYOTETSU] Project Number: [06-046]
* Date : 04-27-2006
* Modeler : [TGS]
* Company : G. Douglas Vallee Limited
* License # : 3569969
* PREDEVELOPMENT
* DETERMINE PREDEVELOPMENT HYDROGRAPH
* RUN MODEL FOR ALL OTHER STORM EVENTS
DESIGN NASHYD ID=[1], NHYD=[PREDEV"], DT=[1.0]min, AREA=[24.5] (ha),
DWF=[0] (cm/s), CH/C=[70], TP=[1.58]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1]
["CH2.STH"]
READ STORM STORM_FILENAME=[STORM.001"]
START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1]
["CH1.STH"]
START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1]
["CH2.STH"]
DESIGN NASHYD ID=[1], NHYD=[PREDEV"], DT=[1.0]min, AREA=[24.5] (ha),
DWF=[0] (cm/s), CH/C=[70], TP=[1.58]hrs,
RAINFALL=[ , , , ] (mm/hr), END=-1
START TZERO=[0.0] hrs or date, METOUT=[2], NSTORM=[1], NRUN=[2]
["CH5.STH"]
START TZERO=[0.0] hrs or date, METOUT=[2], NSTORM=[1], NRUN=[3]
["CH1D.STH"]
START TZERO=[0.0] hrs or date, METOUT=[2], NSTORM=[1], NRUN=[4]
["CH25.STH"]
START TZERO=[0.0] hrs or date, METOUT=[2], NSTORM=[1], NRUN=[5]
["CH50.STH"]
START TZERO=[0.0] hrs or date, METOUT=[2], NSTORM=[1], NRUN=[6]
["CH100.STH"]
FINISH

```

```

2 Metric units
# Project Name: (JUDI PARK TOYOTETSU) Project Number: (06-046)
# Date: 04-27-2006
# Modeler : (TGS)
# Company : G. Douglas Vallee Limited
# License #: 3569969
# POST DEVELOPMENT
# DETERMINE POST DEVELOPMENT HYDROGRAPHS
# TOYOTETSU SITE 16.2 HA
# DESIGN STANDHYD ID=[1], NHYD="TOYOTA", DT=[1]min, AREA=[16.2] (ha),
# XH=[0.50], THP=[0.8], DM=[0] (cm/s), LOS=[2], CH=[70],
# SLOPE=[1.0] (%), RAINFALL=[ , , , ] (mm/hr), EHD=-1
# FUTURE DEVELOPMENT
# ADD HYD IDsum=[3], NHYD="PONDIN", IDs to add=[1,2]
# ROUTE THROUGH RESERVOIR
# ROUTE RESERVOIR IDout=[4], NHYD="PHDOUT", IDin=[3],
# RD=[1] (min),
# TABLE of [ CULVLOW-STORAGE ] values
# (cm) - (ha-m)
# 0.0 , 0.0 ]
# 0.015594, 0.013113]
# 0.022058, 0.027211]
# 0.02703, 0.04384]
# 0.031189, 0.069662]
# 0.03407, 0.109735]
# 0.038199, 0.164385]
# 0.041258, 0.23378]
# 0.044107, 0.318125]
# 0.046785, 0.414625]
# 0.049313, 0.517235]
# 0.05172, 0.621395]
# 0.068023, 0.72729]
# 0.120969, 0.834905]
# 0.214911, 0.944225]
# 0.319742, 1.055205]
# 0.440468, 1.16792]
# 0.57518, 1.282265]
# 0.722529, 1.398255]
# 0.861496, 1.513075]
# [ -1 , -1 ] (max twenty pts)
# IDovf=[5], NHYDovf="PHDOVR"
# RUN MODEL FOR ALL OTHER STORM EVENTS
# START ZERO=[0.0]hrs or date, NETOUT=[2], NSTORM=[1], NRUN=[2]
# ("CH5.5TH")
# START ZERO=[0.0]hrs or date, NETOUT=[2], NSTORM=[1], NRUN=[3]
# ("CH10.5TH")
# START ZERO=[0.0]hrs or date, NETOUT=[2], NSTORM=[1], NRUN=[4]
# ("CH25.5TH")
# START ZERO=[0.0]hrs or date, NETOUT=[2], NSTORM=[1], NRUN=[5]
# ("CH50.5TH")
# START ZERO=[0.0]hrs or date, NETOUT=[2], NSTORM=[1], NRUN=[6]
# ("CH100.5TH")
# FINISH

```

```
***** StormNator Management HYdrologic Model *****

***** SHHYMO-99 Ver/4.02 *****
A single event and continuous hydrologic simulation model
based on the principles of HMO and its successors
OTTHYMO-83 and OTTHYMO-89.

Distributed by: J.Y. Sabourin and Associates Inc.
Ottawa, Ontario: (613) 227-5199
Gatineau, Quebec: (819) 243-6858
E-Mail: smbymo@fax.com

***** PROGRAM ARRAY DIMENSIONS *****
Maximum value for ID numbers : 10
Max. number of rainfall points : 15000
Max. number of flow points : 15000

***** DESCRIPTION SUMMARY TABLE HEADERS (units depend on METOUT in START) *****
*** ID: Hydrograph Identification numbers, (1-10). ***
*** JHYD: Hydrograph reference numbers, (6 digits or characters). ***
*** AREA: Drainage area associated with hydrograph, (ac.) or (ha.). ***
*** QPEAK: Peak flow of simulated hydrograph, (ft^3/s) or (m^3/s). ***
*** TpeakDate_hhmm: is the date and time of the peak flow. ***
*** R.V.: Runoff Volume of simulated hydrograph, (in) or (mm). ***
*** R.C.: Runoff Coefficient of simulated hydrograph, (ratio). ***
*** : see WARNING or NOTE message printed at end of run. ***
*** : and ERROR message printed at end of run. ***

***** SUMMARY OUTPUT *****
* DATE: 2006-05-11 TIME: 13:40:22 RUN COUNTER: 000192 *
* Input filename: D:\DATA\Projects\06-046-2\POST.DAT *
* Output filename: D:\DATA\Projects\06-046-2\POST.out *
* Summary filename: D:\DATA\Projects\06-046-2\POST.sum *
* User comments:
* 1:
* 2:
* 3:

***** Project Name: JUDD PARK TOYOTETSU Project Number: [06-046]
* Date : 04-27-2006
* Modeler : [TGS]
* Company : G. Douglas Vallee Limited
* License #: 3560969

RUN:COMMANDS
001:0001
  START
  [TZERO = .00 hrs on 0]
  [METOUT= 2 {1=imperial, 2=metric output}]
  [HSTORM= 1]
  [HRUN = 1]

001:0002:READ STORM
  Filename = STORM.001
  Comment = 2 YEAR CHICAGO 4 HOUR DESIGN STORM DISTRIBUTION
  [SRT=10.00] [SDUR= 4.00] [PTOT= 39.39]
001:0003:  ID:HYD---ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  DESIGN STANDHYD 01:TOYOTA 16.20 1.588 No_date 1:32 28.43 .722
  [XHYP=.50:TTHP=.80]
  [SLP=1.00:DT= 1.00]
  [LOSS= 2 :CH= 70.0]
001:0004:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  DESIGN STANDHYD 02:FUTURE 8.30 .584 No_date 1:31 20.05 .529
  [XHYP=.36:TTHP=.44]
  [SLP=1.00:DT= 1.00]
  [LOSS= 2 :CH= 70.0]
001:0005:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  ADD HYD 01:TOYOTA 16.20 1.588 No_date 1:32 28.43 n/a
  + 02:FUTURE 8.30 .584 No_date 1:31 20.05 n/a
  [DT= 1.00] [SUM= 03:POUDIN 24.50 2.166 No_date 1:32 25.85 n/a]
001:0006:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  ROUTE RESERVOIR -> 03:POUDIN 24.50 2.166 No_date 1:32 25.06 n/a
  [RDT= 1.00] out<- 04:ENDOUT 24.50 .051 No_date 4:21 25.86 n/a
  overflow <= 05:ENDOVR .00 .000 No_date 0:00 .00 n/a
  [HxStoUsed=.5709] [TotOvVol=.0000E+00] [H-Ovf= 0] [TotDurOvf= 0.hrs]
** END OF RUN : 1

***** RUN:COMMANDS *****
002:0001
  START
  [TZERO = .00 hrs on 0]
  [METOUT= 2 {1=imperial, 2=metric output}]
  [HSTORM= 1]
  [HRUN = 2]

***** Project Name: JUDD PARK TOYOTETSU Project Number: [06-046]
* Date : 04-27-2006
* Modeler : [TGS]
* Company : G. Douglas Vallee Limited
* License #: 3560969


```

```
Project Name: JUDD PARK TOYOTETSU Project Number: [06-046]
* Date : 04-27-2006
* Modeler : [TGS]
* Company : G. Douglas Vallee Limited
* License #: 3560969
***** READ STORM *****
  Filename = STORM.001
  Comment = 2 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTION
  [SRT=10.00] [SDUR= 4.00] [PTOT= 40.48]
002:0003:  ID:HYD---ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  DESIGN STANDHYD 01:TOYOTA 16.20 2.483 No_date 1:32 36.38 .750
  [XHYP=.50:TTHP=.80]
  [SLP=1.00:DT= 1.00]
  [LOSS= 2 :CH= 70.0]
002:0004:  ID:HYD---ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  DESIGN STANDHYD 02:FUTURE 8.30 .892 No_date 1:31 27.16 .560
  [XHYP=.36:TTHP=.44]
  [SLP=1.00:DT= 1.00]
  [LOSS= 2 :CH= 70.0]
002:0005:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  ADD HYD 01:TOYOTA 16.20 2.485 No_date 1:32 36.38 n/a
  + 02:FUTURE 8.30 .892 No_date 1:31 27.16 n/a
  [DT= 1.00] [SUM= 03:POUDIN 24.50 3.361 No_date 1:31 33.25 n/a]
002:0006:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  ROUTE RESERVOIR -> 03:POUDIN 24.50 3.361 No_date 1:31 33.25 n/a
  [RDT= 1.00] out<- 04:ENDOUT 24.50 .077 No_date 4:13 33.25 n/a
  overflow <= 05:ENDOVR .00 .000 No_date 0:00 .00 n/a
  [HxStoUsed=.7425E+00] [TotOvVol=.0000E+00] [H-Ovf= 0] [TotDurOvf= 0.hrs]
** END OF RUN : 2
```

```
RUN:COMMANDS
003:0001
  START
  [TZERO = .00 hrs on 0]
  [METOUT= 2 {1=imperial, 2=metric output}]
  [HSTORM= 1]
  [HRUN = 3]

***** Project Name: JUDD PARK TOYOTETSU Project Number: [06-046]
* Date : 04-27-2006
* Modeler : [TGS]
* Company : G. Douglas Vallee Limited
* License #: 3560969
```

```
003:0002:READ STORM
  Filename = STORM.001
  Comment = 10 YEAR CHICAGO 4 HOURS DESIGN DISTRIBUTION
  [SRT=10.00] [SDUR= 56.08]
003:0003:  ID:HYD---ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  DESIGN STANDHYD 01:TOYOTA 16.20 3.116 No_date 1:32 43.19 .770
  [XHYP=.50:TTHP=.80]
  [SLP=1.00:DT= 1.00]
  [LOSS= 2 :CH= 70.0]
003:0004:  ID:HYD---ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  DESIGN STANDHYD 02:FUTURE 8.30 1.102 No_date 1:31 32.70 .583
  [XHYP=.36:TTHP=.44]
  [SLP=1.00:DT= 1.00]
  [LOSS= 2 :CH= 70.0]
003:0005:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  ADD HYD 01:TOYOTA 16.20 3.116 No_date 1:32 43.19 n/a
  + 02:FUTURE 8.30 1.102 No_date 1:31 32.70 n/a
  [DT= 1.00] [SUM= 03:POUDIN 24.50 4.194 No_date 1:31 39.63 n/a]
003:0006:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  ROUTE RESERVOIR -> 03:POUDIN 24.50 4.194 No_date 1:31 39.63 n/a
  [RDT= 1.00] out<- 04:ENDOUT 24.50 .148 No_date 4:06 39.63 n/a
  overflow <= 05:ENDOVR .00 .000 No_date 0:00 .00 n/a
  [HxStoUsed=.0597E+00] [TotOvVol=.0000E+00] [H-Ovf= 0] [TotDurOvf= 0.hrs]
** END OF RUN : 3
```

```
RUN:COMMANDS
004:0001
  START
  [TZERO = .00 hrs on 0]
  [METOUT= 2 {1=imperial, 2=metric output}]
  [HSTORM= 1]
  [HRUN = 4]

***** Project Name: JUDD PARK TOYOTETSU Project Number: [06-046]
* Date : 04-27-2006
* Modeler : [TGS]
* Company : G. Douglas Vallee Limited
* License #: 3560969
```

```
004:0002:READ STORM
  Filename = STORM.001
  Comment = 25 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTION
  [SRT=10.00] [SDUR= 4.00] [PTOT= 66.02]
004:0003:  ID:HYD---ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  DESIGN STANDHYD 01:TOYOTA 16.20 3.932 No_date 1:31 52.25 .791
  [XHYP=.50:TTHP=.80]
  [SLP=1.00:DT= 1.00]
  [LOSS= 2 :CH= 70.0]
004:0004:  ID:HYD---ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  DESIGN STANDHYD 02:FUTURE 8.30 1.374 No_date 1:31 40.23 .609
  [XHYP=.36:TTHP=.44]
  [SLP=1.00:DT= 1.00]
  [LOSS= 2 :CH= 70.0]
004:0005:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  ADD HYD 01:TOYOTA 16.20 3.932 No_date 1:31 52.25 n/a
  + 02:FUTURE 8.30 1.374 No_date 1:31 40.23 n/a
  [DT= 1.00] [SUM= 03:POUDIN 24.50 5.303 No_date 1:31 40.18 n/a]
004:0006:  ID:HYD---AREA---QPEAK-TpeakDate_hhmm---R.V.-R.C.
  ROUTE RESERVOIR -> 03:POUDIN 24.50 5.303 No_date 1:31 40.18 n/a
  [RDT= 1.00] out<- 04:ENDOUT 24.50 .257 No_date 4:02 40.18 n/a
```

```
RUN:COMMANDS
002:0001
  START
  [TZERO = .00 hrs on 0]
  [METOUT= 2 {1=imperial, 2=metric output}]
  [HSTORM= 1]
  [HRUN = 2]
```

```

overflow <= 05:PHDOVR .00 ,000 No_data 0:00 .00 n/a
[Hx:toUsed=.9887E+00, TotOvFval=.0000E+00, H-Ovf=.0, TotDovF=.0.hrs
** END OF RUN : 4
*****
```

```

RUN:COMBINED
005:0001
START
  [TZERO = .00 hrs on 0]
  [METOUT= 2 (1=imperial, 2=metric output)]
  [HSTORM= 1 ]
  [RNUH = 5 ]
*****
* Project Name: [JUDD PARK TOYOTETSU]  Project Number: [06-046]
* Date:        : 04-27-2006
* Modeler:     : [TGS]
* Company:     : G. Douglas Vallee Limited
* License #:   : 3568969
*****
005:0002
READ STORM
  Filename = STORM.001
  comment = 50 YEAR CHICAGO 4 HOUR DESIGN DISTRIBUTION
  [SDT=10.00:SDUR= 4.00:PTOT= 72.96]
005:0003--ID:HHYD----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.
DESIGN STANDHYD 01:TOYOTA 16.20 4.870 No_data 1:31 58.67 .004
  [XHMP=.50:THMP=.00]
  [SLP=1.00:DY= 1.00]
  [LOSS= 2 :CH= 70.0]
005:0004----ID:HHYD----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.
DESIGN STANDHYD 02:FUTURE 8.30 1.707 No_data 1:30 45.66 .626
  [XHMP=.36:THMP=.44]
  [SLP=1.00:DY= 1.00]
  [LOSS= 2 :CH= 70.0]
005:0005----ID:HHYD----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.
  ADD HYD 01:TOYOTA 16.20 4.870 No_data 1:31 58.67 n/a
    + 02:FUTURE 8.30 1.707 No_data 1:30 45.66 n/a
  [DT= 1.00]  SUD= 03:PHDIN 24.50 6.362 No_data 1:31 54.26 n/a
005:0006----ID:HHYD----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.
  ROUTE RESERVOIR -> (3:PHDIN 24.50 6.562 No_data 1:31 54.26 n/a
  [DT= 1.00] out<- (4:PHDOVR 24.50 .335 No_data 1:31 54.26 n/a
  overflow <- (5:PHDOVR .00 .000 No_data 0:00 .00 n/a
  [Hx:toUsed=.1070E+01, TotOvFval=.0000E+00, H-Ovf=.0, TotDovF=.0.hrs
** END OF RUN : 5
*****
```

```

RUN:COMBINED
006:0001
START
  [TZERO = .00 hrs on 0]
  [METOUT= 2 (1=imperial, 2=metric output)]
  [HSTORM= 1 ]
  [RNUH = 6 ]
*****
* Project Name: [JUDD PARK TOYOTETSU]  Project Number: [06-046]
* Date:        : 04-27-2006
* Modeler:     : [TGS]
* Company:     : G. Douglas Vallee Limited
* License #:   : 3568969
*****
006:0002
READ STORM
  Filename = STORM.001
  comment = 100 YEAR CHICAGO 4 HOUR DESIGN STORM DISTRIBUTION
  [SDT=10.00:SDUR= 4.00:PTOT= 83.90]
006:0003--ID:HHYD----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.
DESIGN STANDHYD 01:TOYOTA 16.20 5.690 No_data 1:31 68.90 .821
  [XHMP=.50:THMP=.80]
  [SLP=1.00:DY= 1.00]
  [LOSS= 2 :CH= 70.0]
006:0004----ID:HHYD----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.
DESIGN STANDHYD 02:FUTURE 8.30 1.978 No_data 1:30 54.46 .649
  [XHMP=.36:THMP=.44]
  [SLP=1.00:DY= 1.00]
  [LOSS= 2 :CH= 70.0]
006:0005----ID:HHYD----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.
  ADD HYD 01:TOYOTA 16.20 5.690 No_data 1:31 68.90 n/a
    + 02:FUTURE 8.30 1.978 No_data 1:30 54.46 n/a
  [DT= 1.00]  SUD= 03:PHDIN 24.50 7.662 No_data 1:31 64.01 n/a
006:0006----ID:HHYD----AREA---QPEAK-TpeakDate_hh:mm---R.V.-R.C.
  ROUTE RESERVOIR -> 01:PHDIN 24.50 7.662 No_data 1:31 64.01 n/a
  [DT= 1.00] out<- 01:PHDOVR 24.50 .492 No_data 2:56 64.01 n/a
  overflow <- 01:PHDOVR .00 .000 No_data 0:00 .00 n/a
  [Hx:toUsed=.1210E+01, TotOvFval=.0000E+00, H-Ovf=.0, TotDovF=.0.hrs
006:0002
  FINISH
*****
```

WARNING / ERRORS / NOTES

Simulation ended on 2006-05-11 at 13:40:23

Appendix B

Swale and Culvert Sizing, & Storm Sewer Design Sheet

Norfolk 100 Year Storm	A	B	C
	801.041	1.501	0.657
Material:	PVC/concrete		
Mannigns Roughness n:	0.013		

North West Drainage Area

Pervious Area C	0.25
Impervious Area C	0.95
Pervious Area	3.428 ha
Impervious Area	3.472 ha
Weighted C	0.60

Time of Concentration	5 min	as per NCDC
100 Year Rainfall	234 mm/hr	
Design Flow	2703 L/s	
Box Culvert Width	1.8 m	
Box Culvert Height	0.9 m	
Box Culvert Slope	0.35%	
Capacity	3304 L/s	
% of Design Capacity	82%	
Velocity	2.0 m/s	
100 Year flow Depth in Culvert	0.64 m	
Distance to Soffit	0.26 m	

	A	B	C
5 Year Storm	583.017	3.007	0.703
100 Year Storm	801.041	1.501	0.657

	Imp.	Area	
C1	0.25	3.428	ha
C2	0.95	3.671	ha
CA	4.34		

Time of Concentration	5	minutes
5 Year Rainfall	135	mm/hr
5 Des. Flow	1630	L/s
100 Year Rainfall	234	mm/hr
100 Des. Flow	2826	L/s

Mannings Formula Trapezoid - 5 Year @ .35%

Flow Height (m)	0.4063	
Flow Target (cu. m / s)	1.63	5 Year flow
Base Width (m)	2	
Side Slope	0.2	
Wetted Perimeter (m)	4.57	
Area (sq. m)	1.64	
Mannings Roughness (n)	0.03	
Slope (m/m)	0.35%	
Flow (cu. m / s)	1.63	
Velocity (m / s)	1.00	

Mannings Formula Trapezoid - 100 Year @ .35%

Flow Height (m)	0.7595	
Flow Target (cu. m / s)	2.83	100 Year flow
Base Width (m)	1	
Side Slope	0.33	
Wetted Perimeter (m)	5.80	
Area (sq. m)	2.51	
Mannings Roughness (n)	0.03	
Slope (m/m)	0.35%	
Flow (cu. m / s)	2.83	
Velocity (m / s)	1.13	Bermuda Grass: OK

100 Year Swale Geometry

Min. Full width Top to Top	5.60 m
Min. Swale Depth	0.76 m
Bottom Width	1.0 m

STORM SEWER DESIGN SHEET

10 Year Storm	670.324	3.007	0.698														
100 Year Storm	801.041	1.501	0.657														
Project: 20-102 - TTCA Plant Expansion																	
Municipality: Simcoe - Norfolk County																	
Sheet of: 1 of 1																	
Sewer Design																	
Area	Location	Time	Rainfall	Des. Flow													
From	To	Individ.	Cumulative	2.778*I*A*C													
		C*A	C*A	Box Width L/s													
		C= 0.25 ha	C= 0.95 ha	Box Height m													
		Avg. C		Slope %													
				Cap %													
				L/s													
Area	Time	Des. Q	Vel	Length													
	mm/hr	% of Cap	m/s	m													
NW	Prop. Swale (10 Year)	Judd Drive SWMP	3.428	3.472	0.000	0.602	4.156	5.0	157	1811.4	1.8	0.9	0.35%	3304	55%	2.0	9
NW	Prop. Swale (100 Year)	Judd Drive SWMP	3.428	3.472	0.000	0.602	4.156	5.0	234.2	2703.2	1.8	0.9	0.35%	3304	82%	2.0	9

Appendix C

Post-Development Visual Otthymo Model Output

** SIMULATION:100yr 4hr 10min Chicago **

CHICAGO STORM	IDF curve parameters: A= 801.041						
Ptotal= 87.09 mm	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	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.17	8.40	1.17	38.70	2.17	16.17	3.17	9.61
0.33	9.34	1.33	160.97	2.33	14.33	3.33	9.08
0.50	10.59	1.50	47.72	2.50	12.95	3.50	8.61
0.67	12.39	1.67	29.71	2.67	11.86	3.67	8.20
0.83	15.24	1.83	22.67	2.83	10.97	3.83	7.84
1.00	20.69	2.00	18.74	3.00	10.24	4.00	7.51

CALIB	
STANDHYD (0006)	Area (ha)= 16.20
ID= 1 DT= 5.0 min	Total Imp(%)= 68.60 Dir. Conn.(%)= 51.70
	IMPERVIOUS PERVIOUS (i)
Surface Area (ha)=	11.11 5.09
Dep. Storage (mm)=	1.00 1.50
Average Slope (%)=	1.00 1.00
Length (m)=	328.63 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	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
Max.Eff.Inten.(mm/hr)=		160.97		127.36			
over (min)		5.00		15.00			
Storage Coeff. (min)=		4.31 (ii)		12.20 (ii)			
Unit Hyd. Tpeak (min)=		5.00		15.00			
Unit Hyd. peak (cms)=		0.23		0.09			
						TOTALS	
PEAK FLOW (cms)=		3.46		1.00		4.035 (iii)	
TIME TO PEAK (hrs)=		1.33		1.50		1.33	
RUNOFF VOLUME (mm)=		86.09		47.27		67.34	
TOTAL RAINFALL (mm)=		87.09		87.09		87.09	
RUNOFF COEFFICIENT =		0.99		0.54		0.77	

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

- (i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
CN* = 70.0 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.

CALIB				
STANDHYD (0007)		Area (ha)=	8.30	
ID= 1 DT= 5.0 min		Total Imp(%)=	44.00	Dir. Conn.(%)= 36.00
		IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=		3.65	4.65	
Dep. Storage (mm)=		1.00	1.50	
Average Slope (%)=		1.00	1.00	
Length (m)=		235.23	40.00	
Mannings n =		0.013	0.250	
Max.Eff.Inten.(mm/hr)=		160.97	78.61	
over (min)		5.00	15.00	
Storage Coeff. (min)=		3.53 (ii)	13.10 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.26	0.08	
				TOTALS
PEAK FLOW (cms)=		1.28	0.55	1.581 (iii)
TIME TO PEAK (hrs)=		1.33	1.50	1.33
RUNOFF VOLUME (mm)=		86.09	40.64	57.00
TOTAL RAINFALL (mm)=		87.09	87.09	87.09
RUNOFF COEFFICIENT =		0.99	0.47	0.65

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

- (i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0008)	1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0006):	16.20	4.035	1.33	67.34	
+ ID2= 2 (0007):	8.30	1.581	1.33	57.00	
ID = 3 (0008):	24.50	5.616	1.33	63.84	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0005)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min				
OUTFLOW (cms)	STORAGE (ha.m.)			
0.0000	0.0000			
0.0160	0.0131			
0.0220	0.0272			
0.0270	0.0438			
0.0310	0.0696			
0.0350	0.1097			
0.0380	0.1644			
0.0410	0.2338			
0.0440	0.3181			
0.0470	0.4148			
OUTFLOW (cms)	STORAGE (ha.m.)			
0.0490	0.5172			
0.0520	0.6214			
0.0680	0.7273			
0.1290	0.8349			
0.2150	0.9442			
0.3200	1.0550			
0.4400	1.1680			
0.5750	1.2820			
0.7230	1.3980			
0.8810	1.5160			
AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	
INFLOW : ID= 2 (0008)	24.500	5.616	1.33	63.84
OUTFLOW: ID= 1 (0005)	24.500	0.468	3.92	63.83

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.34
TIME SHIFT OF PEAK FLOW (min)=155.00
MAXIMUM STORAGE USED (ha.m.)= 1.1919

** SIMULATION:10yr 4hr 10min Chicago **

 | 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
0.17	5.04	1.17	27.43	'	2.17	10.30	3.17	5.84
0.33	5.66	1.33	111.84	'	2.33	9.03	3.33	5.49
0.50	6.49	1.50	34.58	'	2.50	8.07	3.50	5.18
0.67	7.70	1.67	20.31	'	2.67	7.33	3.67	4.92
0.83	9.66	1.83	15.00	'	2.83	6.74	3.83	4.68
1.00	13.55	2.00	12.13	'	3.00	6.25	4.00	4.47

 | CALIB
 | STANDHYD (0006)
ID= 1 DT= 5.0 min

Area (ha)= 16.20
 Total Imp(%)= 68.60 Dir. Conn.(%)= 51.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.11	5.09
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	328.63	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
-------	-------	--	-------	-------	--	-------	------	--	------	------

Max.Eff.Inten.(mm/hr)=	111.84	54.94	
over (min)	5.00	20.00	
Storage Coeff. (min)=	4.99 (ii)	16.03 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.22	0.06	
TOTALS			
PEAK FLOW (cms)=	2.33	0.46	2.521 (iii)
TIME TO PEAK (hrs)=	1.33	1.58	1.33
RUNOFF VOLUME (mm)=	56.94	25.41	41.71
TOTAL RAINFALL (mm)=	57.94	57.94	57.94
RUNOFF COEFFICIENT =	0.98	0.44	0.72

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

- (i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
CN* = 70.0 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.

CALIB	
STANDHYD (0007)	Area (ha)= 8.30
ID= 1 DT= 5.0 min	Total Imp(%)= 44.00 Dir. Conn.(%)= 36.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	3.65	4.65	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	1.00	
Length (m)=	235.23	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	111.84	32.94	
over (min)	5.00	20.00	
Storage Coeff. (min)=	4.08 (ii)	17.63 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.24	0.06	
TOTALS			
PEAK FLOW (cms)=	0.87	0.24	0.962 (iii)
TIME TO PEAK (hrs)=	1.33	1.58	1.33
RUNOFF VOLUME (mm)=	56.94	21.12	34.01
TOTAL RAINFALL (mm)=	57.94	57.94	57.94
RUNOFF COEFFICIENT =	0.98	0.36	0.59

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

- (i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:

CN* = 70.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0008)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 +	2 = 3				
ID1= 1 (0006):		16.20	2.521	1.33	41.71
+ ID2= 2 (0007):		8.30	0.962	1.33	34.01
ID = 3 (0008):		24.50	3.482	1.33	39.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0005)		OVERFLOW IS OFF	
IN= 2--->	OUT= 1	OUTFLOW (cms)	STORAGE (ha.m.)
DT= 5.0 min		0.0000	0.0000
		0.0160	0.0131
		0.0220	0.0272
		0.0270	0.0438
		0.0310	0.0696
		0.0350	0.1097
		0.0380	0.1644
		0.0410	0.2338
		0.0440	0.3181
		0.0470	0.4148

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0008)	24.500	3.482	1.33	39.10
OUTFLOW: ID= 1 (0005)	24.500	0.140	4.08	39.10

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.02
 TIME SHIFT OF PEAK FLOW (min)=165.00
 MAXIMUM STORAGE USED (ha.m.)= 0.8494

 ** SIMULATION:25yr 4hr 10min Chicago **

CHICAGO STORM	IDF curve parameters: A= 721.533
Ptotal= 69.38 mm	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
0.17	6.34	1.17	31.84	2.17	12.58	3.17	7.30
0.33	7.08	1.33	131.63	2.33	11.08	3.33	6.87
0.50	8.07	1.50	39.74	2.50	9.96	3.50	6.50
0.67	9.51	1.67	23.97	2.67	9.08	3.67	6.18
0.83	11.82	1.83	17.98	2.83	8.38	3.83	5.90
1.00	16.33	2.00	14.70	3.00	7.79	4.00	5.64

 | CALIB |
 | STANDHYD (0006) | Area (ha)= 16.20
 | ID= 1 DT= 5.0 min | Total Imp(%)= 68.60 Dir. Conn.(%)= 51.70

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	11.11	5.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	1.00
Length	(m)=	328.63	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

Max.Eff.Inten.(mm/hr)= 131.63 90.81

over (min)	5.00	15.00	
Storage Coeff. (min)=	4.67 (ii)	13.70 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.22	0.08	
			TOTALS
PEAK FLOW (cms)=	2.78	0.68	3.160 (iii)
TIME TO PEAK (hrs)=	1.33	1.50	1.33
RUNOFF VOLUME (mm)=	68.38	33.62	51.59
TOTAL RAINFALL (mm)=	69.38	69.38	69.38
RUNOFF COEFFICIENT =	0.99	0.48	0.74

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

- (i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
CN* = 70.0 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.

CALIB			
STANDHYD (0007)	Area (ha)=	8.30	
ID= 1 DT= 5.0 min	Total Imp(%)=	44.00	Dir. Conn.(%)= 36.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	3.65	4.65	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	1.00	
Length (m)=	235.23	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	131.63	43.98	
over (min)	5.00	20.00	
Storage Coeff. (min)=	3.82 (ii)	15.89 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.25	0.07	
			TOTALS
PEAK FLOW (cms)=	1.03	0.34	1.170 (iii)
TIME TO PEAK (hrs)=	1.33	1.58	1.33
RUNOFF VOLUME (mm)=	68.38	28.37	42.77
TOTAL RAINFALL (mm)=	69.38	69.38	69.38
RUNOFF COEFFICIENT =	0.99	0.41	0.62

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

- (i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

ADD HYD (0008)				
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)
				R.V. (mm)
ID1= 1 (0006):	16.20	3.160	1.33	51.59
+ ID2= 2 (0007):	8.30	1.170	1.33	42.77
<hr/>				
ID = 3 (0008):	24.50	4.330	1.33	48.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0005)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	OUTFLOW STORAGE OUTFLOW STORAGE
	(cms) (ha.m.) (cms) (ha.m.)
	0.0000 0.0000 0.0490 0.5172
	0.0160 0.0131 0.0520 0.6214
	0.0220 0.0272 0.0680 0.7273
	0.0270 0.0438 0.1290 0.8349
	0.0310 0.0696 0.2150 0.9442
	0.0350 0.1097 0.3200 1.0550
	0.0380 0.1644 0.4400 1.1680
	0.0410 0.2338 0.5750 1.2820
	0.0440 0.3181 0.7230 1.3980
	0.0470 0.4148 0.8810 1.5160
	AREA QPEAK TPEAK R.V.
	(ha) (cms) (hrs) (mm)
INFLOW : ID= 2 (0008)	24.500 4.330 1.33 48.60
OUTFLOW: ID= 1 (0005)	24.500 0.264 4.08 48.59
	PEAK FLOW REDUCTION [Qout/Qin](%)= 6.10
	TIME SHIFT OF PEAK FLOW (min)=165.00
	MAXIMUM STORAGE USED (ha.m.)= 0.9971

** SIMULATION:2yr 4hr 10min Chicago **

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 hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.17	2.68	1.17	17.69	2.17	5.90	3.17	3.14
0.33	3.04	1.33	72.24	2.33	5.09	3.33	2.94
0.50	3.53	1.50	22.78	2.50	4.50	3.50	2.76
0.67	4.26	1.67	12.62	2.67	4.04	3.67	2.60
0.83	5.49	1.83	8.98	2.83	3.68	3.83	2.47
1.00	8.02	2.00	7.08	3.00	3.39	4.00	2.35

CALIB	
STANDHYD (0006)	Area (ha)= 16.20
ID= 1 DT= 5.0 min	Total Imp(%)= 68.60 Dir. Conn.(%)= 51.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.11	5.09
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	328.63	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	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 22.18
 over (min) 5.00 25.00
 Storage Coeff. (min)= 5.94 (ii) 21.81 (ii)
 Unit Hyd. Tpeak (min)= 5.00 25.00

Unit Hyd. peak (cms)=	0.19	0.05	*TOTALS*
PEAK FLOW (cms)=	1.44	0.17	1.486 (iii)
TIME TO PEAK (hrs)=	1.33	1.67	1.33
RUNOFF VOLUME (mm)=	34.21	11.16	23.08
TOTAL RAINFALL (mm)=	35.21	35.21	35.21
RUNOFF COEFFICIENT =	0.97	0.32	0.66

(i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
 $CN^* = 70.0$ $I_a = \text{Dep. Storage (Above)}$

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

CALIB			
STANDHYD (0007)	Area (ha)=	8.30	
ID= 1 DT= 5.0 min	Total Imp(%)=	44.00	Dir. Conn.(%)= 36.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	3.65	4.65	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	1.00	
Length (m)=	235.23	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	72.24	12.85	
over (min)	5.00	25.00	
Storage Coeff. (min)=	4.86 (ii)	24.60 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	0.22	0.05	
			TOTALS
PEAK FLOW (cms)=	0.54	0.09	0.564 (iii)
TIME TO PEAK (hrs)=	1.33	1.67	1.33
RUNOFF VOLUME (mm)=	34.21	8.90	18.01
TOTAL RAINFALL (mm)=	35.21	35.21	35.21
RUNOFF COEFFICIENT =	0.97	0.25	0.51

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

(i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
 $CN^* = 70.0$ $I_a = \text{Dep. Storage (Above)}$

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.

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

ADD HYD (0008)	1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0006):		16.20	1.486	1.33	23.08
+ ID2= 2 (0007):		8.30	0.564	1.33	18.01
=====					
ID = 3 (0008):		24.50	2.050	1.33	21.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0005)	OVERFLOW IS OFF
IN= 2--> OUT= 1	
DT= 5.0 min	
	OUTFLOW STORAGE
	(cms) (ha.m.)
	0.0000 0.0000
	0.0160 0.0131
	0.0220 0.0272
	0.0270 0.0438
	0.0310 0.0696
	0.0350 0.1097
	0.0380 0.1644
	0.0410 0.2338
	0.0440 0.3181
	0.0470 0.4148
	OUTFLOW STORAGE
	(cms) (ha.m.)
	0.0490 0.5172
	0.0520 0.6214
	0.0680 0.7273
	0.1290 0.8349
	0.2150 0.9442
	0.3200 1.0550
	0.4400 1.1680
	0.5750 1.2820
	0.7230 1.3980
	0.8810 1.5160

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0008)	24.500	2.050	1.33	21.36
OUTFLOW: ID= 1 (0005)	24.500	0.048	4.25	21.35

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.34
 TIME SHIFT OF PEAK FLOW (min)=175.00
 MAXIMUM STORAGE USED (ha.m.)= 0.4631

** SIMULATION:50yr 4hr 10min Chicago **

CHICAGO STORM	IDF curve parameters: A= 766.038
Ptotal= 78.32 mm	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
0.17	7.35	1.17	35.40	'	2.17	14.38	3.17	8.44
0.33	8.19	1.33	146.50	'	2.33	12.71	3.33	7.96
0.50	9.32	1.50	43.93	'	2.50	11.45	3.50	7.55
0.67	10.95	1.67	26.91	'	2.67	10.46	3.67	7.18
0.83	13.53	1.83	20.36	'	2.83	9.66	3.83	6.85
1.00	18.53	2.00	16.73	'	3.00	9.00	4.00	6.56

CALIB	
STANDHYD (0006)	Area (ha)= 16.20
ID= 1 DT= 5.0 min	Total Imp(%)= 68.60 Dir. Conn.(%)= 51.70

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.11	5.09
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	328.63	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

Max.Eff.Inten.(mm/hr)=	146.50	108.93
over (min)	5.00	15.00
Storage Coeff. (min)=	4.48 (ii)	12.87 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.23	0.08
		TOTALS
PEAK FLOW (cms)=	3.13	0.84
TIME TO PEAK (hrs)=	1.33	1.50
		3.599 (iii)
		1.33

RUNOFF VOLUME (mm)=	77.32	40.39	59.48
TOTAL RAINFALL (mm)=	78.32	78.32	78.32
RUNOFF COEFFICIENT =	0.99	0.52	0.76

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

- (i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
CN* = 70.0 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.

CALIB			
STANDHYD (0007)	Area (ha)=	8.30	
ID= 1 DT= 5.0 min	Total Imp(%)=	44.00	Dir. Conn.(%)= 36.00
		IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	3.65	4.65	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	1.00	
Length (m)=	235.23	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	146.50	53.11	
over (min)	5.00	15.00	
Storage Coeff. (min)=	3.66 (ii)	14.86 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.25	0.08	
			TOTALS
PEAK FLOW (cms)=	1.16	0.44	1.394 (iii)
TIME TO PEAK (hrs)=	1.33	1.50	1.33
RUNOFF VOLUME (mm)=	77.32	34.43	49.87
TOTAL RAINFALL (mm)=	78.32	78.32	78.32
RUNOFF COEFFICIENT =	0.99	0.44	0.64

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

- (i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
CN* = 70.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0008)			
1 + 2 = 3	AREA	QPEAK	TPEAK
			R.V.

		(ha)	(cms)	(hrs)	(mm)
ID1=	1 (0006):	16.20	3.599	1.33	59.48
+ ID2=	2 (0007):	8.30	1.394	1.33	49.87
=====					
	ID = 3 (0008):	24.50	4.993	1.33	56.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0005)	OVERFLOW IS OFF			
IN= 2 ---> OUT= 1				
DT= 5.0 min				
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0490	0.5172
	0.0160	0.0131	0.0520	0.6214
	0.0220	0.0272	0.0680	0.7273
	0.0270	0.0438	0.1290	0.8349
	0.0310	0.0696	0.2150	0.9442
	0.0350	0.1097	0.3200	1.0550
	0.0380	0.1644	0.4400	1.1680
	0.0410	0.2338	0.5750	1.2820
	0.0440	0.3181	0.7230	1.3980
	0.0470	0.4148	0.8810	1.5160

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0008)	24.500	4.993	1.33	56.22
OUTFLOW: ID= 1 (0005)	24.500	0.366	4.00	56.22

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.33
TIME SHIFT OF PEAK FLOW (min)=160.00
MAXIMUM STORAGE USED (ha.m.)= 1.0987

** SIMULATION:5yr 4hr 10min Chicago **

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
0.17	4.20	1.17	23.22	'	2.17	8.64	3.17	4.87

0.33	4.72	1.33	96.03	2.33	7.56	3.33	4.58
0.50	5.42	1.50	29.33	2.50	6.76	3.50	4.32
0.67	6.44	1.67	17.13	2.67	6.13	3.67	4.10
0.83	8.09	1.83	12.62	2.83	5.63	3.83	3.90
1.00	11.39	2.00	10.19	3.00	5.22	4.00	3.72

CALIB							
STANDHYD (0006)		Area (ha)=	16.20				
ID= 1 DT= 5.0 min		Total Imp(%)=	68.60	Dir. Conn.(%)=	51.70		

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	11.11	5.09
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	1.00
Length (m)=	328.63	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

Max.Eff.Inten.(mm/hr)=	96.03	41.94
over (min)	5.00	20.00
Storage Coeff. (min)=	5.30 (ii)	17.60 (ii)
Unit Hyd. Tpeak (min)=	5.00	20.00
Unit Hyd. peak (cms)=	0.21	0.06

TOTALS

PEAK FLOW (cms)=	1.97	0.34	2.104 (iii)
TIME TO PEAK (hrs)=	1.33	1.58	1.33
RUNOFF VOLUME (mm)=	48.03	19.44	34.22
TOTAL RAINFALL (mm)=	49.03	49.03	49.03
RUNOFF COEFFICIENT =	0.98	0.40	0.70

(i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
 CN* = 70.0 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.

CALIB	
STANDHYD (0007)	Area (ha)= 8.30
ID= 1 DT= 5.0 min	Total Imp(%)= 44.00 Dir. Conn.(%)= 36.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	3.65	4.65	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	1.00	
Length (m)=	235.23	40.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	96.03	22.05	
over (min)	5.00	25.00	
Storage Coeff. (min)=	4.34 (ii)	20.24 (ii)	
Unit Hyd. Tpeak (min)=	5.00	25.00	
Unit Hyd. peak (cms)=	0.23	0.05	
TOTALS			
PEAK FLOW (cms)=	0.74	0.17	0.785 (iii)
TIME TO PEAK (hrs)=	1.33	1.67	1.33
RUNOFF VOLUME (mm)=	48.03	15.93	27.48
TOTAL RAINFALL (mm)=	49.03	49.03	49.03
RUNOFF COEFFICIENT =	0.98	0.32	0.56

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

(i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
 CN* = 70.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.

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

ADD HYD (0008)	
1 + 2 = 3	AREA QPEAK TPEAK R.V.
	(ha) (cms) (hrs) (mm)
ID1= 1 (0006):	16.20 2.104 1.33 34.22
+ ID2= 2 (0007):	8.30 0.785 1.33 27.48

ID = 3 (0008): 24.50 2.889 1.33 31.94

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0005)	OVERFLOW IS OFF			
IN= 2--> OUT= 1	OUTFLOW	STORAGE	OUTFLOW	STORAGE
DT= 5.0 min	(cms)	(ha.m.)	(cms)	(ha.m.)
	0.0000	0.0000	0.0490	0.5172
	0.0160	0.0131	0.0520	0.6214
	0.0220	0.0272	0.0680	0.7273
	0.0270	0.0438	0.1290	0.8349
	0.0310	0.0696	0.2150	0.9442
	0.0350	0.1097	0.3200	1.0550
	0.0380	0.1644	0.4400	1.1680
	0.0410	0.2338	0.5750	1.2820
	0.0440	0.3181	0.7230	1.3980
	0.0470	0.4148	0.8810	1.5160

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0008)	24.500	2.889	1.33	31.94
OUTFLOW: ID= 1 (0005)	24.500	0.065	4.25	31.93

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.26
TIME SHIFT OF PEAK FLOW (min)=175.00
MAXIMUM STORAGE USED (ha.m.)= 0.7096

TTCA Water Use History and Preliminary Projections

June 1, 2021



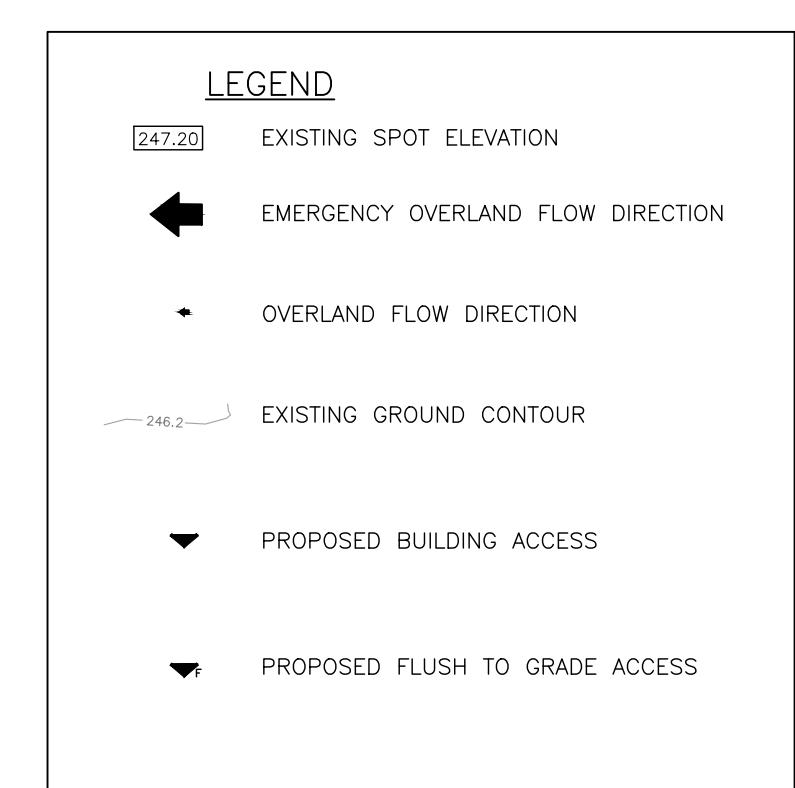
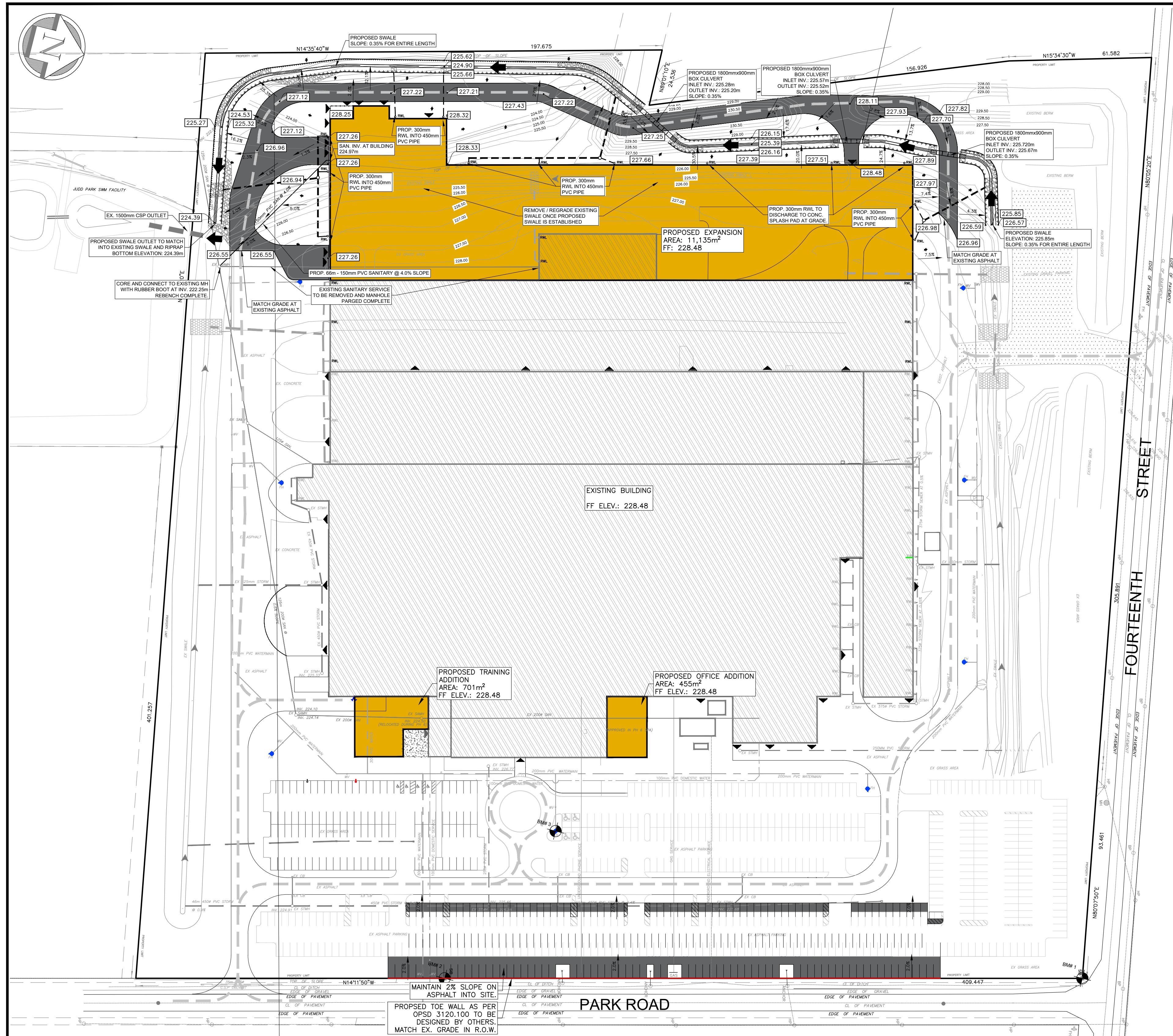
2020/2021	Period		Days	Total Usage M ³	Total
Apr	20-Apr-20	20-May-20	30	500.00	\$ 2,556.38
May	20-May-20	22-Jun-20	33	1200.00	\$ 5,080.58
June	26-Jun-20	20-Jul-20	24	1400.00	\$ 5,801.78
July	20-Jul-20	19-Aug-20	30	1400.00	\$ 5,801.78
Aug	19-Aug-20	18-Sep-20	30	1500.00	\$ 6,162.38
Sep	18-Sep-20	19-Oct-20	31	1300.00	\$ 5,441.18
Oct	19-Oct-20	19-Nov-20	31	1200.00	\$ 5,080.58
Nov	19-Nov-20	21-Dec-20	32	1100.00	\$ 4,719.98
Dec	21-Dec-20	20-Jan-21	30	504.92	\$ 2,670.12
Jan	20-Jan-21	20-Feb-21	31	487.14	\$ 2,658.27
Feb	20-Feb-21	22-Mar-21	30	472.47	\$ 2,602.62
Mar	22-Mar-21	21-Apr-21	30	553.66	\$ 2,910.57
Total			362	11618.19	\$ 51,486.22

EXISTING PLANT @ 9 BAYS

Average	1787.41 m ³
Average Daily Flow	32 m ³ / day
Average Daily Flow	32094 l / day
Norfolk Design Criteria Flow	450 l / person / day
Person Equivalent	71 people
Dwelling Equivalent	2.5 ppu
	29 houses

APPROX. INCREASE TO 11 BAYS

Todays Person Equivalent per bay	9 bays	8 people per bay
Todays Flow per bay	9 bays	3566 litres per day per bay
Additional People Equivalent	2 bays	16 people
Additional Flow	2 bays	7132 litres per day
Additional Household equivalent	2 bays	6 households



REV. NO.	DATE	REVISION
0	2021/06/18	ISSUED FOR CLIENT FOR REVIEW
	2021/06/30	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 LOCATIONS FROM EACH AREA UTILITY COMPANY TO AVOID CONSTRUCTION OR EXCAVATION. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE PROTECTION OF THESE UTILITIES INCLUDING THOSE NOT INDICATED ON THIS DRAWING. G. DOUGLAS VALLEE LTD. ACCEPTS RESPONSIBILITY FOR DAMAGE TO ANY EXISTING UTILITY WHICH MAY OR MAY NOT BE INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION

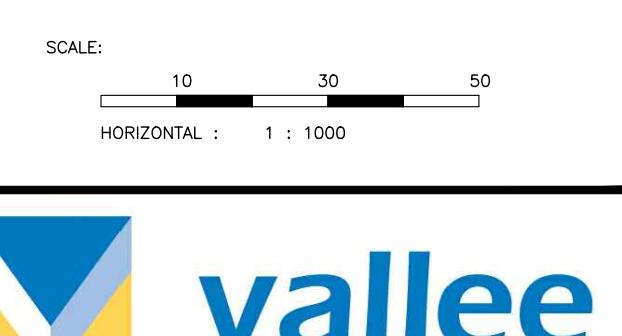
WINDHAM CONCESSION 14 PT LOTS 3 AND 4, RP379427 PARTS 1 AND 2, PT PARTS 3 AND 4 88 PARK ROAD, SIMCOE, ONTARIO

APPLICANT INFORMATION

TICA (TOYOTETSU CANADA)
NAME: EDWARD BILOPAJOVIC
TELEPHONE NUMBER: 519-428-6502
ADDRESS: 88 PARK ROAD, SIMCOE, ONTARIO

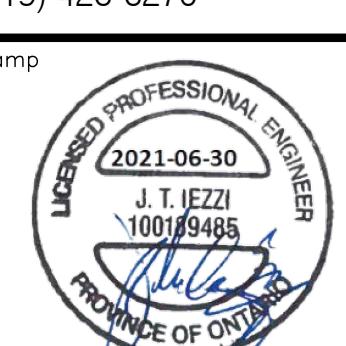
DRAWING LIST

G. DOUGLAS VALLEE LIMITED DRAWINGS
20-102-01 SITE PLAN & EROSION CONTROL PLAN
20-102-02 GRADING PLAN & SERVICING PLAN



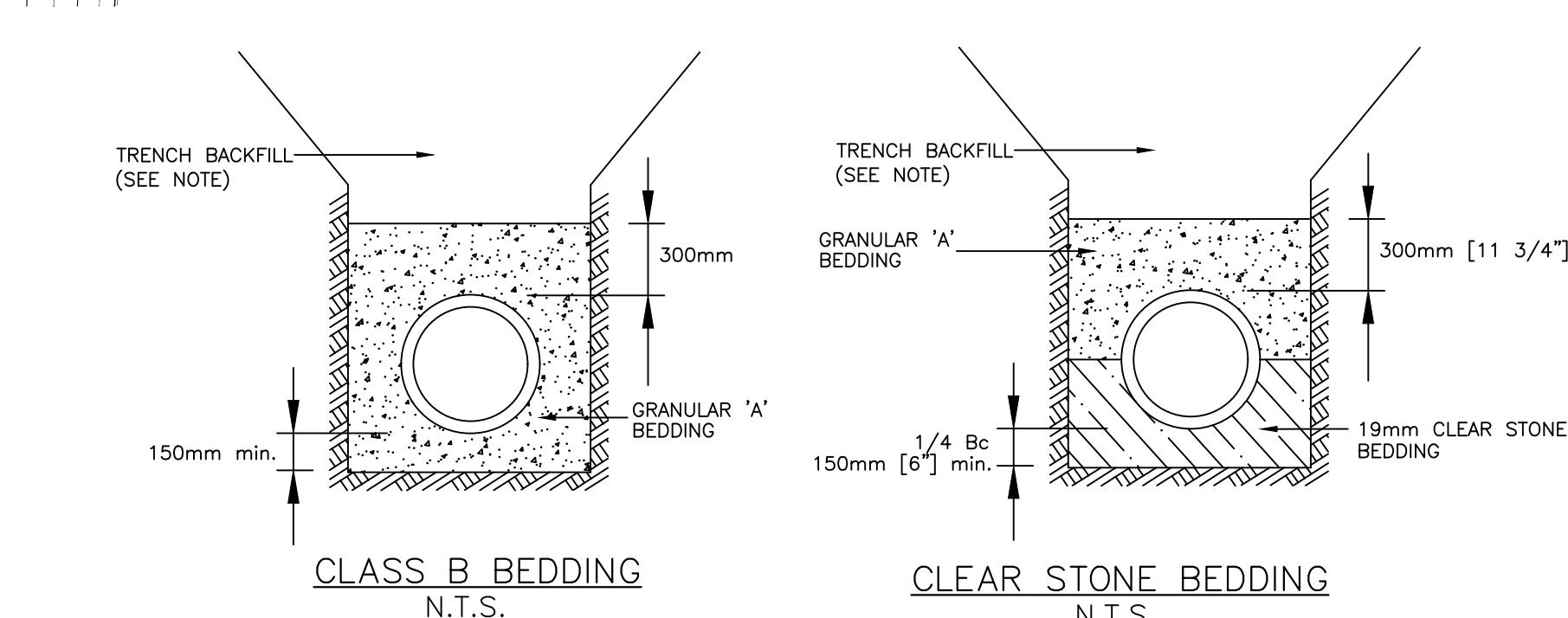
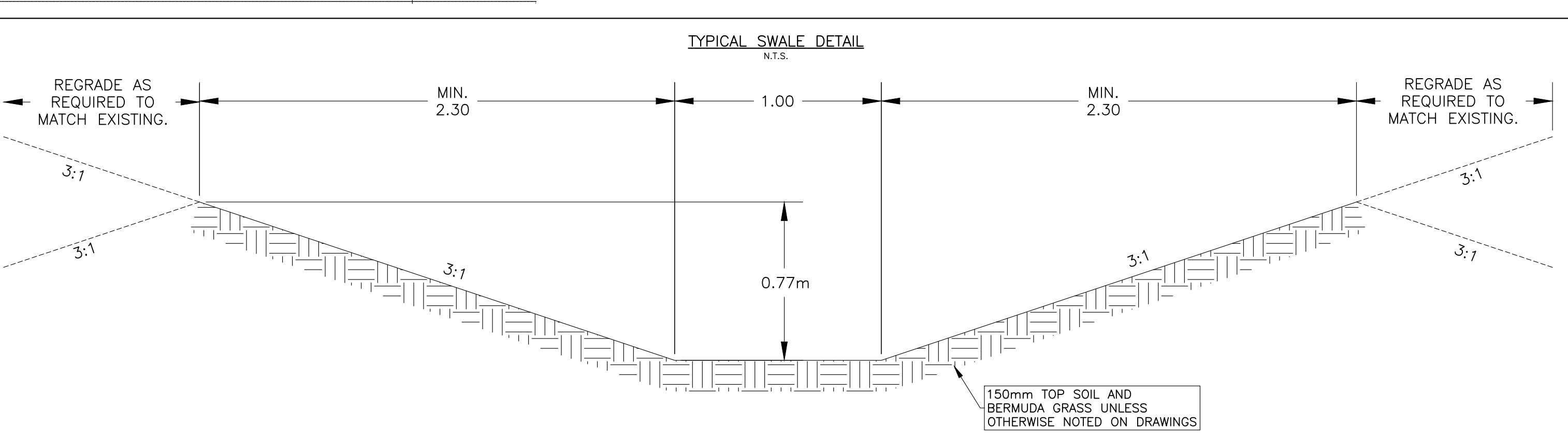
Consulting Engineers,
Architects & Planners

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



Project Title	20-102
TOYOTETSU SITE PLAN AMMENDMENT SITE PLAN AMMENDMENT PHASE 7-9 NORFOLK COUNTY	
Drawing Title	GRADING & SERVICING PLAN
Designed by :	Drawn By :
JLS	JLS
Checked by :	Date Started :
JTI	6/30/21
Drawing Scale :	AS SHOWN
Project No.	C101
20-102	

TYPICAL SWALE DETAIL
N.T.S.



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

**G. DOUGLAS VALLEE LIMITED
CONSULTING ENGINEER & ARCHITECT & PLANNERS**
2 TALBOT ST. N.
SIMCOE, ONTARIO N3Y3W4
TEL: (519) 426-6270

001463

DATE 2 0 21 - 06 - 30
Y Y Y M M D D

PAY to Norfolk County \$ 3,594.00
the order of
Three thousand five hundred ninety-four dollars



ROYAL BANK OF CANADA
SIMCOE BRANCH
55 NORFOLK ST S
SIMCOE ON N3Y 2W1

RE Site Plan Fee for TTCA
Project # 20-102

G. DOUGLAS VALLEE LIMITED
CONSULTING ENGINEER & ARCHITECT & PLANNERS

PER

100 DOLLARS

Security features
included

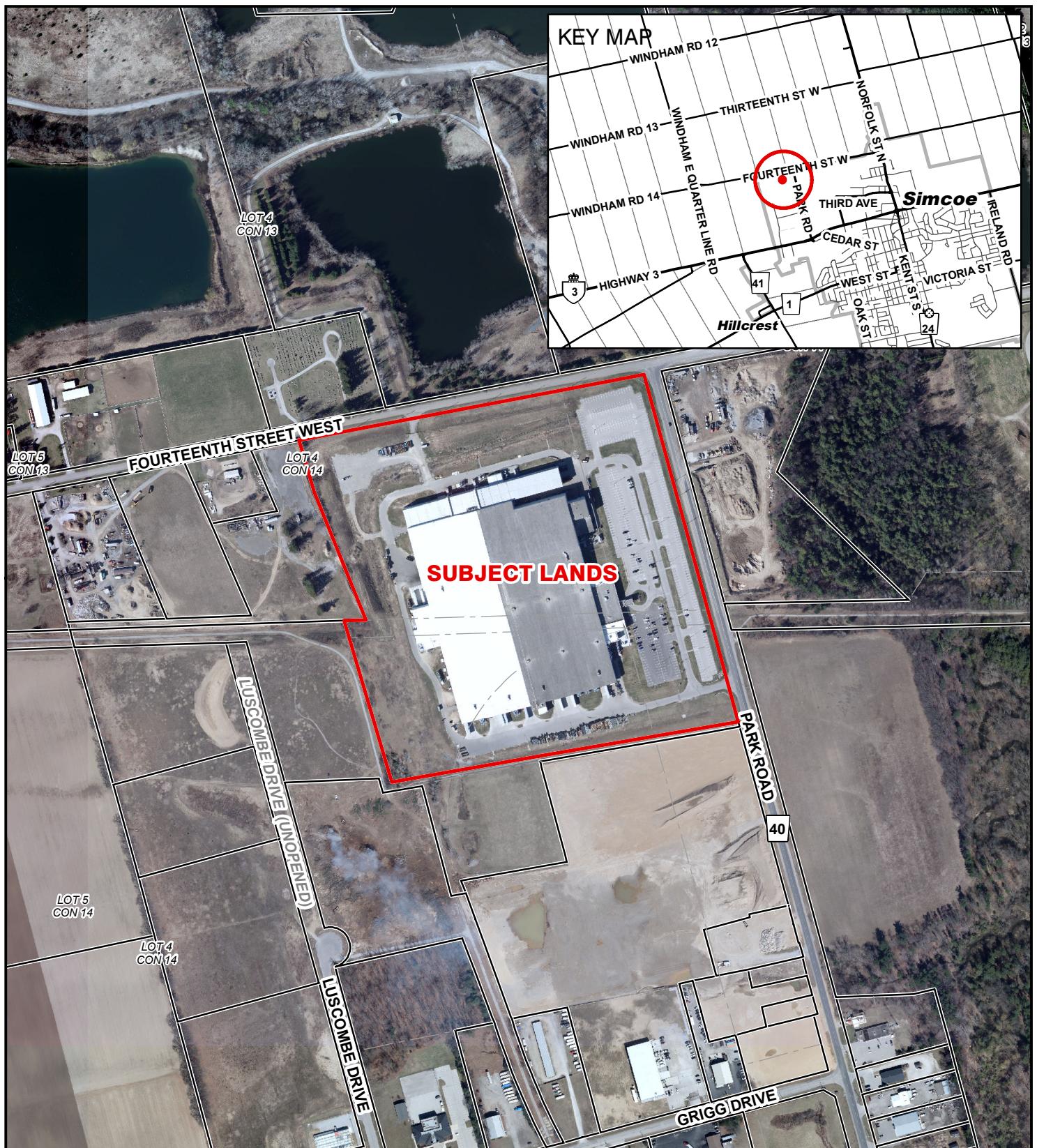
100 146 30 1046620030 100 735 00

00 00 Interbank Branch
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CONTEXT MAP

Geographic Township of WINDHAM

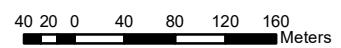
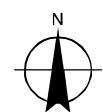


Legend

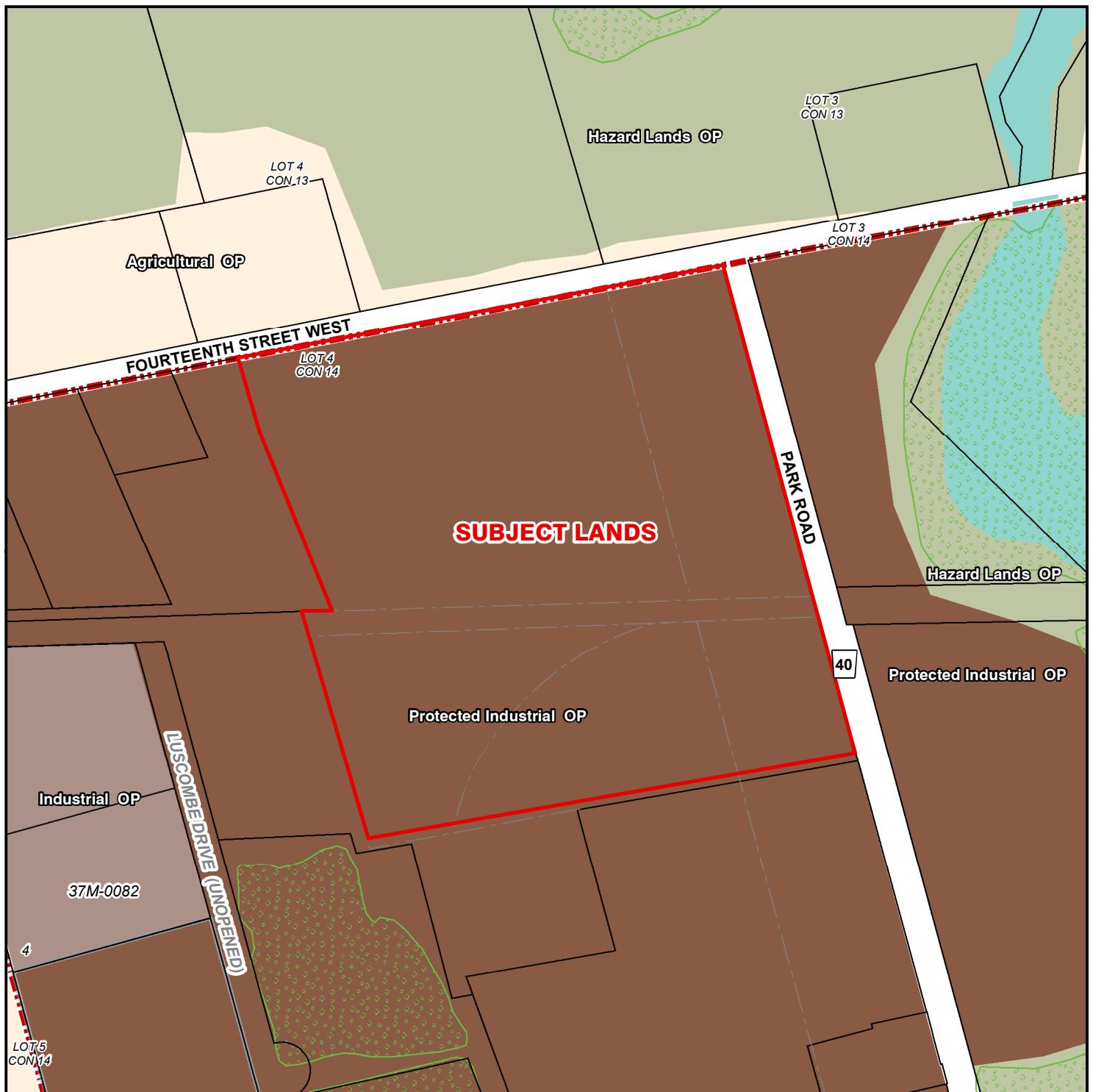
 Subject Lands

2020 Air Photo

2021-07-22

A scale bar showing distances in meters, ranging from 0 to 160 with increments of 20.

OFFICIAL PLAN MAP
Geographic Township of WINDHAM



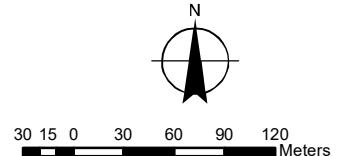
Legend

Official Plan Designations

Subject Lands

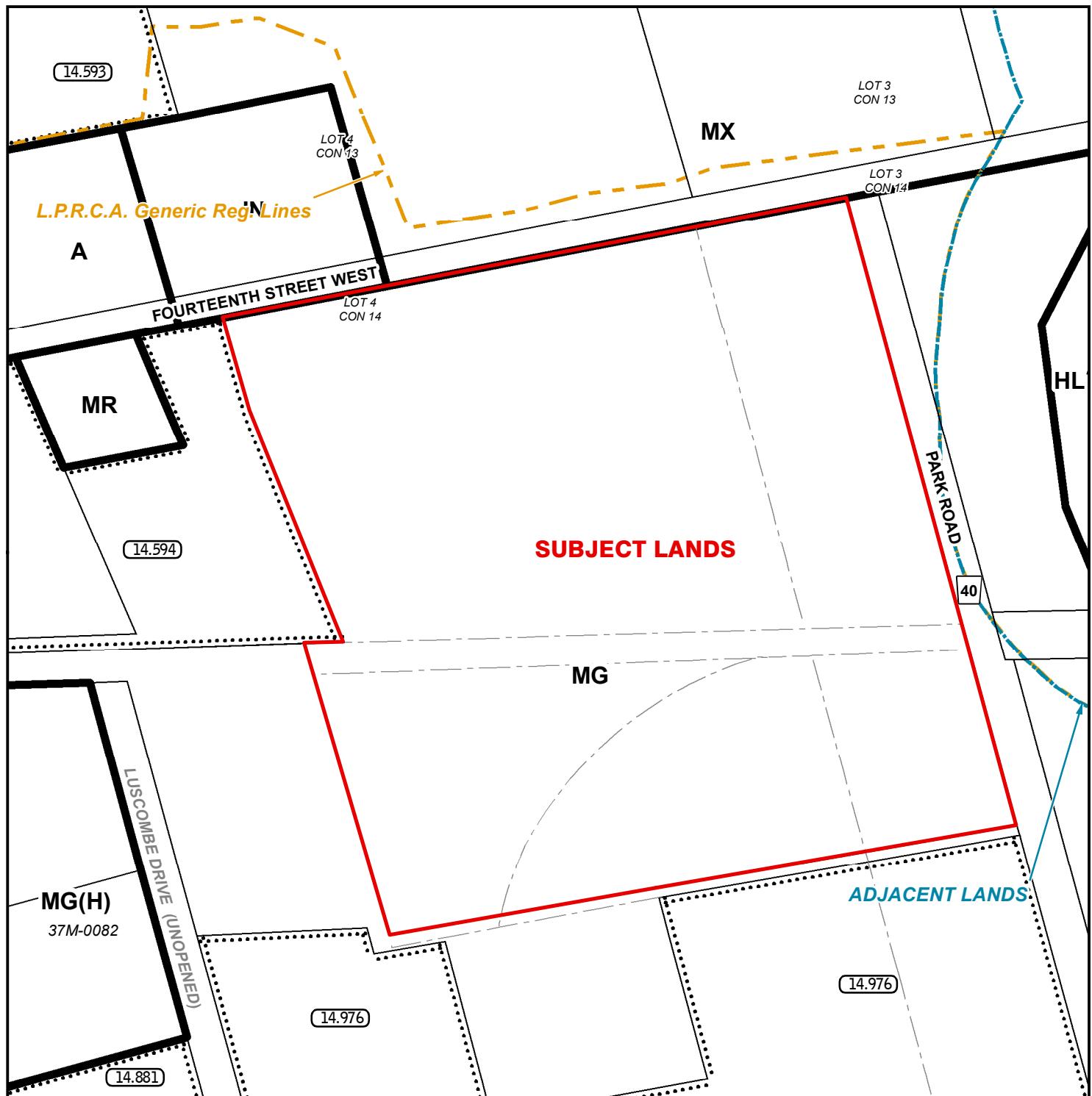
	Agricultural
	Hazard Lands
	Provincially Significant Wetland
	Protected Industrial
	Urban Area Boundary
	Significant Woodland

2021-07-22



ZONING BY-LAW MAP

Geographic Township of WINDHAM



2021-07-22

ZONING BY-LAW 1-Z-2014

(H) - Holding

A - Agricultural Zone

MX - Extractive Industrial Zone

MG - General Industrial Zone

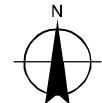
HL - Hazard Land Zone

IN - Neighbourhood Institutional Zone

MR - Rural Industrial Zone

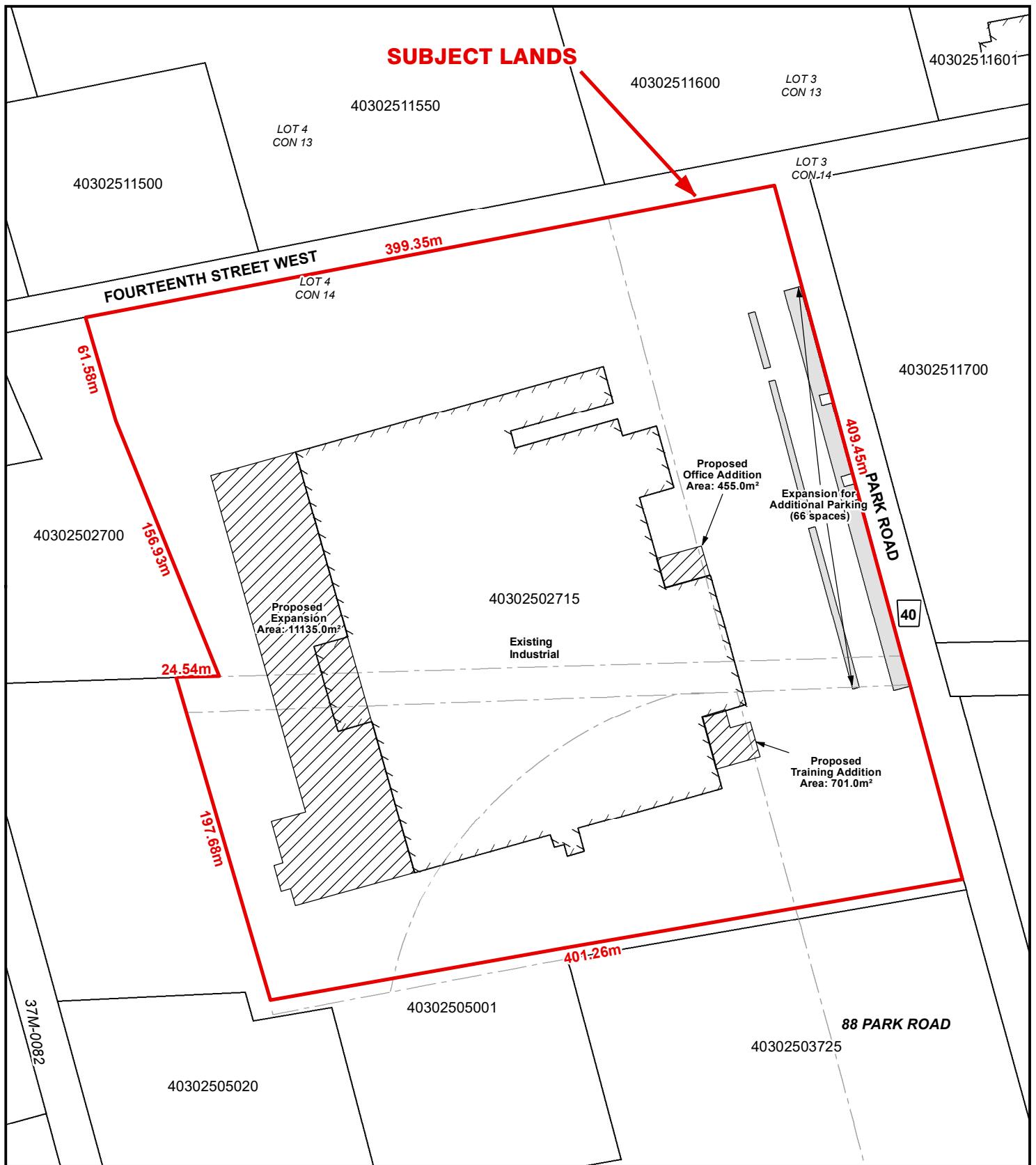
LEGEND

- Subject Lands (Red Box)
- Adjacent Lands (Blue Dashed Box)
- LPRCA Generic RegLines (Yellow Dashed Box)



25 12.5 0 25 50 75 100 Meters

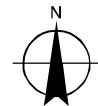
CONCEPTUAL PLAN
Geographic Township of WINDHAM



Legend

Subject Lands

2021-07-22



25 12.5 0 25 50 75 100 Meters