



Date: May 19, 20223

To: Fabian Serra
Planner
Planning and Community Development Division
Norfolk County

From: Cynthia Zahoruk Architects

Subject: 78 King Street, Delhi – Site Plan Application

Dear Fabian,

Kindly find attached our Site Plan application documents for the New five-storey Mixed-Use building with the following attachments:

1. Development application form.
2. Architectural Site plan, Floor plans and elevations by Cynthia Zahoruk Architect Inc.
3. Civil engineering plans and Storm water management reports and calculations by J H Cohoon Engineering Limited
4. Topo survey by Jewitt and Dixon Ltd.

We hope you find the above satisfactory and please do not hesitate to contact us with any questions or comments.

Sincerely,

Cynthia Zahoruk

O.A.A., MRAIC, LEED Ap
B.E.S., B. Arch

Per/ *Nevine Soliman*

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 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)

To construct a new 5-Storey Mixed-Use Building, with Commercial/Office use and Residential amenity space at Ground floor,
23 apartments on ground to fifth floors and 22 surface parking spaces.

Property Assessment Roll Number: 331049200204000

A. Applicant Information

Name of Owner Sentry Property Group

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 2178 Old Highway 24

Town and Postal Code Scotland, ON N0E 1R0

Phone Number 877-930-1553

Cell Number 519-757-9360

Email darrink@sentrypropertygroup.ca

Name of Applicant Cynthia Zahoruk Architect Inc.

Address 3077 New Street

Town and Postal Code Burlington, L7N 1M6

Phone Number 905-331-4480

Cell Number _____

Email cz@czarchitect.com

Name of Agent _____

Address _____

Town and Postal Code _____

Phone Number _____

Cell Number _____

Email _____

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

☒ Owner

☐ Agent

☒ Applicant

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

B. Location, Legal Description and Property Information

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

Part of Lots 2 & 3, Block 16, Registered Plan 189, Town of Delhi, Norfolk County.

Municipal Civic Address: 78 King Street, Delhi

Present Official Plan Designation(s): Central Business District

Present Zoning: Central Business District - CBD

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:

Commercial - Vacant

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:

Vacant lot

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.

n/a

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:

Please see attached Site plan and Site statistics Chart.

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:

Retail on East and West sides.

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:

Site Plan Application to construct a new 5-storey Mixed-use building.

statistics chart on Sheet A0.1

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

The proposed work is in compliance with all the CBD zoning regulations as shown on the development

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: n/a

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: n/a

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	<u>n/a</u>	<u>36.83 m</u>
Lot depth	<u>n/a</u>	<u>49.9 m</u>
Lot width	<u>n/a</u>	<u>36.83 m</u>
Lot area	<u>n/a</u>	<u>1,957 m²</u>
Lot coverage	<u>80 %</u>	<u>27 %</u>
Front yard	<u>0.0 m min - 3.0 m max</u>	<u>0.50 m</u>
Rear yard	<u>0.0 m</u>	<u>21.98 m</u>
Left Interior side yard	<u>0.0 m</u>	<u>10.62 m</u>
Right Interior side yard	<u>0.0 m</u>	<u>2.27 m</u>
Exterior side yard (corner lot)	<u>n/a</u>	<u>n/a</u>
Landscaped open space	<u>n/a</u>	<u></u>
Entrance access width	<u>7.30 m</u>	<u>7.30 m</u>
Exit access width	<u>n/a</u>	<u></u>
Size of fencing or screening	<u>n/a</u>	<u>Existing Fence</u>
Type of fencing	<u>n/a</u>	<u>Ex. Chainlink fence</u>

10. Building Size

Number of storeys	<u>6 storeys max.</u>	<u>5 Storeys</u>
Building height	<u>n/a</u>	<u>16.8 m</u>
Total ground floor area	<u>n/a</u>	<u>527 m²</u>
Total gross floor area	<u>n/a</u>	<u>2,635 m²</u>
Total useable floor area	<u>n/a</u>	<u>2,635 m²</u>

11. Off Street Parking and Loading Facilities

Number of off street parking spaces	<u>0</u>	<u>22 Spaces</u>
Number of visitor parking spaces	<u>0</u>	<u>0 Spaces</u>
Number of accessible parking spaces	<u>0</u>	<u>2 Spaces</u>
Number of off street loading facilities	<u>n/a</u>	<u>n/a</u>

12. Residential (if applicable)

Number of buildings existing: n/a

Number of buildings proposed: 1

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	<u>6</u>	<u>60 m2</u>
Apartment - Two bedroom	<u>16</u>	<u>80 m2</u>
Apartment - Three bedroom	<u>1</u>	<u>110 m2</u>

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

13. Commercial/Industrial Uses (if applicable)

Number of buildings existing: n/a

Number of buildings proposed: 1

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):
225 m2 of Office/Retail use on the ground floor.

Seating Capacity (for assembly halls or similar): n/a

Total number of fixed seats: _____

Describe the type of business(es) proposed: _____

Total number of staff proposed initially: _____

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: n/a

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)

n/a

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):

Commercial Use

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:

A Phase 2 Environmental and UST Removal Report was completed November 9, 2022, with a clean bill of health.

The Report can be provided upon request.

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:

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 350m

Wooded area

☐ On the subject lands or ☐ within 500 meters – distance N/A

Municipal Landfill

☐ On the subject lands or ☐ within 500 meters – distance N/A

Sewage treatment plant or waste stabilization plant

☐ On the subject lands or ☐ within 500 meters – distance N/A

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

☐ On the subject lands or ☐ within 500 meters – distance N/A

Floodplain

☐ On the subject lands or ☐ within 500 meters – distance N/A

Rehabilitated mine site

☐ On the subject lands or ☐ within 500 meters – distance N/A

Non-operating mine site within one kilometre

☐ On the subject lands or ☐ within 500 meters – distance N/A

Active mine site within one kilometre

☐ On the subject lands or ☐ within 500 meters – distance N/A

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

☐ On the subject lands or ☐ within 500 meters – distance Comm.

Active railway line

☐ On the subject lands or ☐ within 500 meters – distance N/A

Seasonal wetness of lands

☐ On the subject lands or ☐ within 500 meters – distance N/A

Erosion

☐ On the subject lands or ☐ within 500 meters – distance N/A

Abandoned gas wells

☐ On the subject lands or ☐ within 500 meters – distance N/A

F. Servicing and Access

1. Indicate what services are available or proposed:

Water Supply

- | | |
|---|---|
| <input checked="" type="checkbox"/> Municipal piped water | <input type="checkbox"/> Communal wells |
| <input type="checkbox"/> Individual wells | <input type="checkbox"/> Other (describe below) |
-

Sewage Treatment

- | | |
|---|---|
| <input checked="" type="checkbox"/> Municipal sewers | <input type="checkbox"/> Communal system |
| <input type="checkbox"/> Septic tank and tile bed in good working order | <input type="checkbox"/> Other (describe below) |
-

Storm Drainage

- | | |
|--|---------------------------------------|
| <input checked="" type="checkbox"/> Storm sewers | <input type="checkbox"/> Open ditches |
| <input type="checkbox"/> Other (describe below) | |
-

2. Existing or proposed access to subject lands:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Municipal road | <input type="checkbox"/> Provincial highway |
| <input type="checkbox"/> Unopened road | <input type="checkbox"/> Other (describe below) |

Name of road/street: _____

G. Other Information

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

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

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

H. Supporting Material to be submitted by Applicant

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

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

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

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

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

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

Site Plan applications will require the following supporting materials:

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

Standard condominium exemptions will require the following supporting materials:

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

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

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

I. Development Agreements

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

J. Transfers, Easements and Postponement of Interest

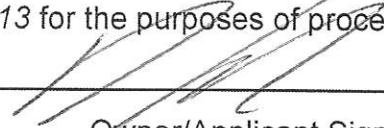
The owner acknowledges and agrees that if required it is their solicitor's responsibility on behalf of the owner for the registration of all transfer(s) of land to the County, and/or transfer(s) of easement in favour of the County and/or utilities. Also, the owner further acknowledges and agrees that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

K. Permission to Enter Subject Lands

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

L. Freedom of Information

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



Owner/Applicant Signature

2023/05/16

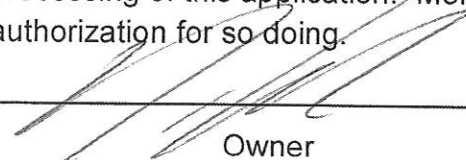
Date

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 Darrin Knill am/are the registered owner(s) of the lands that is the subject of this application.

I/We authorize Cynthia Zahoruk Architects 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

2023/05/16

Date

Owner

Date

N. Declaration

I, Cynthia Zahoruk of City of Burlington

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*.

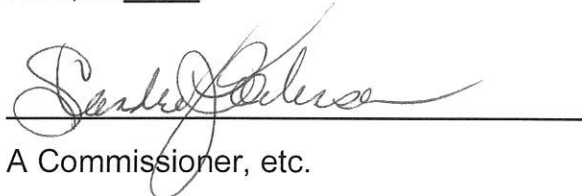
Declared before me at:

THE CITY OF BURLINGTON
IN THE REGIONAL MUNICIPALITY
OF HALTON
In PROVINCE OF ONTARIO

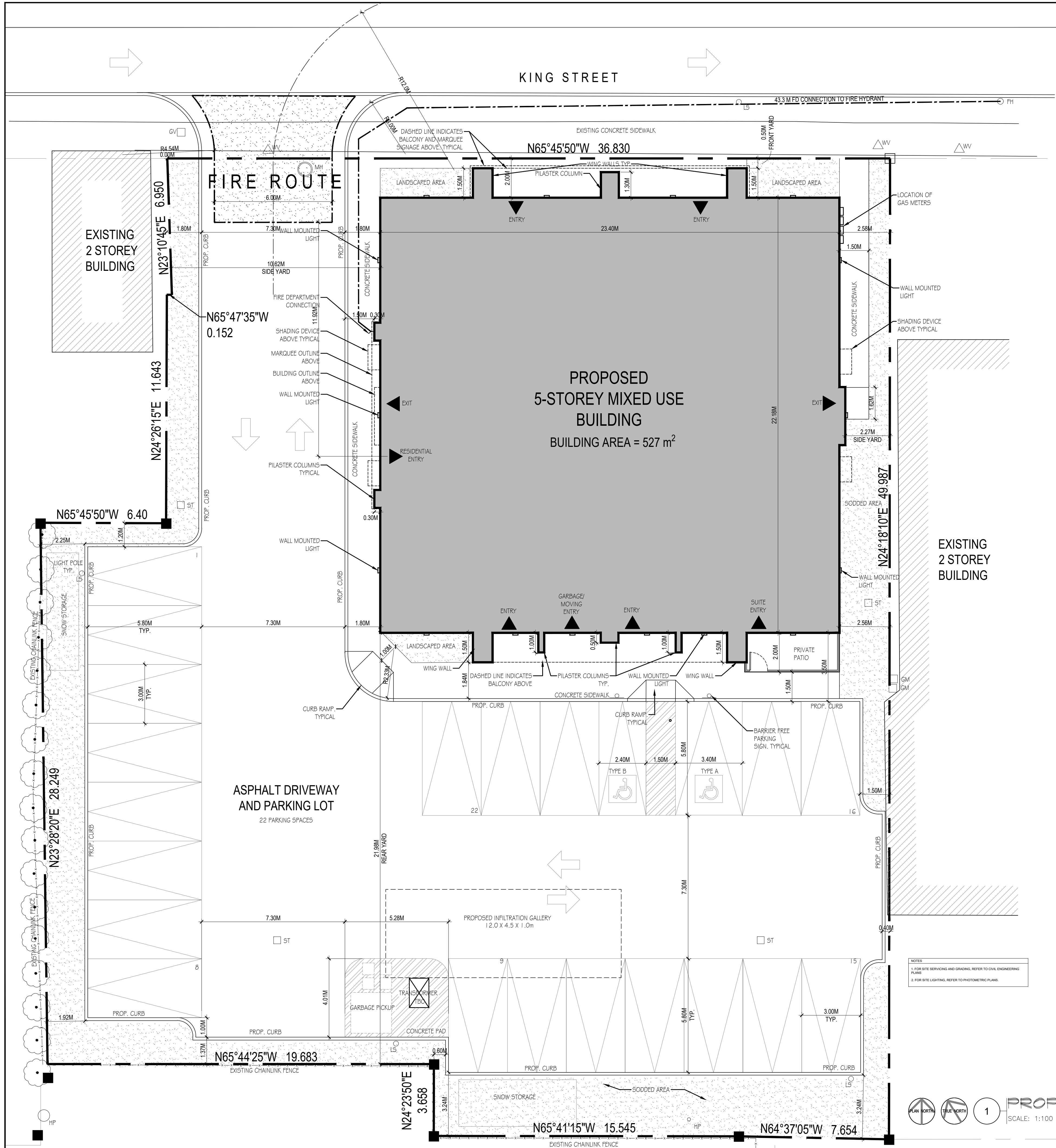

Owner/Applicant Signature

This 17 day of MAY

A.D., 2023


A Commissioner, etc.

SANDRA JOY TOMLINSON
a Commissioner, etc.
Province of Ontario
for Harry W. Zahoruk
Barrister & Solicitor
Expires January 5, 2024



GENERAL NOTES

1. CONTRACTOR OR OWNER ACTING AS GENERAL CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL DIMENSIONS ON SITE PRIOR TO PROCEEDING WITH ANY WORK AND REPORT ANY DISCREPANCIES TO THE ARCHITECT. ARCHITECT IS NOT RESPONSIBLE FOR ANY CHANGES TO THE PROJECT, IN LAYOUT OR MATERIALS UNLESS APPROVED BY THE ARCHITECT PRIOR TO THE CHANGE.

2. CONTRACTOR TO OBTAIN WORKER'S COMPENSATION INSURANCE AND REGISTER "NOTICE OF PROJECT" WITH WSIB IN ACCORDANCE WITH LEGISLATION PROVIDE ALL NECESSARY HEALTH AND SAFETY DEVICES AND BARRIERS.

3. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS AND INSPECTIONS AS REQUIRED BY CURRENT LEGISLATION.

4. LINEAR DIMENSIONS INDICATING NEW CONSTRUCTION ARE TO FACE OF THE STUD. ALL EXISTING DIMENSIONS PROVIDED ARE TO BE USED AS REFERENCE ONLY.

5. ALL CONSTRUCTION TO BE CARRIED OUT IN ACCORDANCE WITH THE ONTARIO BUILDING CODE 2012 EDITION AND APPLICABLE BYLAWS AND LEGISLATION FOR THE MUNICIPALITY AND PROVINCE.

7. THICKNESS OF CONCRETE BLOCK WALLS SHALL BE AS NOTED ON DRAWINGS. HEIGHTS OF THESE WALLS TO BE US OF ROOF/FLOOR DECK ABOVE. (UNLESS NOTED OTHERWISE) ALL BLOCK WALLS TO HAVE SOLID TOP COURSE AND ARE TO BE Laterally SUPPORTED AT ALL CHASES.

8. WHERE SOUND ATTENUATION BLANKET IS SPECIFIED, APPLY ACOUSTICAL SEALANT TO PARTITION PERIMETER ON BOTH SIDES, TOP & BOTTOM.

DWG/DETAIL REFERENCE	IDENTIFICATION REFERENCE
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DEVELOPMENT STATISTICS				May 05, 2023
Municipal Address	78 King St., Delhi			
Legal Description	Part of Lots 2 & 3 - Block 16 - Registered Plan 189 - Town of Delhi			
Existing Zoning	CBD - Central Business District			
Existing Use	Commercial			
Proposed Use	Mixed Use Building (Residential Apartments and Commercial Units)			
ZONING REGULATIONS	CBD	Proposed	Compliance	✓ or ✗
Site Data				
Lot Area	N/A	1,957 m ²	✓	
Lot Coverage	80% max.	27 %	✓	
Yards & Setbacks				
Front Yard (North)	0.0 m min., 3.0 m max.	0.5 m	✓	
Interior Side Yard (East)	1.2 m min. if abutting residential zone (N/A)	2.27 m	✓	
Interior Side Yard (West)	0.0 m min., 1.2 m min. if abutting residential zone (N/A)	10.62 m	✓	
Rear Yard (South)	0.0 m 6.0 m if abutting residential zone (N/A)	21.98 m	✓	
Building Size & Use				
Height	6 Storeys max.	5 Storeys	✓	
Location of First Storey	Any dwelling units shall not occupy more than 50 percent of the usable floor area of the first storey.	Residential units at Ground floor occupy 15.5 % of the usable floor area.	✓	
Use of First Storey	Frontage of first storey shall be dedicated to retail, office or service uses.	Frontage of first storey is dedicated to Retail/Office use.	✓	
Encroachments into Required Yards				
Balconies	1.5 m into required front, rear or exterior side yard	No encroachments	✓	
Parking				
Number of Parking Spaces	No parking spaces are required for lands identified in the CBD Zone.	22 Spaces	✓	
Barrier Free Parking	No barrier free parking spaces are required.	1 Type A space 1 Type B Space	✓	
	Type A: 3.40 m x 5.80 m Type B: 2.40 m x 5.80m Plus 1.50 m Access aisle	Type A: 3.40 m x 5.80m Type B: 2.40 m x 5.80m Plus 1.50 m Access aisle	✓	
Location of parking on a lot	For apartment dwelling, no parking lot shall be located closer than 3.00 m from any dwelling on the lot	3.50 m between parking lot and BF dwelling unit on ground floor	✓	
Floor Area				
Ground Floor		527		
Second Floor		527		
Third Floor		527		
Fourth Floor		527		
Fifth Floor		527		
Total		2,635		
Number of Residential Units				
First Floor		1 Barrier free Unit		
DEVELOPMENT STATISTICS				May 05, 2023
Municipal Address	78 King St., Delhi			
Legal Description	Part of Lots 2 & 3 - Block 16 - Registered Plan 189 - Town of Delhi			
Existing Zoning	CBD - Central Business District			
Existing Use	Commercial			
Proposed Use	Mixed Use Building (Residential Apartments and Commercial Units)			
ZONING REGULATIONS	CBD	Proposed	Compliance	✓ or ✗
Second Floor		6 Units		
Third Floor		6 Units		
Fourth Floor		5 Units		
Fifth Floor		5 Units		
Total		23 Units		



CYNTHIA ZAHORUK ARCHITECTS
3077 NEW STREET
BURLINGTON, ON L7M 1M6
905.331.4480

ONTARIO ASSOCIATION OF ARCHITECTS

CYNTHIA ZAHORUK
LICENCE 4488

ONTARIO ASSOCIATION OF ARCHITECTS

DDMMYY	#	REVISION
17/10/2022		ISSUED FOR PRE-CONSULTATION MTG.
16/05/2023		ISSUED FOR SPA

SCALE:	AS NOTED
DRAWN BY:	KR
PRINT DATE:	16/05/2023

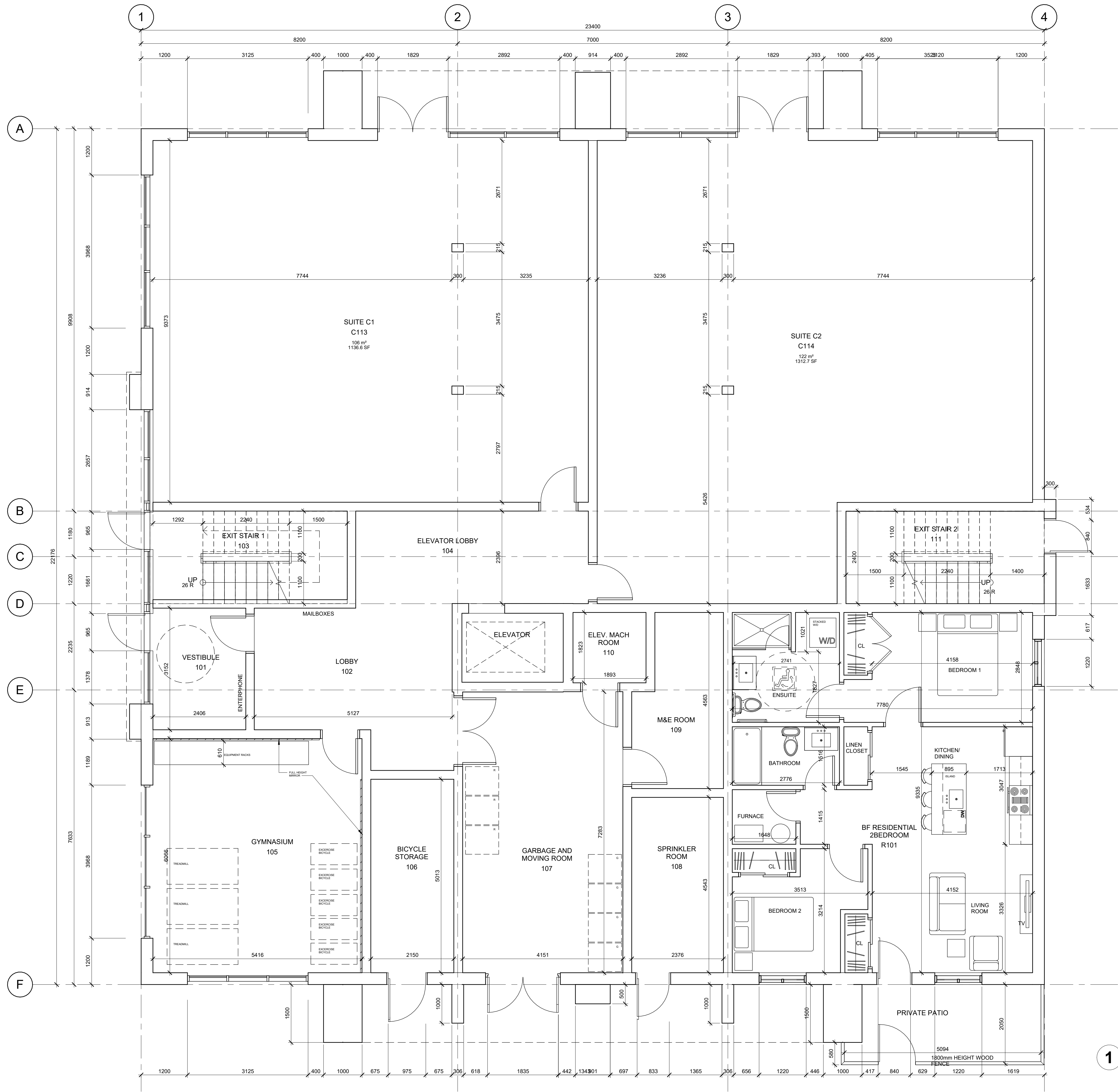
NEW MIXED USE BUILDING

RESIDENTIAL AND COMMERCIAL

78 KING STREET
DELHI, ONTARIO N4B 1X6

PROPOSED SITE PLAN

A 0.1



GENERAL NOTES:	
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7. WHERE SOUND ATTENUATION BLANKET IS SPECIFIED, APPLY ACOUSTICAL SEALANT TO PARTITION PERIMETER ON BOTH SIDES, TOP & BOTTOM.	
8. CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR CONSULTANTS REVIEW PRIOR TO MANUFACTURING FOR ELEVATORS, RAILING, STAIRS, DOORS, WINDOWS, AND ALL OTHER ITEMS AS LISTED ON STRUCTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS.	
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	A REVISION NUMBER
	xxx ROOM NUMBER
ELEVATION REFERENCE	INTERCONNECTED SMOKE & CO ALARM
DWG. REF. No.	INTERCONNECTED SMOKE & CO ALARM
DWG. ON PAGE	

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CYNTHIA ZAHORUK ARCHITECTS

3077 NEW STREET, BURLINGTON, ON L7N1M6 905.331.4480



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78 KING
MIXED USE BUILDING
78 KING STREET
DELHI, ONTARIO

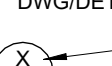








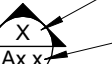

FIRST FLOOR PLAN

A1.1

1 FIRST FLOOR
1:50



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BURLINGTON, ON L7N1M6
905.331.4480



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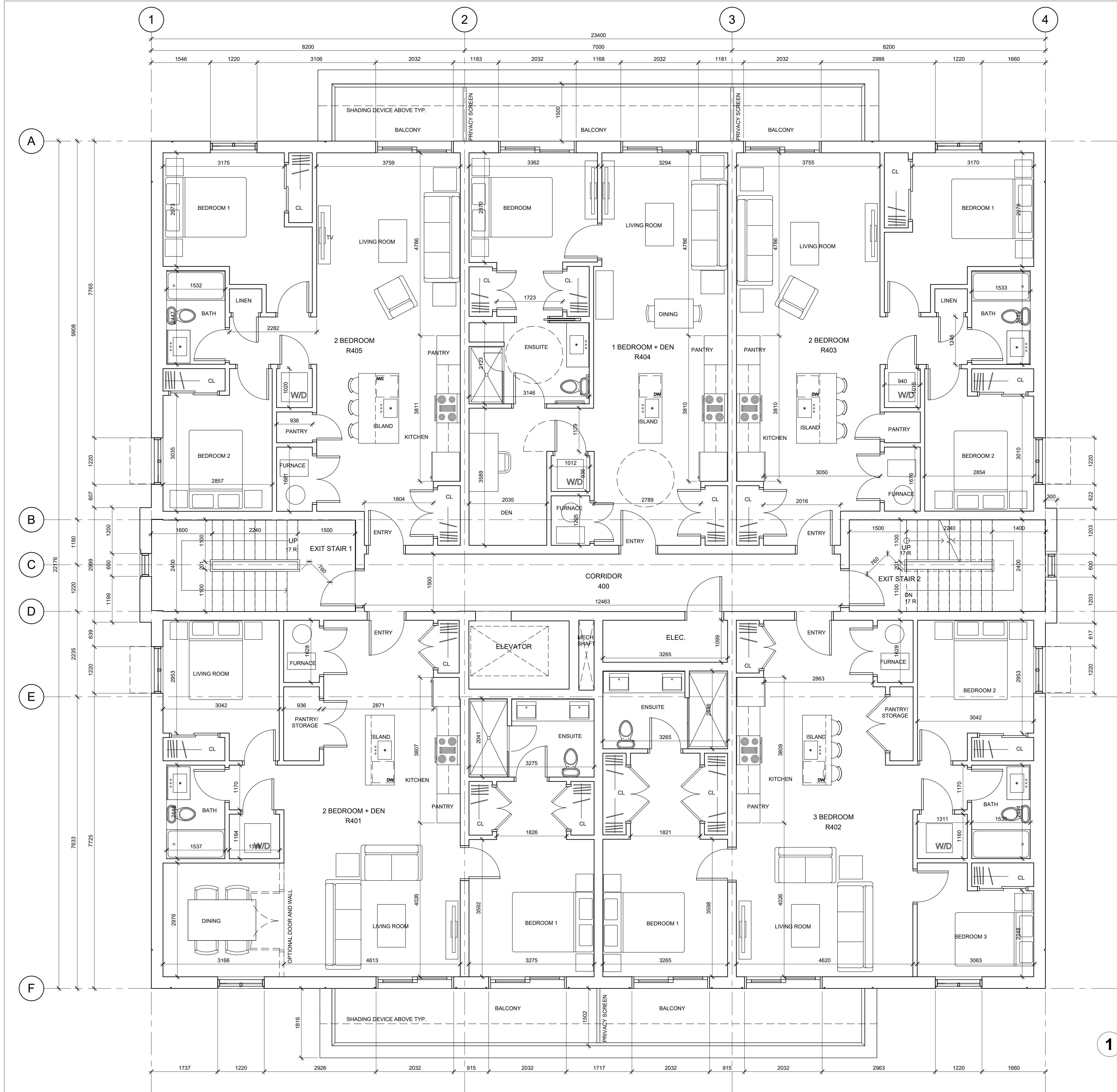
78 KING
MIXED USE BUILDING
78 KING STREET
DELHI, ONTARIO

SECOND/ THIRD
FLOOR PLAN

A1.2



A1.3



FIFTH FLOOR
1 : 50

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DWG. ON PAGE	

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BURLINGTON, ON L7N1M6
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DELHI, ONTARIO

FIFTH FLOOR PLAN

A1.4



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<p>ELEVATION REFERENCE</p> <p>DWG. REF. No.</p> <p>DWG. ON PAGE</p>	<p> INTERCONNECTED SMOKE & CO ALARM</p>

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BURLINGTON, ON L7N1M6
905.331.4480



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78 KING
MIXED USE BUILDING
78 KING STREET
DELHI, ONTARIO

ROOF PLAN

A1.5

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**CYNTHIA
ZAHORUK
ARCHITECTS**

3077 NEW STREET,
BURLINGTON, ON L7N1M6
905.331.4480



ONTARIO ASSOCIATION
OF ARCHITECTS

CYNTHIA ZAHORUK
LICENCE
4488
ONTARIO ASSOCIATION
OF ARCHITECTS

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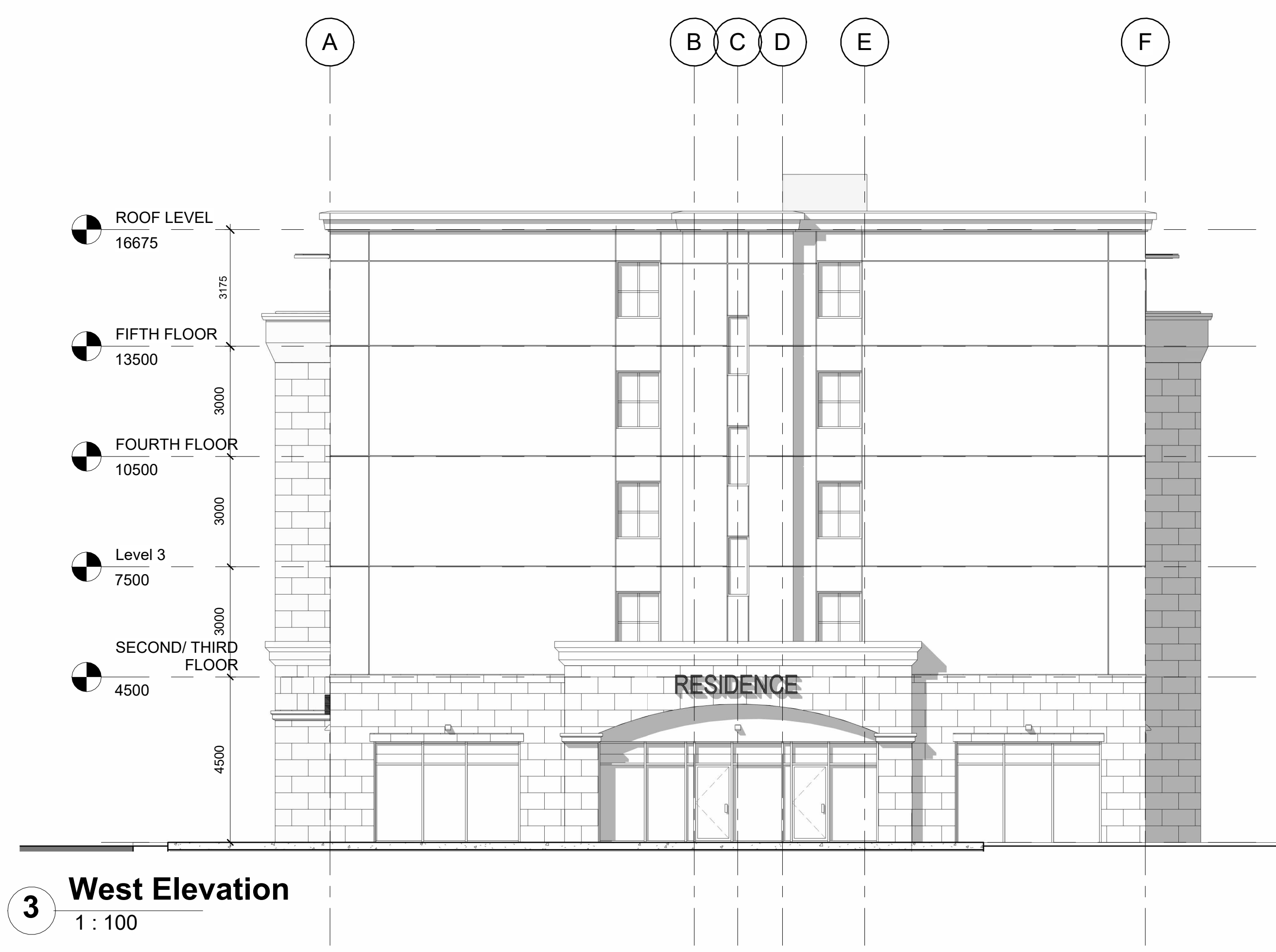
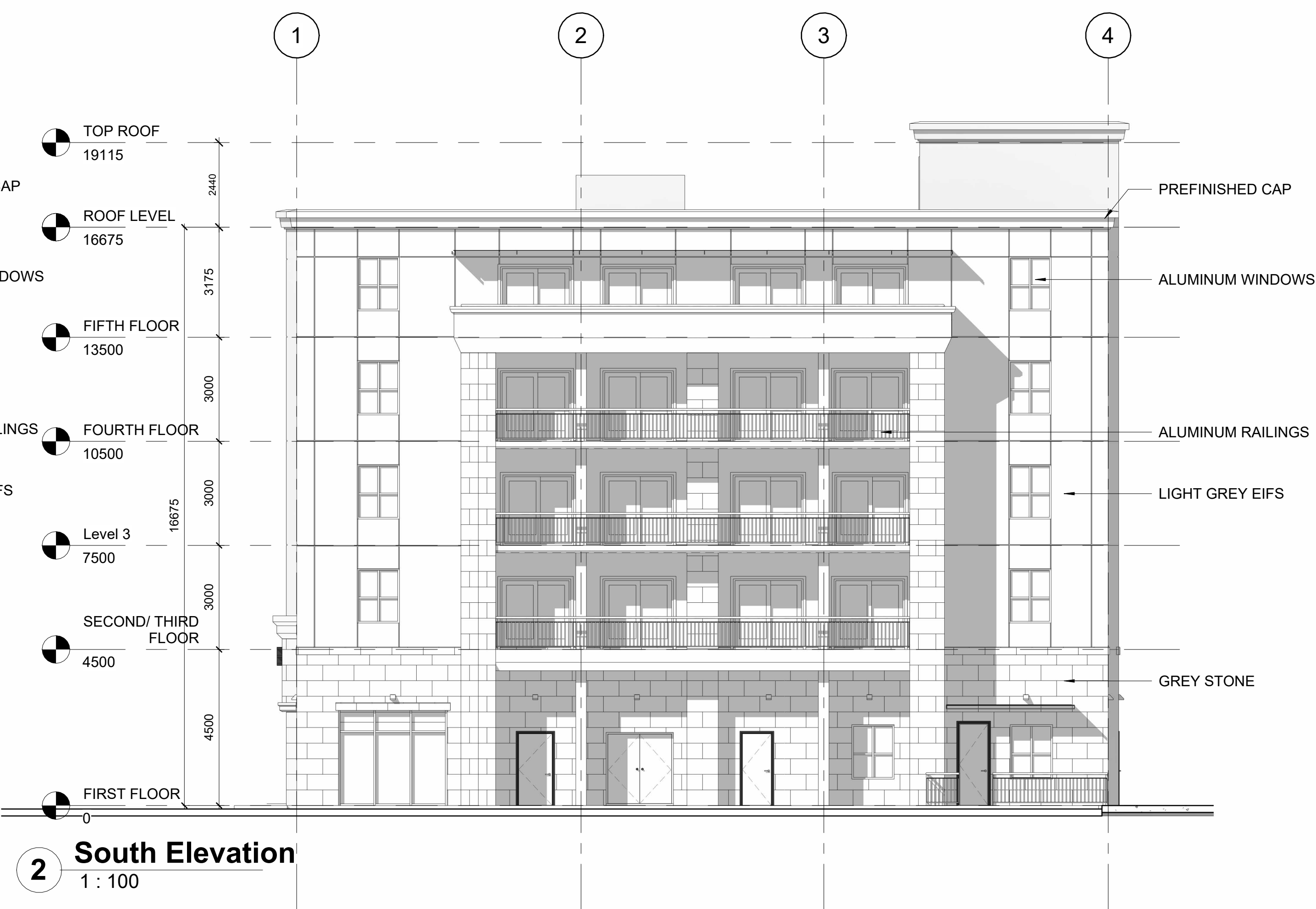
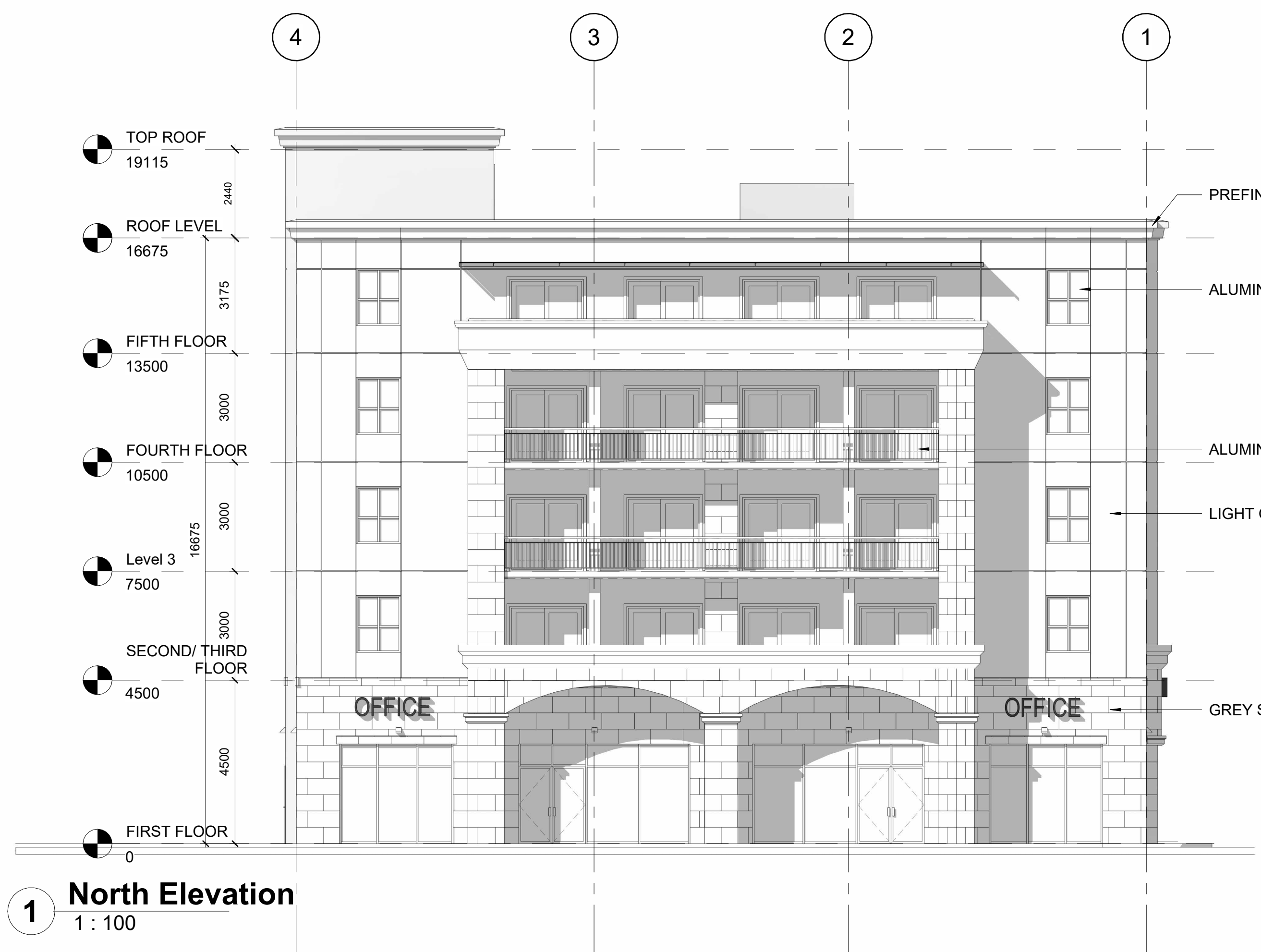
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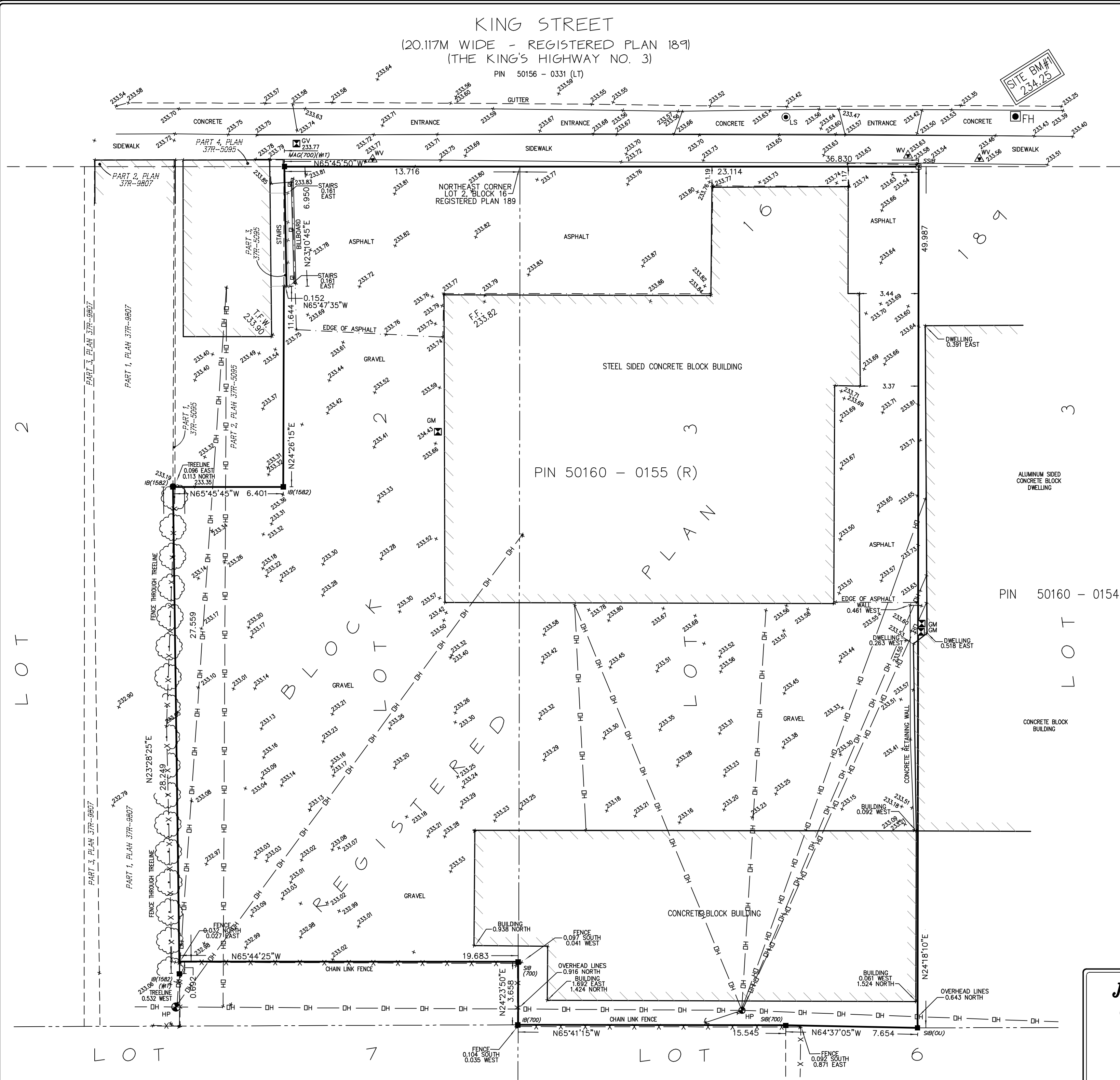
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DELHI, ONTARIO

ELEVATIONS

A2.1

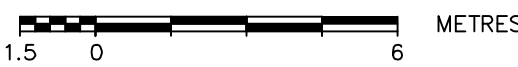




TOPOGRAPHIC SITE PLAN
OF PART OF
LOTS 2 and 3
BLOCK 16
REGISTERED PLAN 189
(TOWN OF DELHI)
IN
NORFOLK COUNTY

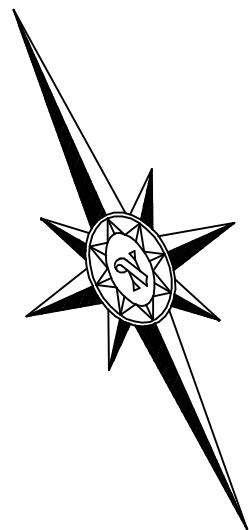
PIN 50160-0155 (R)

SCALE: 1 : 150



JEWITT AND DIXON LTD.

SITE B.M.#1
TOP OF MAIN OUTLET
OF FIRE HYDRANT
ELEV = 234.25
(GEODETIC)



MAY 26, 2022

Kim Husted
KIM HUSTED, O.L.S.
THIS COPY IS NOT VALID UNLESS
EMBOSSD WITH THE SURVEYOR'S SEAL.

LEGEND

LIGHT STANDARD	SHOWN	LS	●
FINISHED FLOOR	SHOWN	F.F.	—
TOP OF FOUNDATION WALL	SHOWN	T.F.W.	—
OVERHEAD WIRES	SHOWN	—OH—	—
WATER VALVE	SHOWN	WV	⊕
HYDRO POLE	SHOWN	HP	⊕
GAS METER/GAS VALVE	SHOWN	GM/GV	⊕
FIRE HYDRANT	SHOWN	FH	⊕

ELEVATIONS SHOWN HEREON ARE IN METRES AND
ARE REFERRED TO CGVD 1928 VERTICAL DATUM

METRIC NOTE:

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

NOTE:

THE VARIOUS UTILITY LOCATIONS SHOWN ON THIS PLAN ARE
BASED ON PHYSICAL LOCATES.

PRIOR TO ANY ON SITE CONSTRUCTION ACTIVITY A VERIFICATION
LOCATE IS BOTH RECOMMENDED AND ADVISED.

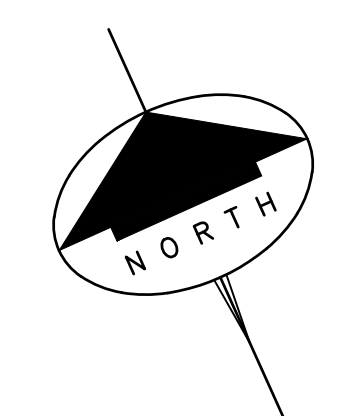
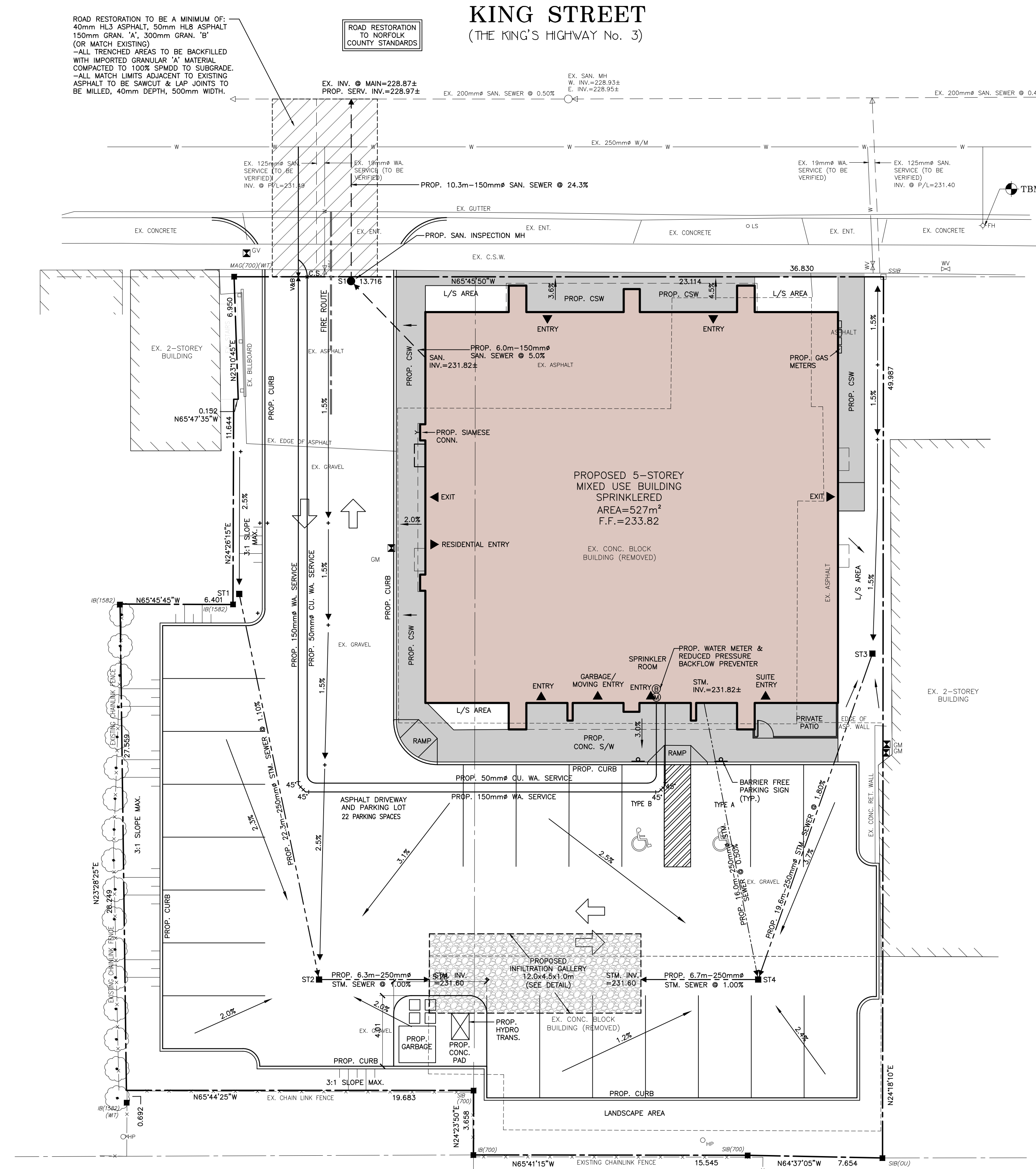
JEWITT AND DIXON LTD.
ONTARIO LAND SURVEYORS

R.R.1, SIMCOE, ONTARIO, N3Y 4J9
(51 PARK ROAD)

PHONE: (519) 426-0842
E-mail: info@jewittdixon.com

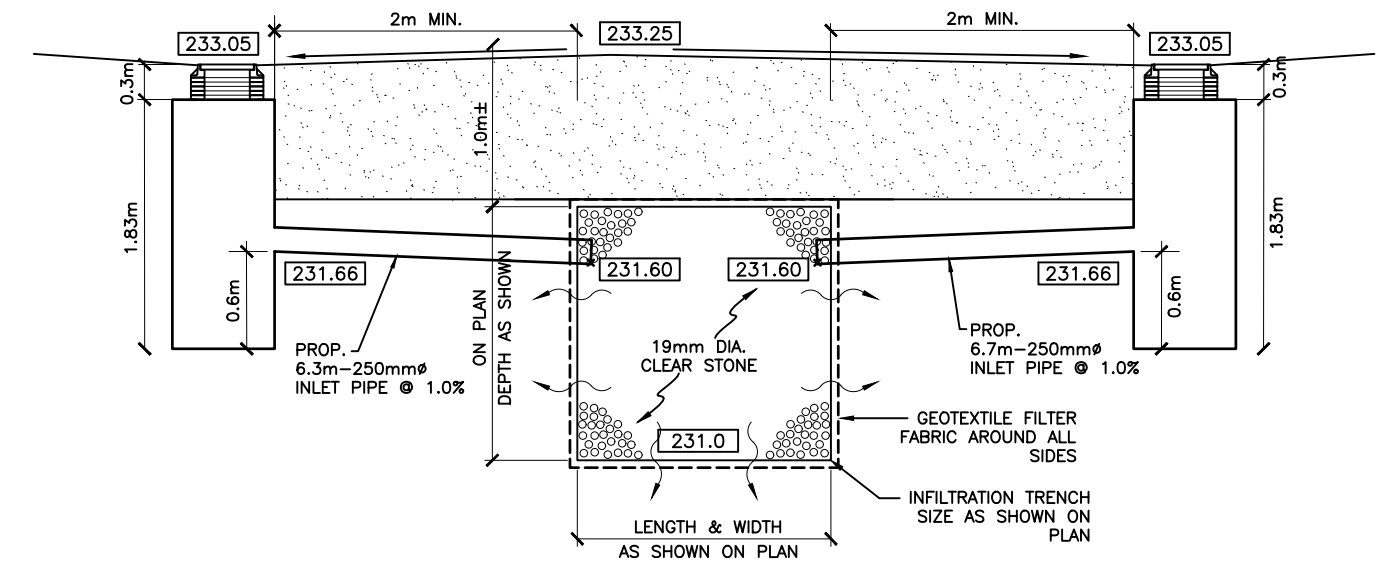
F.W.	—	J.P.H.
BOOK	—	LL
CALC.	—	J.L.M.
PLAN	—	J.L.M.
CHECK	—	K.H.
CLIENT	—	KNILL
PROJECT No.	—	22-3363

22-3363-TOPO



SANITARY SYSTEM			
MH No.	DESCRIPTION	T/G	INVERTS
S1	1.2mø P/C MH	233.75	N 231.47 SE 231.52

STORM SYSTEM			
MH No.	DESCRIPTION	T/G	INVERTS
ST1	0.6x0.6x1.52m P/C CB	233.30	S 231.93
ST2	0.6x0.6x1.52m P/C CB	233.05	N 231.68 E 231.66
ST3	0.6x0.6x1.52m P/C CB	233.40	S 232.03
ST4	0.6x0.6x1.52m P/C CB	233.05	N 231.68 W 231.66 NW 231.74



INFILTRATION GALLERY DETAIL
N.T.S.

WATERMAINS:

- WATERMAINS AND RELATED APPURTENANCES SHALL BE DESIGNED AND CONSTRUCTED SO AS TO COMPLY WITH APPLICABLE LAW, TO BE CONSISTENT WITH THE COUNTY OF NORFOLK DEVELOPMENT AND ENGINEERING STANDARDS AND IN ACCORDANCE WITH CURRENT GUIDELINES, CODES, REGULATIONS, BEST PRACTICES AND STANDARDS PRESCRIBED BY THE COUNTY.
- WATERMAINS TO BE INSTALLED WITH A MINIMUM DEPTH OF COVER OF 1.70m BELOW FINISHED GRADE.
- WATERMAINS TO BE INSTALLED IN ACCORDANCE WITH OPSD 802.010 TYPE 2. TRENCH BEDDING TO BE GRANULAR 'A' UNLESS OTHERWISE NOTED.
- WATERMAINS TO BE PVC DR-18 IN ACCORDANCE WITH AWWA C300 & CSA B137.3. THE PIPE SHALL BE SHIPPED TO THE SITE WITH THE ENDS FACTORY CAPPED.
- FOR PVC WATERMAIN DEFLECTION:
 - MAXIMUM ALLOWABLE DEFLECTION OF 1 DEGREE PER JOINT SHALL NOT BE EXCEEDED.
 - EACH JOINT SHALL BE DEFLECTED AN EQUAL AMOUNT.
- ALL WATER MAINS TO BE SWABBED, TESTED, DISINFECTED AND FLUSHED UNDER THE SUPERVISION OF THE ENGINEER TO THE SATISFACTION OF THE COUNTY OF NORFOLK PRIOR TO CONNECTION TO THE EXISTING MUNICIPAL SYSTEM. REFER TO OPSD 701.07.25, AWWA C651 & COUNTY OF NORFOLK GENERAL WATERMAIN DISINFECTION PROCEDURES.
- A REDUCED PRESSURE DOUBLE BACKFLOW PREVENTER IS REQUIRED ON THE TEMPORARY SUPPLY LINES USED FOR FILLING AND FLUSHING/SWABBING OF WATERMAINS AND TO BE TESTED AND CERTIFIED ON SITE.
- UPON COMPLETION OF INSTALLATION, THE CONTRACTOR SHALL PERFORM A PRESSURE TEST ON THE WATERMAINS AS PER OPSD 701.07.24 AND COUNTY OF NORFOLK SPECIFICATIONS. WATERMAIN IS TO BE TESTED UNDER THE SUPERVISION OF THE ENGINEER PRIOR TO CONNECTION TO EXISTING WATERMAINS USING TEMPORARY CAPS OR PLUGS.
- PIPE CLOSURES WHERE REQUIRED, ARE TO BE SUPPLIED BY THE CONTRACTOR. THE CONTRACTOR SHALL ALSO SUPPLY AND INSTALL ALL ADAPTOR PIECES IN ORDER TO CONNECT EXISTING WATERMAINS.
- ALL WATER SERVICE CONNECTIONS 19mm DIA. ASTM B88 TYPE 'K' SOFT COPPER AS PER OPSD 1104.01 & COUNTY OF NORFOLK ENGINEERING STANDARDS, WITH SAND BEDDING.
- WATER SERVICES TO BE LOCATED AS PER TYPICAL SERVICING DETAIL ON THIS SHEET AND CURB STOPS TO BE MUELLER A-726 OR EQUIVALENT APPROVED BY THE COUNTY OF NORFOLK.
- 3-WAY HYDRANTS TO BE INSTALLED AS PER OPSD 1105.01 (SHALL OPEN LEFT - COUNTER CLOCKWISE) & PAINTED RED. HYDRANTS TO BE CANADA VALVE CENTURY HYDRANT OR EQUIVALENT APPROVED BY THE COUNTY OF NORFOLK.
- ALL WATERMAIN VALVES, BENDS AND FITTINGS TO HAVE MECHANICAL JOINTS.
- CATHODIC PROTECTION TO BE PROVIDED AT ALL VALVES, BENDS AND FITTINGS WITH 11.0 KG ZINC ANODES AND ON ALL WATER SERVICE CONNECTIONS WITH 5.5 KG ZINC ANODES.
- SHOULD AIR IN THE WATERMAIN BE DEMONSTRATED TO BE A PROBLEM, THE CONTRACTOR WILL BE REQUIRED TO INSTALL AN AIR RELIEF VALVE(S) TO THE SATISFACTION OF THE COUNTY OF NORFOLK.
- THE APPLICANT AND/OR CONTRACTOR MUST SUBMIT A DETAILED DISINFECTION AND COMMISSIONING PLAN TO THE COUNTY OF NORFOLK PUBLIC WORKS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
- NO WORK ON WATER SERVICES CAN TAKE PLACE WITHOUT SUPERVISION OF A LICENSED NORFOLK COUNTY WATER OPERATOR ON-SITE.

SANITARY & STORM SEWERS:

- SANITARY & STORM SEWERS & RELATED APPURTENANCES SHALL BE DESIGNED AND CONSTRUCTED SO AS TO COMPLY WITH APPLICABLE LAW, TO BE CONSISTENT WITH THE COUNTY OF NORFOLK DEVELOPMENT AND ENGINEERING STANDARDS AND IN ACCORDANCE WITH CURRENT GUIDELINES, CODES, REGULATIONS, BEST PRACTICES AND STANDARDS PRESCRIBED BY THE COUNTY.
- COVER AND BEDDING MATERIAL FOR CONCRETE PIPE AS PER OPSD 802.030 CLASS 'B' BEDDING SHALL BE GRANULAR 'A' MATERIAL UNLESS OTHERWISE INDICATED.
- COVER AND BEDDING MATERIAL FOR PVC PIPE AS PER OPSD 802.010 TYPE 2 TRENCH BEDDING SHALL BE GRANULAR 'A' MATERIAL UNLESS OTHERWISE INDICATED.
- PVC PIPE WILL REQUIRE SPECIAL CONSTRUCTION PROCEDURES FOR LEAKAGE AND TESTING, PIPE DEFLECTION, ETC.
- ALTERNATE MATERIALS MAY BE ACCEPTABLE, PROVIDED APPROVAL HAS FIRST BEEN OBTAINED FROM THE COUNTY OF NORFOLK AND ENGINEER IN WRITING.
- ALL STORM MANHOLES AND CATCHBASINS TO BE PRECAST CONCRETE STRUCTURES MANUFACTURED IN THE QUALIFIED PLANTS IN ACCORDANCE WITH THE LATEST APPLICABLE ONTARIO PROVINCIAL STANDARD (OPS) DRAWINGS AND SPECIFICATIONS.
- ALL SEWER INSTALLATIONS TO CONFORM WITH OPSD 802.031 TYPE 3 SOIL.
- ALL MANHOLE FRAMES AND COVERS TO CONFORM WITH OPSD 401.010 TYPE 'A' CLOSED COVER.
- MANHOLES SHALL BE SUPPLIED TO THE SITE PRE-BENCHED UNLESS OTHERWISE NOTED.
- PRIVATE SANITARY & STORM DRAINS TO BE LOCATED AS PER THE TYPICAL LOT SERVICING DETAIL THIS SHEET.
- PRIVATE SANITARY DRAINS TO 125mmø PVC DR28 PIPE.
- A 38x89mm x 2.0m LONG MARKER IS TO BE PLACED FROM THE CAPPED LATERAL AND EXTEND 1.0m ABOVE GROUND AND PAINTED GREEN FOR SANITARY AND WHITE FOR STORM.
- BEDDING FOR PRIVATE SANITARY & STORM DRAINS AS PER OPSD 1006.010 TYPE 2 TRENCH WITH GRANULAR 'A' BEDDING AND COVER MATERIAL.
- MINIMUM FALL FOR PRIVATE SANITARY & STORM DRAINS TO BE 2.0%
- INFILTRATION GALLERIES/PROPOSED DRYWELLS ARE NOT THE RESPONSIBILITY OF NORFOLK COUNTY.
- ALL APPLICABLE PERMITS ARE TO BE APPLIED FOR PRIOR TO THE INSTALLATION OF ANY SERVICES.
- ALL ON-SITE STORM SEWERS TO BE REMOVED OR FILLED WITH GROUT.
- ALL SANITARY SEWER LATERAL CONNECTIONS SHALL BE INSTALLED USING PREFABRICATED TEES. THE USE OF SERVICE SADDLES MUST BE APPROVED BY NORFOLK COUNTY ENVIRONMENTAL SERVICES DIVISION. ALL CONNECTIONS SHALL CONFORM TO CURRENT OPSD 1006.010 AND OPSD 410.
- NO DEFLECTIONS OF SANITARY LATERALS ALLOWED FROM MAIN TO PROPERTY LINE. NEW CONNECTIONS MUST BE 3.0m FROM PROPERTY LINE. BARS OR AS APPROVED BY THE MANAGER OF ENVIRONMENTAL SERVICES. AFTER THE PROPERTY LINE ONLY 22.5° FITTINGS ARE ALLOWED OR 1.2m, 45° SWEEPS. CLEANOUTS ARE REQUIRED EVERY 30.5m AND PRIVATE MANHOLES EVERY 91.3m.
- SPATIAL SEPARATION FROM WATER SERVICE CONNECTIONS OF NOT LESS THAN 2.44m MEASURED HORIZONTALLY FROM UNDISTURBED OR COMPACTED EARTH OR AS APPROVED BY THE MANAGER OF ENVIRONMENTAL SERVICES.

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

LEGEND:

- S1 EXISTING SANITARY MANHOLE
- ST1 EXISTING STORM MANHOLE
- CB EXISTING CATCHBASIN
- DCB EXISTING DOUBLE CATCHBASIN
- DCB EXISTING DITCH INLET CATCHBASIN
- ◆ FH EXISTING FIRE HYDRANT
- ◆ V&B EXISTING VALVE & BOX
- ◆ WB EXISTING WATER BOX
- LS EXISTING LIGHT STANDARD
- S1 PROPOSED SANITARY MANHOLE
- PROPOSED SANITARY SERVICE
- PROPOSED STORM SERVICE
- ST1 PROPOSED STORM MANHOLE
- ST1 PROPOSED CATCHBASIN MANHOLE
- CB PROPOSED CATCHBASIN
- ◆ V&B PROPOSED VALVE & BOX
- CS PROPOSED WATER SERVICE & CURBSTOP

NOTES:

- ALL ELEVATIONS SHOWN ARE METRIC.
- BUILDER/OWNER TO VERIFY COMPLIANCE WITH ZONING BYLAWS (i.e. SIDEYARDS, SETBACKS, REARYARDS ETC.)
- BOUNDARY AND TOPOGRAPHIC SURVEY PROVIDED BY JEWITT AND DIXON SURVEYING (PROJECT 22-3363 DATED MAY 26, 2022)

T.B.M. No. 1 ELEV. = 234.25m (GEO)
TOP OF MAIN OUTLET OF FIRE HYDRANT AS SHOWN (TO BE VERIFIED).

NO.	REVISION	DATE (MM/DD/YY)	BY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS

440 HARDY ROAD, UNIT #1, BRANTFORD - ONTARIO, N3T 5L8
TEL. (519) 753-2656 FAX. (519) 753-4263 www.cohooneg.com

PROJECT:

PROPOSED MIXED USE BUILDING
LOTS 2 & 3, BLOCK 16
R-PLAN 189
78 KING STREET, DELHI
NORFOLK COUNTY

CLIENT:

SENTRY GROUP

SERVICING PLAN

DESIGN:	R.W.P.	SCALE:	1:150
DRAWN:	S.L.M./K.P.B.	JOB No:	16025
CHECKED:	R.W.P.	DWG. No:	16025-2
SHEET:	2 of 2		
DATE:	APR. 20/23		

FUNCTIONAL SERVICING REPORT
PROPOSED MIXED USE DEVELOPMENT
MN 78 King Street
Delhi, Ontario
Norfolk County

Prepared By:

J.H. Cohoon Engineering Limited
440 Hardy Road, Unit 1
Brantford, Ontario
N3T 5L8
Phone (519) 753-2656
Fax (519) 753-4263

Job: 16025

May 2023

INTRODUCTION

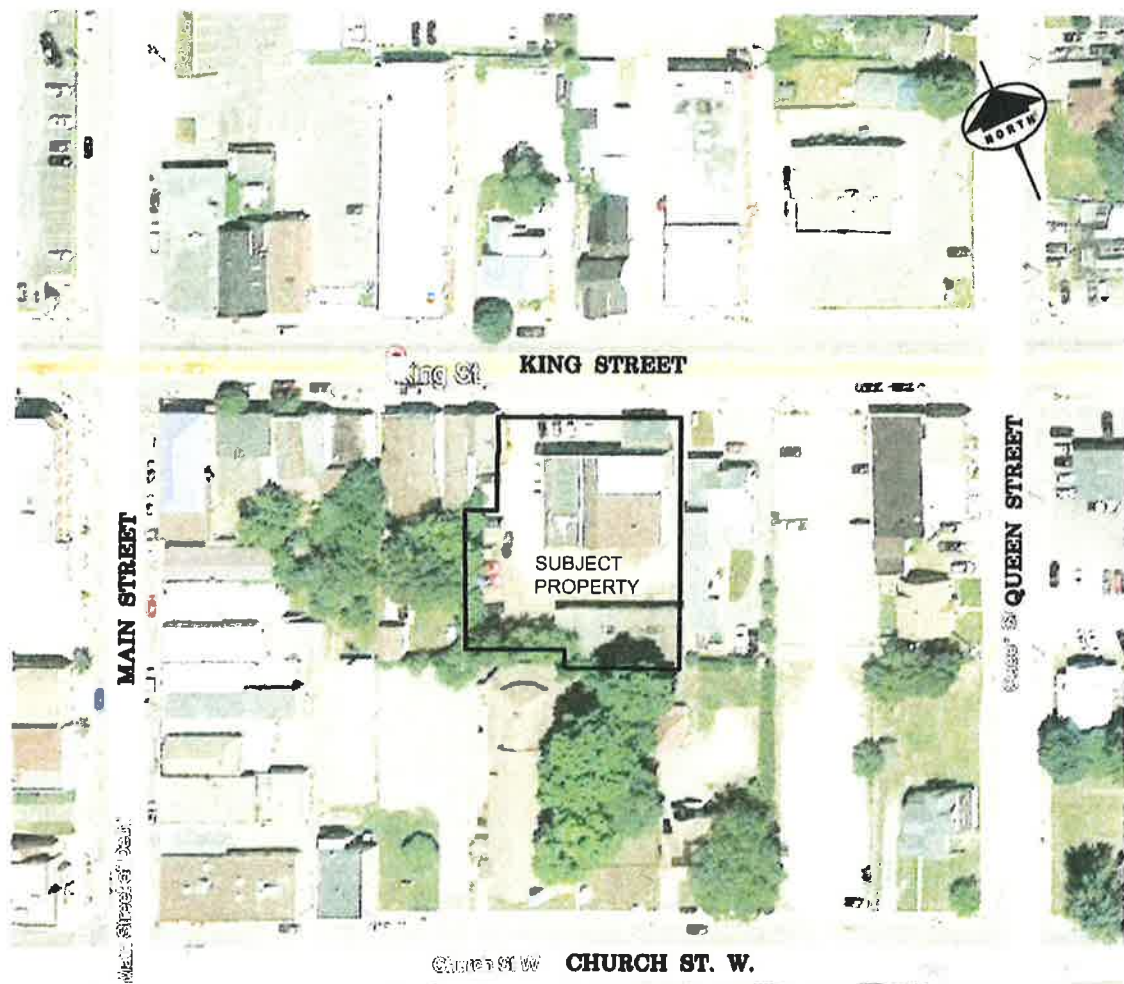
The following Functional Servicing Report was prepared by J.H. Cohoon Engineering Limited for Mr. D. Knill of Sentry Property Group (Brantford, Ontario) in support of a proposed mixed-use commercial \ residential development of the site on the southwest side of King Street in the Town of Delhi, in Norfolk County. The site is located at MN 78 King Street in Delhi, Ontario. The proposal is to construct a 527 +/- sq.m., five (5) storey development consisting of 527 sq.m. of commercial space (broken into two units) on the main level of the building and four (4) storeys of residential apartments consisting of twenty-three (23) units. (Note: one barrier free unit is located at the rear of the building on the main floor). The proposal includes the provision of some off-street parking on the property to be located at the rear of the building. The entire property is some 0.195 ha. in size. The preliminary layout of the development is illustrated within Appendix 'A' of this report on drawings prepared by J H Cohoon Engineering Limited being drawing 16025-1 (which illustrates the proposed grading and servicing of this site).

The objective of this report is to document the servicing strategy to be utilized for the site. The property is currently serviced with all municipal services including sanitary and water services. The owner will assume full responsibility for the installation and maintenance of the services on the property and any associated upgrades.

PROPOSED DEVELOPMENT CONCEPT

As noted above, the proposed development is to be constructed on the on the subject lands which is located on the southwest side of King Street h side of Wellington Avenue in downtown Delhi, Ontario in Norfolk County. The site is located east of Main Street and west of Queen Street in the downtown core. The site proposed for the development as a mixed-use development (commercial / residential) development is 0.195 hectares in size. A key map illustrating the site location is provided in Figure 1.

The development is intended to construct a five (5) story – twenty-three (23) unit 18-unit residential apartment style building with two (2) commercial units on the main floor including the associated servicing, and improvements to the presently developed site. The overall development is illustrated on the plans prepared by the J H Cohoon Engineering Limited being drawing 16025-1 which has been included within Appendix 'A' of this report



**Site Location – Key Plan
Figure No. 1**

SANITARY SEWERS & APPURTENANCES

3.1 Design Flows

This site is proposed to be fully connected to the municipal sanitary sewer system located on King Street adjacent to the site. The proposed development is illustrated on the attached site plan being drawing that is located within Appendix 'A' of this report (being J H Cohoon Engineering Limited 16025-1) which indicates the location of the proposed sanitary servicing into this site.

In accordance with the current Norfolk County design criteria, the design flows are being submitted to the County for the review of the conveyance systems within the Town of Delhi, Norfolk County. The following information is being provided to the Norfolk County for their use and consideration.

Sanitary Design Flows

Residential Component

23 Residential Apartment Units

2.75 people per unit

As per the requirements of the Norfolk County, the average daily flow is based upon 450 litres per person per day

$$2.75 \times 23 \times 450 = 28,462.5 \text{ liters per day}$$

$$= 0.329 \text{ liters per second}$$

Total Average Design Residential Flow

$$= 0.329 \text{ liters per second.}$$

Commercial Component

Two (2) units – Total Area = Approximately 527 sq.m. x 50% of the Mian Floor
= 263.5 sq.m. +/-

As per the requirements of the Norfolk County, the average daily flow is based upon 90 persons per hectare or in this case

$90 \times 263.5 \text{ sq.m.} / 10,000 = 2.37 \text{ persons.}$ We have estimated that the occupant load may be in the order of 5 to 7 persons

Again, utilizing the Norfolk County standards, the associated sanitary discharge is based upon 40 cu.m. / hectare / day

$$40 \times 263.5 / 10,000 = 1.054 \text{ cu.m. per day}$$

$$= 1054 \text{ litres per day}$$

$$= 0.012 \text{ litres per second.}$$

Total Average Design Commercial Flow

$$= 0.013 \text{ liters per second.}$$

Total Sanitary Effluent Flow from the development

$$= 0.341 \text{ litres per second}$$

Therefore, the total sanitary effluent from this site results in the following estimation of the sanitary flows:

Summary of Results

Average Flow Rate

Residential Component = 0.329 liters per sec

Commercial Component = 0.012 liters per sec

$$\text{Total} = 0.341 \text{ litres per sec}$$

Infiltration Allowance

$$\text{Site Area} = 0.195 \text{ hectares}$$

$$\text{Infiltration Rate} = 0.28 \text{ liters per second per hectare}$$

$$\text{Infiltration Allowance} = 0.043 \text{ liters per second}$$

Total Average Flow Rate

$$= 0.384 \text{ liters per sec}$$

On the basis of the Modified Harmon Peaking Factor, and a total population for this site being 63.25 (residential) and 2.37 (commercial), the peaking factor of 4.135 (Max 4) was applied resulting in a peak design flow for this building being 1.364 liters per second. (See peaking factor calculation below)

The peak flow was calculated as follow:

$$\text{AR} = \text{Residential Area} = 2,371.5 \text{ sq.m. (50\% residential area on main floor)}$$

$$\text{AI} = \text{Industrial Area} = 0.0$$

$$\text{AC} = \text{Commercial Area} = 263.5 \text{ sq.m.}$$

$$\text{Mav} = \text{Kav} * (1 + (14 / (4 + (P + \text{Pe}) ** 0.5)))$$

Where

$$\text{Kav} = (\text{AR} + (0.80 * ((\text{AI} + \text{AC}))) / (\text{AR} + \text{AI} + \text{AC})))$$

In this case, the Modified Harmon Peaking Factor is

$$\begin{aligned} \text{Kav} &= \\ &= (2371.5 + (0.80 * ((0.0 + 263.5))) / (2371.5 + 0.0 + 263.5)) \\ &= 0.964 \end{aligned}$$

$$\begin{aligned} \text{Mav} &= \text{Kav} * (1 + (14 / (4 + (P + \text{Pe}) ** 0.5))) \\ &= 0.964 * (1 + (14 / (4 + ((63.25 + 2.37) / 1000) ** 0.5))) \\ &= 4.135 \text{ (Max 4)} \end{aligned}$$

Therefore, the resulting flows from this development are as follows:

$$\text{Average Day Flow Route (including infiltration)} = 0.384 \text{ lps}$$

$$\text{Peak Flow Rate (including infiltration)} = 1.420 \text{ lps}$$

The proposed sanitary connection is proposed to be located into the existing sanitary main on King Street adjacent to the property.

Sanitary Outlet

The sanitary sewer system for the subject development will be connected into the existing sanitary sewer that are located on King Street in the Town of Delhi, Norfolk County. The analysis relating to the overall impact of this development on the receiving sanitary sewer system will be reviewed by the Norfolk County as part of this submission.

WATERMAINS & APPURTENANCES

Design Flows

The peak design flow rate from the proposed development using current Norfolk County Standards. As with the wastewater, the estimated average flows have been detailed with the Sanitary Sewer Section of this report. (Section 3.1 above). However, in this case the peaking factor of 2 has been utilized and a demand of 450 liters per person per day.

The summary of the water system demands can be summarized as follows:

	Average Daily Flow Rate (Liters per second)	Peak Daily Flow Rate* (Litres per second)
Residential Component	0.341	0.682

The proposed fire protection to this development will be handled by the existing fire hydrants located adjacent to the property.

Utilizing the requirements of the Fire Underwriters Survey 2020, the following outlines the water demand for the overall building area:

This building is approximately 527.0 +/- sq. m. in size (multi - storey residential building with commercial on the ground floor). In accordance with the requirements of the Fire Underwriters Survey, the area is to include 25% of the floor areas above and below the main level. In this case, the area of 790.5 sq.m. was utilized. Utilizing the Fire Underwriters Survey Document, our estimation of the required fire demand is as follows:

$$\begin{array}{lcl} \text{Estimate of Fire Flow Required} & = & 220 * C * \text{SQRT}(A) \\ \text{Where } C & = & \text{Coefficient related to type of Construction} \end{array}$$

In this case, ordinary construction is proposed.

Ordinary Construction = 1.0

A = Total Area of the Building (As outlined above)
 790.5 sq. m.

$$= 220 \times 1.0 \times \text{SQRT}(790.5)$$

$$= 6,185.5 \text{ litres per min}$$

Rounded

$$= 6,000 \text{ litres per min}$$

Modifications

Occupancy

$$= \text{Low Hazard Occupancy} = -15\%$$

$$\text{Reduction} = 900 \text{ litres per min}$$

Net Fire Demand

$$= 5,100 \text{ litres per min}$$

Further Modifications

$$\text{Automatic Sprinkler System} = 50\%$$

$$\text{Reduction} = 2,550 \text{ litres per min}$$

Spatial Exposure (Estimated)

$$\text{North Street} = + 0 \%$$

$$\text{East 3.24m +/-} = + 20 \%$$

$$\text{West 10.6 +/-} = + 15 \%$$

$$\text{South 25.6m +/-} = + 10 \%$$

$$\text{Total} = + 45 \%$$

$$\text{Increase} = 2,295 \text{ litres per min}$$

Total Fire Demand

$$4,845.0 \text{ litres per min}$$

$$5,000 \text{ litres per min (Rounded)}$$

$$83.3 \text{ litres per sec.}$$

STORM SEWERS & APPURTENANCES

Storm Sewers

The site is intended to be serviced with municipal storm sewers which are to be designed to handle the 5-year storm event where possible. The overall stormwater management system is to be consistent with the current policies of the County of Norfolk which require reduction in the post development flows to below the pre-development rates for all storm events up to and including the 100-year event. In this case, no municipally owned storm sewer exists on the King Street right-of-way adjacent to the site. In fact, the site presently drains in a southerly direction

towards the abutting property to the south. The site is presently developed with a commercial building and its associated parking facilities. The proposal is to collect the runoff to reduce the runoff that is being directed to the rear lot line and the abutting land / property. In this case, an infiltration gallery is proposed to direct the runoff into the soils in the area which are suitable for infiltration. The soils report prepared by "Soil Mat Engineers and Consultants Ltd." Dated June 29, 2023, indicates that the native soils have an infiltration capacity of between 75 and 90 mm per hour. For the purposes of our design, we have utilized an initial infiltration rate of 50 mm per hour with a degradation of that rate to 10 mm per hour. (These assumptions would be considered conservative and reflect the potential for variety in the soils to be encountered).

The soils report prepared by Soil-Mat Engineers is included within Appendix 'B' of this report.

The proposed development is a slightly larger impervious areas and as such, conventional stormwater management techniques are required to be implemented.

Pre-Development Hydrologic Modeling Parameters

MIDUSS modeling software was used to establish pre-development runoff rates for the site. The site is approximately 0.195 hectares in size with the flow direction being extremely flat but is directed towards the Wellington Avenue right-of-way. The existing topography slope is approximately 1.5+/-% and directs the runoff to the rear of the site.

Post Development Conditions

The proposed concept plan includes the following:

- A proposed 527.0 +/- sq.m. mixed use building consisting of two (2) commercial units and one (1) residential unit on the main floor and an additional twenty-two (22) unit residential units on the upper floors of a total of a five (5) storey building, with the required parking, resulting in an overall % impervious on the site being increased from the 97.3% impervious surfaces in the pre-development condition to a 85.5% impervious condition.

For the purposes of this report, 85.5% has been utilized in the hydrologic modeling for the overall development to represent the proposed development. Actual reduction of the runoff is not required to meet the Norfolk County design standards, however, as the site drains into an abutting neighbour's property, a reduction is being proposed for this site.

Modelling Results – Quantity Control

Stormwater flows were calculated using MIDUSS modeling software. Norfolk County IDF parameters were used to generate rainfall for sizing of the SWM facilities in accordance with Norfolk County Development Engineering Standards.

Peak flow reduction will be achieved through on-site detention in an effort minimize the potential for downstream flooding and erosion. Post development surface water runoff will be controlled to existing pre-development levels for the 2, 5, 10, 25, 50- and 100-year storm events (as possible). The results of the Miduss modeling have been included within Appendix 'D' of this report and can be summarized as follows:

Table 1 – Peak Flow Rates

Storm Event	Pre-Development Peak Flow (m ³ /sec)	Post Development Peak Flow No SWM (m ³ /sec)	Post Development Peak Flow with SWM
2 Year	0.037	0.032	0.005
5 Year	0.048	0.044	0.013
10 Year	0.057	0.052	0.019
25 Year	0.068	0.065	0.028
50 Year	0.076	0.074	0.037
100 Year	0.083	0.082	0.047

Peak flow reduction will be achieved by designing the proposed infiltration gallery to be located in the rear parking area of the site, whereas the infiltration gallery has a storage capacity of 21.6 cu.m. which is based on the following infiltration gallery.

Proposed Infiltration Galley = 12.0 x 4.5m x 1.0m
 Capacity = 54 cu.m.
 Void Ratio = 0.40
 Storage Capacity within the gallery (assuming no infiltration)
 = 21.6 cu.m.

Table 2 – Post Development Storage Volumes

Storm Event	Infiltration Galley Storage (cms)	Required Storage (cms)
2 Year	21.6	20.863
5 Year	21.6	21.153
10 Year	21.6	20.698
25 Year	21.6	21.437
50 Year	21.6	21.566
100 Year	21.6	21.617

Peak flow reduction will be achieved by designing an outlet structure that restricts the runoff into the neighboring property that is the pre-development flow direction.

The pre-development runoff computer simulations results have been included within Appendix 'C' of this report. The post-development runoff computer simulations results have been included within Appendix 'D' of this report.

The storage that is being proposed will be surface storage within the site with an overland flow towards Wellington Avenue. We have illustrated on the enclosed preliminary grading and servicing plan. (Included within Appendix 'A' of this report).

The proposed stormwater management system includes the provision for a minor system designed to accommodate the 5-year storm event. The storm sewer design calculations are included in Appendix 'E' of this report

GRADING

Preliminary site grades are illustrated on the attached grading plan prepared by J H Cohoon Engineering Limited being drawing 16025-1 included with this report.

UTILITIES

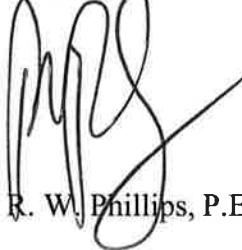
Gas, hydro, Bell, and cable utilities are available to service the proposed development. Coordination of these services will be required with Union Gas, Brantford Power, Bell, and Rogers.

CONCLUSIONS

The preceding sections of this report outline the preliminary servicing and grading requirements for the proposed residential development on this site. Based on the work completed to date, it may be concluded that the proposed development may be developed with full municipal services.

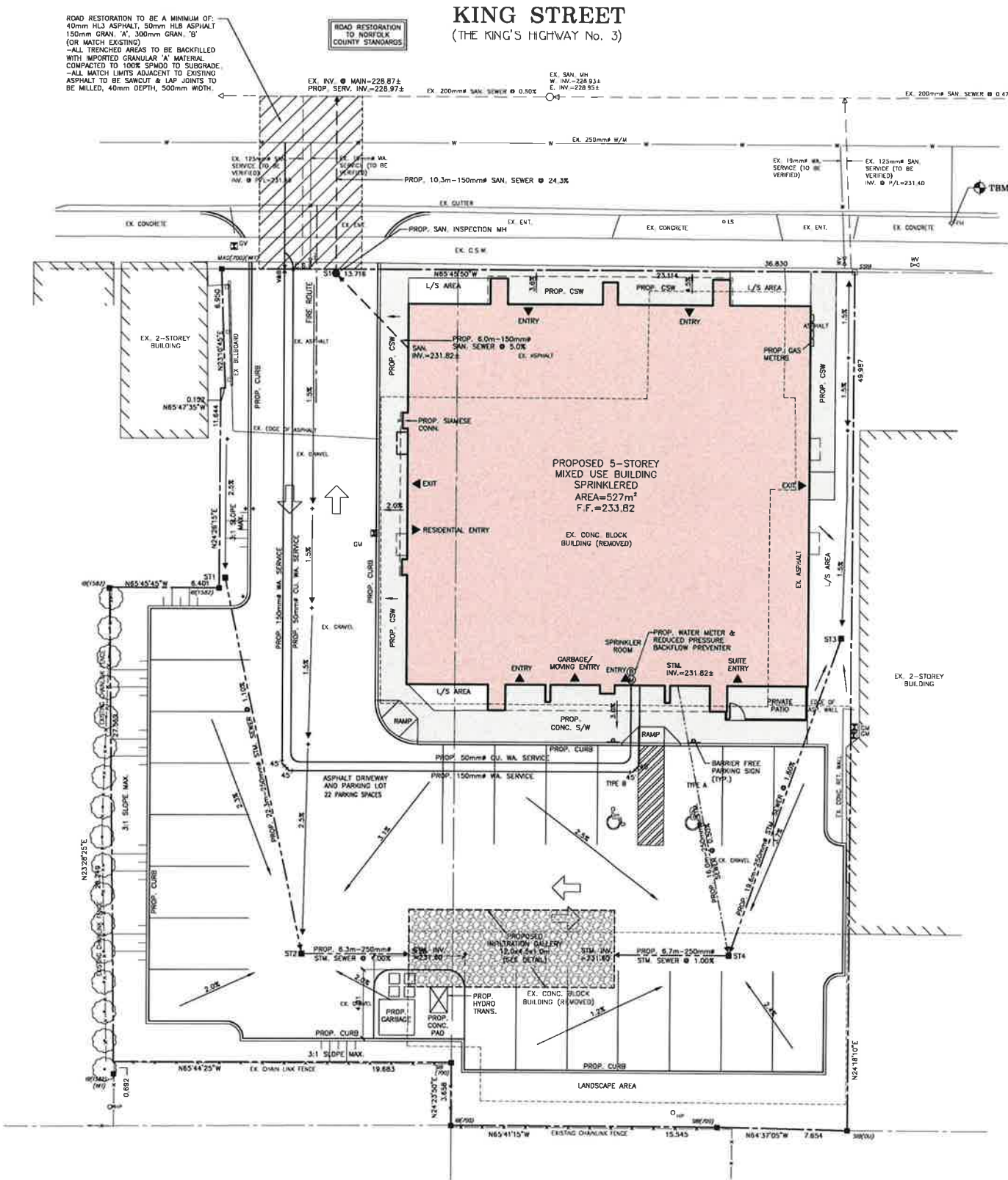
Report Prepared By:

J.H. COHOON ENGINEERING LIMITED


R. W. Phillips, P.Eng.

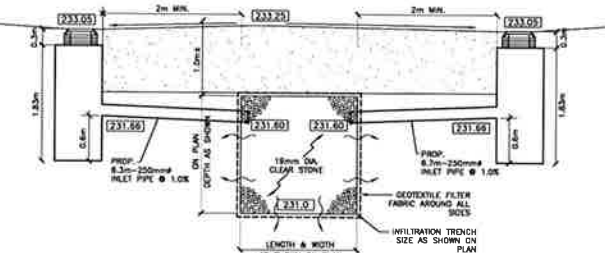


Appendix 'A'
Development Proposal as prepared by
J H Cohoon Engineering Drawing 16025-1



SANITARY SYSTEM			
MV No.	DESCRIPTION	T/C	INVERTS
S1	1.2m P/C MH	233.75	N 231.47 SE 231.52

STORM SYSTEM			
MV No.	DESCRIPTION	T/C	INVERTS
ST1	0.6x0.6x1.52m P/C CB	233.30	S 231.93
ST2	0.6x0.6x1.52m P/C CB	233.05	N 231.68 E 231.66
ST3	0.6x0.6x1.52m P/C CB	233.40	S 232.03
ST4	0.6x0.6x1.52m P/C CB	233.05	N 231.68 W 231.66 NW 231.74



INFILTRATION GALLERY DETAIL

WATERMAINS:

1. WATERMAINS AND RELATED APPURTENANCES SHALL BE DESIGNED AND CONSTRUCTED SO AS TO COMPLY WITH APPLICABLE LAW, TO BE CONSISTENT WITH THE COUNTY OF NORFOLK DEVELOPMENT AND ENGINEERING STANDARDS AND IN ACCORDANCE WITH CURRENT GUIDELINES, CODES, REGULATIONS, BEST PRACTICES AND STANDARDS PRESCRIBED BY THE COUNTY.
2. WATERMAINS TO BE INSTALLED WITH A MINIMUM DEPTH OF COVER OF 1.70m BELOW FINISHED GRADE.
3. WATERMAINS TO BE INSTALLED IN ACCORDANCE WITH OPSD 802.010 TYPE 2 TRENCH BEDDING TO BE GRANULAR 'A' UNLESS OTHERWISE NOTED.
4. WATERMAINS TO BE PVC DR-15 IN ACCORDANCE WITH AWWA C900 & CSA B137.3. THE PIPE SHALL BE SHIPPED TO THE SITE WITH THE ENDS FACTORY CAPPED.
5. FOR PVC WATERMAIN DEFLECTION:
 - MAXIMUM ALLOWABLE DEFLECTION OF 1 DEGREE PER JOINT SHALL NOT BE EXCEEDED.
 - EACH JOINT SHALL BE DEFLECTED AN EQUAL AMOUNT.
6. ALL WATER MAINS TO BE SWABBED, TESTED, DISINFECTED AND FLUSHED UNDER THE SUPERVISION OF THE ENGINEER TO THE SATISFACTION OF THE COUNTY OF NORFOLK PRIOR TO CONNECTION TO THE EXISTING MUNICIPAL SYSTEM. REFER TO OPSD 701.07.25, AWWA C901 & COUNTY OF NORFOLK GENERAL WATERMAIN DISINFECTION PROCEDURES.
7. A REDUCED PRESSURE DOUBLE BACKFLOW PREVENTER IS REQUIRED ON THE TEMPORARY SUPPLY LINES USED FOR FILLING AND FLUSHING/SWABBING OF WATERMAINS AND TO BE TESTED AND CERTIFIED ON SITE.
8. UPON COMPLETION OF INSTALLATION, THE CONTRACTOR SHALL PERFORM A PRESSURE TEST ON THE WATERMAINS AS PER OPSD 701.07.24 AND COUNTY OF NORFOLK SPECIFICATIONS. WATERMAIN IS TO BE TESTED UNDER THE SUPERVISION OF THE ENGINEER PRIOR TO CONNECTION TO EXISTING WATERMAINS USING TEMPORARY CAPS OR PLUGS.
9. PIPE CLOSURES WHERE REQUIRED, ARE TO BE SUPPLIED BY THE CONTRACTOR. THE CONTRACTOR SHALL ALSO SUPPLY AND INSTALL ALL ADAPTOR PIECES IN ORDER TO CONNECT EXISTING WATERMAINS.
10. ALL WATER SERVICE CONNECTIONS 19mm DIA. ASTM B88 TYPE 'K' SOFT COPPER AS PER OPSD 1104.01 & COUNTY OF NORFOLK ENGINEERING STANDARDS, WITH SAND BEDDING.
11. WATER SERVICES TO BE LOCATED AS PER TYPICAL SERVICING DETAIL ON THIS SHEET AND CURB STOPS TO BE MUELLER A-728 OR EQUIVALENT APPROVED BY THE COUNTY OF NORFOLK.
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13. ALL WATERMAIN VALVES, BENDS AND FITTINGS TO HAVE MECHANICAL JOINTS.
14. CATHODIC PROTECTION TO BE PROVIDED AT ALL VALVES, BENDS AND FITTINGS WITH 11.0 KG ZINC ANODES AND ON ALL WATER SERVICE CONNECTIONS WITH 5.5 KG ZINC ANODES.
15. SHOULD AIR IN THE WATERMAIN BE DEMONSTRATED TO BE A PROBLEM, THE CONTRACTOR WILL BE REQUIRED TO INSTALL AN AIR RELIEF VALVE(S) TO THE SATISFACTION OF THE COUNTY OF NORFOLK.
16. THE APPLICANT AND/OR CONTRACTOR MUST SUBMIT A DETAILED DISINFECTION AND COMMISSIONING PLAN TO THE COUNTY OF NORFOLK PUBLIC WORKS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
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SANITARY & STORM SEWERS:

1. SANITARY & STORM SEWERS & RELATED APPURTENANCES SHALL BE DESIGNED AND CONSTRUCTED SO AS TO COMPLY WITH APPLICABLE LAW, TO BE CONSISTENT WITH THE COUNTY OF NORFOLK DEVELOPMENT AND ENGINEERING STANDARDS AND IN ACCORDANCE WITH CURRENT GUIDELINES, CODES, REGULATIONS, BEST PRACTICES AND STANDARDS PRESCRIBED BY THE COUNTY.
2. COVER AND BEDDING MATERIAL FOR CONCRETE PIPE AS PER OPSD 802.030 CLASS 'B' BEDDING SHALL BE GRANULAR 'A' MATERIAL UNLESS OTHERWISE INDICATED.
3. COVER AND BEDDING MATERIAL FOR PVC PIPE AS PER OPSD 802.010 TYPE 2 TRENCH BEDDING SHALL BE GRANULAR 'A' MATERIAL UNLESS OTHERWISE INDICATED.
4. PVC PIPE WILL REQUIRE SPECIAL CONSTRUCTION PROCEDURES FOR LEAKAGE AND TESTING, PIPE DEFLECTION, ETC.
5. ALL SEWERS TO BE FLUSHED & VIDEOED PRIOR TO THE SUBMISSION OF THE FIRST INTERIM COMPLETION CERTIFICATE AND PRIOR TO THE FINAL COMPLETION CERTIFICATE.
6. ALTERNATE MATERIALS MAY BE ACCEPTABLE, PROVIDED APPROVAL HAS FIRST BEEN OBTAINED FROM THE COUNTY OF NORFOLK AND ENGINEER IN WRITING.
7. ALL STORM MANHOLES AND CATCHBASINS TO BE PRECAST CONCRETE STRUCTURES MANUFACTURED IN PRE QUALIFIED PLANTS IN ACCORDANCE WITH THE LATEST APPLICABLE ONTARIO PROVINCIAL STANDARD (OPS) DRAWINGS AND SPECIFICATIONS.
8. ALL SEWER INSTALLATIONS TO CONFORM WITH OPSD 802.031 TYPE 3 SOIL.
9. ALL MANHOLE FRAMES AND COVERS TO CONFORM WITH OPSD 401.010 TYPE 'A' CLOSED COVER.
10. MANHOLES SHALL BE SUPPLIED TO THE SITE PRE-BENCHED UNLESS OTHERWISE NOTED.
11. PRIVATE SANITARY & STORM DRAINS TO BE LOCATED AS PER THE TYPICAL LOT SERVICING DETAIL THIS SHEET.
12. PRIVATE SANITARY DRAINS TO 125mm PVC DR28 PIPE.
13. A 3x489mm x 2.0m LONG MARKER IS TO BE PLACED FROM THE CAPPED LATERAL AND EXTEND 1.0m ABOVE GROUND AND PAINTED GREEN FOR SANITARY AND WHITE FOR STORM.
14. BEDDING FOR PRIVATE SANITARY & STORM DRAINS AS PER OPSD 1008.02 TYPE 2 TRENCH WITH GRANULAR 'A' BEDDING AND COVER MATERIAL.
15. MINIMUM FALL FOR PRIVATE SANITARY & STORM DRAINS TO BE 2.0%.
16. INFILTRATION GALLERIES/PROPOSED DRYWELLS ARE NOT THE RESPONSIBILITY OF NORFOLK COUNTY.
17. ALL APPLICABLE PERMITS ARE TO BE APPLIED FOR PRIOR TO THE INSTALLATION OF ANY SERVICES.
18. ALL ON-SITE STORM SEWERS TO BE REMOVED OR FILLED WITH GROUT.
19. ALL SANITARY SEWER LATERAL CONNECTIONS SHALL BE INSTALLED USING PREFABRICATED TEES. THE USE OF SERVICE SADDLES MUST BE APPROVED BY NORFOLK COUNTY ENVIRONMENTAL SERVICES DIVISION. ALL CONNECTIONS SHALL CONFORM TO CURRENT OPSD 1008.010 AND OPSD 410.
20. NO DEFLECTIONS OF SANITARY LATERALS ALLOWED FROM MAIN TO PROPERTY LINE. NEW CONNECTIONS MUST BE 3.0m FROM PROPERTY LINE BASIS OR AS APPROVED BY THE MANAGER OF ENVIRONMENTAL SERVICES. AFTER THE PROPERTY LINE ONLY 22.5 FITTINGS ARE ALLOWED OR 1.2m, 45° SWEEPS. CLEANOUTS ARE REQUIRED EVERY 30.5m AND PRIVATE MANHOLES EVERY 91.3m.
21. SPATIAL SEPARATION FROM WATER SERVICE CONNECTIONS OF NOT LESS THAN 2.44m MEASURED HORIZONTALLY FROM UNDISTURBED OR COMPACTED EARTH OR AS APPROVED BY THE MANAGER OF ENVIRONMENTAL SERVICES.

LEGEND:

- S1 EXISTING SANITARY MANHOLE
- ST1 EXISTING STORM MANHOLE
- CB EXISTING CATCHBASIN
- CB EXISTING DOUBLE CATCHBASIN
- CB EXISTING DITCH INLET CATCHBASIN
- F EXISTING FIRE HYDRANT
- V&B EXISTING VALVE & BOX
- W EXISTING WATER BOX
- S EXISTING LIGHT STANDARD
- S1 PROPOSED SANITARY MANHOLE
- PROPOSED SANITARY SERVICE
- PROPOSED STORM SERVICE
- ST1 PROPOSED STORM MANHOLE
- ST1 PROPOSED CATCHBASIN MANHOLE
- CB PROPOSED CATCHBASIN
- V&B PROPOSED VALVE & BOX
- CS PROPOSED WATER SERVICE & CURBSTOP

NOTES:

1. ALL ELEVATIONS SHOWN ARE METRIC.
2. BUILDER/OWNER TO VERIFY COMPLIANCE WITH ZONING BYLAWS (e.g. SETBACKS, REAR YARDS ETC.)
3. BOUNDARY AND TOPOGRAPHIC SURVEY PROVIDED BY JEWITT AND OXON SURVEYING (PROJECT 22-3363 DATED MAY 28, 2022)

T.B.M. No. 1 ELEV. = 234.25m (GEO)
TOP OF MANHOLE OUTLET OF FIRE HYDRANT AS SHOWN (TO BE VERIFIED)



440 HARDY ROAD, UNIT #1, BRANTFORD - ONTARIO, N3T 5L8
TEL. (519) 753-2696 FAX. (519) 753-4283 www.cohooneg.com

PROJECT:
PROPOSED MIXED USE BUILDING
LOTS 2 & 3, BLOCK 16
R-PLAN 189
78 KING STREET, DELHI
NORFOLK COUNTY

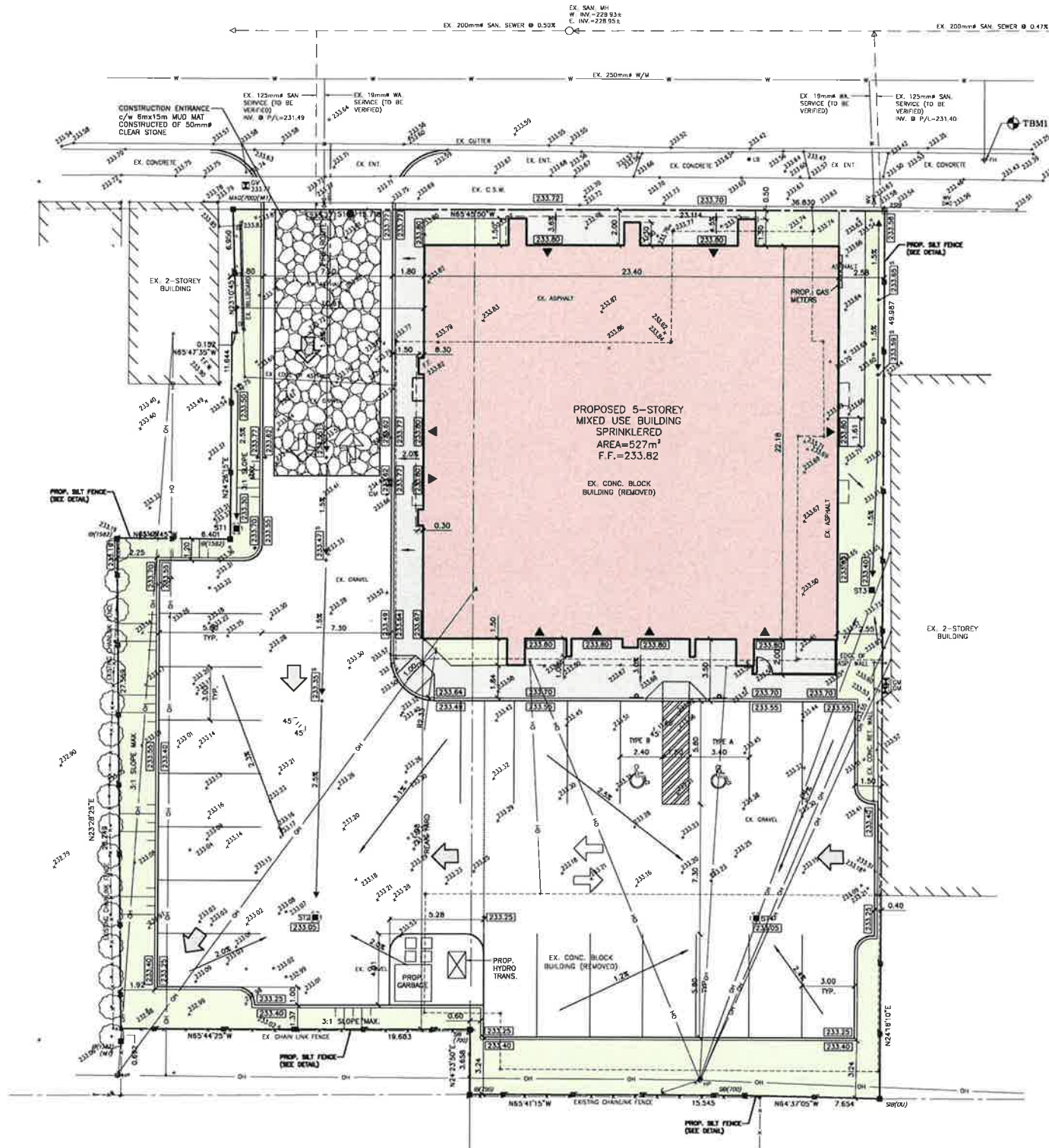
CLIENT: **SENTRY GROUP**

SERVICING PLAN

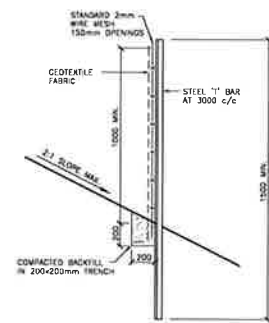
DESIGN	R.W.P.	SCALE	1:150
DRAWN	S.L.M./K.P.B.	JOB No.	16025
CHECKED	R.W.P.		
SHEET	2 of 2	DWG. No.	16025-2
DATE	APR. 20/23		

KING STREET
(THE KING'S HIGHWAY No. 3)

ROAD RESTORATION
TO NORFOLK
COUNTY STANDARDS



MUD MAT DETAIL
N.T.S.



HEAVY DUTY
SILT FENCE DETAIL
OPSD 219.130
N.T.S.

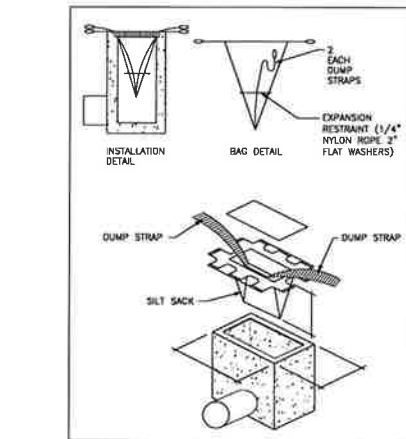
GENERAL NOTES:

- CONSTRUCTION OF SEWERS, WATERMANS AND RELATED APPURTENANCES SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE CURRENT STANDARD DRAWINGS OF THE COUNTY OF NORFOLK, AND THE ONTARIO PROVINCIAL STANDARDS DRAWINGS (OPSD). THE COUNTY OF NORFOLK DRAWINGS SHALL TAKE PRECEDENCE OVER THE OPSD DRAWINGS.
- INFORMATION REGARDING ANY EXISTING SERVICES AND/OR UTILITIES SHOWN ON THE APPROVED SET OF CONSTRUCTION DRAWINGS IS FURNISHED AS THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL INTERPRET THIS INFORMATION AS THEY SEE FIT WITH THE UNDERSTANDING THAT THE OWNER AND HIS AGENTS DISCLAIM ALL RESPONSIBILITY FOR ITS ACCURACY AND/OR SUFFICIENCY.
- ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND HE SHALL REPORT ANY DISCREPANCIES IMMEDIATELY TO THE ENGINEER.
- RELOCATION OF EXISTING SERVICES AND/OR UTILITIES SHALL BE CONSTRUCTED AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
- THE CONTRACTOR SHALL OBTAIN ALL PERMITS FOR CONSTRUCTION.
- FOR ALL SEWERS AND WATERMANS IN FILL SECTIONS, THE COMPACTION SHALL BE VERIFIED PRIOR TO LAYING OF PIPE.
- NO SUBSTITUTIONS WILL BE ALLOWED WITHOUT WRITTEN APPROVAL FROM THE COUNTY OF NORFOLK OR THE ENGINEER.
- NO BLASTING WILL BE PERMITTED.
- ALL EXCAVATIONS TO BE BACKFILLED WITH SELECT NATIVE MATERIAL, APPROVED BY THE ENGINEER, TO 95% S.P.D.
- THE DEVELOPER AND/OR CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND MAINTAINING (UNTIL ROAD CONSTRUCTION IS FINISHED) SILT CONTROL DEVICES AS SHOWN ON THE DRAWINGS AND AS DIRECTED BY THE ENGINEER.
- TREE PROTECTION PROCEDURES TO BE IMPLEMENTED IN ACCORDANCE WITH COUNTY OF NORFOLK STANDARDS.
- ALL WORKS SHALL BE DESIGNED AND CONSTRUCTED SO AS TO COMPLY WITH APPLICABLE LAW, TO BE CONSISTENT WITH THE COUNTY OF NORFOLK DEVELOPMENT & ENGINEERING STANDARDS AND IN ACCORDANCE WITH CURRENT GUIDELINES, CODES, REGULATIONS AND STANDARDS PRESCRIBED BY THE COUNTY.
- ALL BOULEVARD AREAS TO BE RESTORED WITH #1 NURSERY SOO ON A MINIMUM 100mm OF SELECT TOPSOIL.
- ALL TRENCH BACKFILL UNDER EXISTING ROADWAYS SHALL BE COMPACTED IN MINIMUM 230mm LIFTS TO 98% STANDARD PROCTOR DENSITY. A GEOTECHNICAL ENGINEER'S REPRESENTATIVE SHALL BE ON SITE DURING THE WORK TO VERIFY THE COMPACTION OF EACH LIFT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS OF RE-TESTING.
- AN ENGINEER IS REQUIRED TO BE ON-SITE FOR INSPECTION OF ALL UNDERGROUND SERVICES.
- DRIVEWAYS MUST HAVE MINIMUM 1.0m CLEARANCE FROM CATCHBASINS, VALVES, HYDRANTS, STREETLIGHT POLES, TRANSFORMERS, CANADA POST COMMUNITY MAILBOX LOCATIONS ETC.

ROADWORKS:

- ROADWAYS & RELATED WORKS SHALL BE DESIGNED AND CONSTRUCTED SO AS TO COMPLY WITH APPLICABLE LAW, TO BE CONSISTENT WITH THE COUNTY OF NORFOLK DEVELOPMENT & ENGINEERING STANDARDS AND IN ACCORDANCE WITH CURRENT GUIDELINES, CODES, REGULATIONS, BEST PRACTICES AND STANDARDS PRESCRIBED BY THE COUNTY.
- CATCH BASIN CONNECTIONS TO BE PVC PIPE CSA 8182.4, SDR 35 OR 'ULTRA RIB'. SINGLE CATCH BASIN LEADS TO BE MIN. 250mm DIA. DOUBLE CATCH BASIN LEADS TO BE MIN. 300mm DIA. REAR LOT CATCHBASIN LEADS AND DITCH INLET LEADS TO BE CSA A257.1 EXTRA STRENGTH CL3 CONC. 300mm DIA. AT 1.0% MIN.
- SINGLE CATCH BASINS AS PER OPSD 705.010 FRAME AND COVER AS PER OPSD 400.110.
- FINAL ROADWAY CROSSFALL TO BE 2.0%.
- VALVES, MANHOLES AND CATCH BASINS SHALL BE PLACED AT ASPHALT BINDER COURSE (H4) ELEVATION AS DIRECTED BY THE ENGINEER.
- AT SAG POINTS, CATCH BASIN ADJUSTMENT AND PAVING TO BE PLACED IN SUCH MANNER THAT WILL NOT OBSTRUCT DRAINAGE.
- FINAL ASPHALT COURSE (H4) SHALL BE PLACED IN ACCORDANCE WITH APPROVED COUNTY OF NORFOLK STANDARDS FOR TIMING, AS DIRECTED BY THE ENGINEER AND AS PER THE REQUIREMENTS STIPULATED IN THE DEVELOPMENT AGREEMENT.
- FOR MANHOLE AND CATCH BASIN TOP ADJUSTMENTS, ALL PERMANENT ADJUSTMENTS ARE TO BE POURED IN PLACE OR APPROVED EQUIVALENT (e.g. MODULOC).
- ALL BEDDING AND BACKFILL MATERIAL, ROAD SUB-GRADES AND GRANULAR ROAD BASES SHALL BE COMPACTED TO MIN 100% SPD UNLESS OTHERWISE SPECIFIED.
- SILTATION CONTROL BARRIERS SHALL BE PLACED AS DETAILED ON THE SILTATION AND EROSION CONTROL PLAN.
- ADDITIONAL SILT CONTROL LOCATIONS MAY BE REQUIRED AS DETERMINED BY THE COUNTY AND/OR THE ENGINEER.

KEY PLAN



SILT SACK DETAIL
N.T.S.

LEGEND:

- EXISTING ELEVATIONS
- PROPOSED ELEVATIONS
- PROPOSED SWALE ELEVATIONS
- PROPOSED SWALE
- GENERAL DRAINAGE
- SILTATION FENCE
- SILT SOCK AS SHOWN
- CONSTRUCTION ENTRANCE
2' x 6' x 15' MUD MAT
CONSTRUCTED OF 50mm#
CLEAR STONE
- OVERLAND FLOW ROUTE
- EXISTING CATCHBASIN
- EXISTING DOUBLE CATCHBASIN
- EXISTING DITCH INLET CATCHBASIN
- EXISTING FIRE HYDRANT
- EXISTING VALVE & BOX
- EXISTING WATER BOX
- EXISTING LIGHT STANDARD

NOTES:

- ALL ELEVATIONS SHOWN ARE METRIC.
- BUILDER/OWNER TO VERIFY COMPLIANCE WITH ZONING BYLAWS (e.g. SIDEYARDS, SETBACKS, REARWARDS ETC.).
- BOUNDARY AND TOPOGRAPHIC SURVEY PROVIDED BY JEWITT AND DIXON SURVEYING (PROJECT 22-3383 DATED MAY 28, 2022).
- THE SILTATION & EROSION CONTROL (SEC) MEASURES ILLUSTRATED ON THIS PLAN ARE CONSIDERED TO BE THE MINIMUM REQUIREMENT. SITE CONDITIONS MAY REQUIRE ADDITIONAL MEASURES WHICH WILL BE IDENTIFIED BY THE ENGINEER DURING CONSTRUCTION.
- ALL SEC MEASURES ARE TO BE IN PLACE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
- OWNER/CONTRACTOR TO MAINTAIN EROSION CONTROL MEASURES THROUGHOUT SITE, UNTIL A COMPLETE GRASS/VEGETATION COVER IS ACHIEVED.
- ONLY AT THE DIRECTION OF THE ENGINEER ARE THE SEC MEASURES TO BE REMOVED.
- ALL EXPOSED AREAS NOT SUBJECT TO ACTIVE CONSTRUCTION WITHIN 30 DAYS ARE TO BE REVEGETATED AS PER O.P.S.S. 572 IMMEDIATELY UPON COMPLETION OF AREA GRADING.
- ALL RAINWATER LEADERS FROM EACH HOUSE ARE TO BE DIRECTED TOWARDS THE RIGHT-OF-WAY, UNLESS NOTED OTHERWISE.
- CONTRACTOR TO PROVIDE SILT FENCE AROUND PERIMETER OF ALL ON SITE STOCKPILES.
- CONTRACTOR TO PROVIDE SILT SACKS ON TOP OF ALL EXISTING AND PROPOSED STORM STRUCTURES WITHIN THE INFLUENCE OF RUNOFF DURING CONSTRUCTION UNTIL ADEQUATE VEGETATIVE COVER IS ACHIEVED.
- SEC CONSULTANT TO VISIT DEVELOPMENT, AT A MINIMUM, ON A WEEKLY BASIS AND ALSO DURING AND AFTER EACH STORM EVENT TO ENSURE SEC MEASURES ARE FUNCTIONING PROPERLY.
- SEC CONSULTANT SHALL PROVIDE THE CITY WITHIN 48 HRS. OF A STORM EVENT A LIST OF DEFICIENCIES AND TIMEFRAME FOR THE COMPLETION OF NECESSARY CORRECTIVE MEASURES.

T.B.M. No. 1 ELEV. = 234.25m (GEO)
TOP OF VAN OUTLET OF FIRE HYDRANT AS SHOWN (TO BE VERIFIED)

J.H. COHOON
ENGINEERING
LIMITED
CONSULTING ENGINEERS

440 HARDY ROAD, UNIT #1, BRANTFORD - ONTARIO, N3T 5L8
TEL. (519) 753-2856 FAX. (519) 753-4283 www.cohooneg.com

PROPOSED
MIXED USE BUILDING
LOTS 2 & 3, BLOCK 16
R-PLAN 189
78 KING STREET, DELHI
NORFOLK COUNTY

CLIENT: SENTRY GROUP

GRADING &
SILTATION CONTROL
PLAN

DESIGN	R.W.P.	SCALE	1:150
DRAWN	S.L.M./K.P.B.	JOB No.	16025
CHECKED	R.W.P.		
SHEET	1 of 2	DWG. No.	16025-1
DATE	APR 20/23		

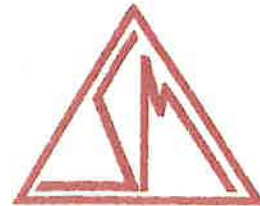
Appendix 'B'
Soil Mat Engineers & Consultants Ltd Report dated June 29, 2022

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

www.soil-mat.ca info@soil-mat.ca TF: 800.243.1922

Hamilton: 130 Lancing Drive L8W 3A1 T: 905.318.7440 F: 905.318.7455

Milton: PO Box 40012 Derry Heights PO L9T 7W4 T: 800.243.1922



PROJECT No.: SM 220178-G

June 29, 2022

SENTRY PROPERTY GROUP
224 Colborne Street West – Unit 4
Brantford, Ontario
N4T 1L8

Attention: Darrin Knill, P. Eng.

**GEOTECHNICAL INVESTIGATION
PROPOSED MIXED-USE STRUCTURE
78 KING STREET
DELHI, ONTARIO**

Dear Mr. Knill,

Further to your authorisation, SOIL-MAT ENGINEERS & CONSULTANTS LTD. has completed the fieldwork, laboratory testing, and report preparation in connection with the above noted project. The scope of work was completed in general accordance with our proposal P220178, dated March 11, 2022. Our comments and recommendations based on our findings at the five [5] borehole locations are presented in the following paragraphs.

1. INTRODUCTION

We understand that the project will involve the construction of a basementless, 3 to 4 storey mixed-use structure, upon demolition of the existing structure located at 78 King Street in Delhi, Ontario. It is understood that the development would also include the construction of an asphalt paved surface level parking lot. The purpose of this geotechnical investigation work is to assess the site subsurface soil conditions, and to provide our comments and recommendations with respect to the design and construction of the extension 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 the 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 five [5] sampled boreholes were advanced at the locations illustrated in the attached Drawing No. 1, Borehole Location Plan. The boreholes were advanced using direct push equipment on April 11, 2022 under the direction and supervision of representatives of SOIL-MAT ENGINEERS & CONSULTANTS LTD. and PINCHIN LTD. to termination at depths of approximately 10.7 metres below the existing ground surface.

Upon completion of drilling, groundwater monitoring wells were installed at all borehole locations to allow for future measurements of the static groundwater level. The monitoring wells consist of 50-millimetre diameter PVC pipe, screened in the lower 3 metres. The wells were encased in well filter sand up to approximately 0.3 metres above the screened portion, then with bentonite 'hole plug' up to the surface and fitted with a protective "flush mount" casing.

Representative samples of the subsoils were recovered from the borings at selected depth intervals using direct push equipment with soil properties determined by dynamic cone penetration testing directly adjacent to the sampled borehole. 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, with hand penetrometer testing conducted on cohesive samples. A selected sample of the native soils was submitted for grain size analysis.

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 was referenced to a temporary benchmark, described as the top of manhole cover located on the centreline of King Street, east of the project area, as shown on Drawing No. 1, Borehole Location Plan. This benchmark has been assigned an elevation of 100.00 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 Boreholes Nos. 1 to 5 inclusive, following the text of this report.



3. SITE DESCRIPTION AND SUBSURFACE CONDITIONS

The subject site is located at 78 King Street in Delhi, Ontario and consists of a used car dealership fronting onto King Street to the north. The property is bordered by commercial properties to the west, a church to the south and residential properties to the east. The subject site is relatively flat and even, roughly level with the adjacent roadways.

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

Pavement Structure

All boreholes were advanced through the existing pavement structure, which was noted to consist of approximately 250 to 300 millimetres of compact granular base, with approximately 80 millimetres of asphaltic concrete overlying the granular base in Borehole No. 5.

Silty Sand Fill

Silty sand fill material was encountered beneath the pavement structure at all borehole locations. The fill was reddish brown in colour and contained trace gravel and clay with occasional construction debris in the upper levels. The granular fill soil encountered was generally very loose to compact in consistency and proven to depths of approximately 1.5 to 3.0 metres below the existing ground surface.

Sand

Native sand material was encountered beneath the silty sand fill material at all borehole locations. The native material was brown in colour containing trace to some gravel becoming coarser with depth and containing occasional silty sand seams. The granular soil encountered was generally very loose to dense in consistency and proven to depths of 9.4 to 10.7 metres below the existing ground surface.

As noted above, one [1] selected sample was subjected to grain size analysis including sieve and hydrometer tests. The result of this grain size analysis has been summarised as follows:

TABLE A: SUMMARY OF GRAIN SIZE ANALYSIS

Sample	Depth [m]	Clay [%]	Silt [%]	Sand [%]	Gravel [%]
BH1 SS3	1.5	3	8	89	0

Silty Clay/Clayey Silt

Native silty clay/clayey silt soils were encountered beneath the native sand material with the exception of Borehole No. 3. The native material was brown in colour, transitioning to grey with depth, containing trace sand and gravel. The cohesive soil was generally very stiff to hard in consistency and proven to termination at depths of approximately 10.7 metres below the existing ground surface.

Groundwater Observations

All boreholes were recorded as being open and 'wet' at depths ranging from 7.0 to 7.5 metres below the existing ground surface. It is noted that insufficient time would have passed for the static groundwater level to stabilise in the open boreholes. As noted above, monitoring wells were installed at all borehole locations to allow for future measurements of the static groundwater level. The details of the monitoring well installation, as well as the groundwater measurements taken by PINCHIN LTD., have been summarised as follows:

TABLE B: SUMMARY OF GROUNDWATER MEASUREMENTS

BH/MW #	Ground Surface Elevation	MW Depth (m)	Screened Interval (m)	Date	Water Depth	Water Elevation
1	100.46	10.67	7.62–10.67	29/04/22	7.42	93.04
2	100.21	10.67	7.62–10.67	29/04/22	7.05	93.16
3	100.21	10.67	7.62–10.67	29/04/22	6.97	93.24
4	100.27	10.67	7.62–10.67	29/04/22	7.09	93.18
5	100.44	10.67	7.62–10.67	29/04/22	7.30	93.14

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

4. FOUNDATION CONSIDERATIONS

Without underground levels, it is anticipated that the proposed structure would typically have a founding elevation on the order of approximately 1 to 2 metres below the existing grade. However, given the encountered depths of fill, it is recommended that the foundations extend to depths of 3 to 4 metres, where more competent native soils are encountered. The soil conditions encountered at these depths are generally considered to be suitable to support the proposed structure on conventional spread footings founded in the undisturbed native sand soils, below any fill or otherwise unsuitable material. Spread footings founded in the competent native sand 3 metres below the ground surface may be designed using a factored Ultimate Limit State [ULS] bearing capacity of 150 kPa [$\sim 3,000$ psf]. The allowable bearing stress at Serviceability Limit State [ULS] should be limited to 100 kPa [$\sim 2,000$ psf], based on the total and differential settlements not exceeding 25 and 20 millimetres respectively. These design bearing capacities are based on a minimum footing width of one metre wide, and would decrease linearly with footing width such that a width of zero would also have a bearing capacity of zero.

Alternatively, the proposed additions to the structure may be supported on helical piers installed into the compact sand soils below at a depth of approximately 4 metres or greater below the exterior grade of the structure. Helical piers may be a preferred option considering the relative ease of access, the speed of installation, limited vibration and disturbance of the neighbouring structures, as well as the lack of spoil and no need to place large volumes of concrete. As helical pier systems are proprietary in nature a specialty contractor should be consulted in the design process. On a preliminary basis, helical piers installed in the compact granular soils may be expected to develop approximate capacities of 200 kN [45 kips] SLS and 270 kN [60 kips] ULS.

It is noted that the SLS value represents the Serviceability Limit State, which is governed by the tolerable deflection [settlement] based on proposed building type, using unfactored load combinations. The ULS value represents the Ultimate Limit State and is intended to reflect an upper limit of the available bearing capacity of the founding soils in terms of geotechnical design, using factored load combinations. There is no direct relationship between ULS and SLS; rather they are a function of the soil type and the tolerable deflections for serviceability, respectively. Evidently, the bearing capacity would be lower for more settlement sensitive structures, and larger for more flexible buildings.

The support conditions afforded by the founding soils are usually not uniform across the site, neither are that loads on various foundation elements. It is therefore recommended that the footings and foundation walls be structurally reinforced to account for the potential variable support conditions.

In areas where it will be necessary to provide adjacent footings at different founding elevations, the lower footing should be constructed before the higher footing is constructed, if possible, and the higher footing should be set below an imaginary line drawn up from the lower footing at 10 horizontal to 7 vertical. This practice will stress transfer from the higher footings to the lower footings.

All footings exposed to the environment must be provided with a minimum of 1.2 metres of earth cover or equivalent insulation to protect against frost damage. This frost protection would also be required if construction were undertaken during the winter months. All footings and foundations should be designed and constructed in accordance with the current Ontario Building Code.

With foundations designed as outlined above and as required by the Ontario Building Code, and with careful attention paid to construction detail, total and differential settlement should be well within normally tolerated limits of 25 and 20 millimetres respectively, for the type of building and occupancy expected.

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

5. SEISMIC DESIGN CONDITIONS

The structure shall be designed according to Section 4.1.8 of the Ontario Building Code, Ontario Regulation 332/12. Based on the subsurface soil conditions encountered in this investigation the applicable Site Classification for the seismic design is Site Class D, stiff soil, based on the average soil characteristics for this site.

The seismic data from Supplementary Standard SB-1 of the Ontario Building Code for nearby Simcoe are as follows:

$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	$S_a(5.0)$	$S_a(10.0)$	PGA	PGV
0.141	0.084	0.047	0.0230	0.0058	0.0024	0.087	0.064



6. FLOOR SLAB AND PERMANENT DRAINAGE

The floor slab may be constructed using conventional slab-on-grade techniques on a prepared subgrade. The exposed subgrade surface should be well compacted in the presence of a representative of SOIL-MAT ENGINEERS. Any 'soft spots' delineated during this work should be sub-excavated and replaced with quality backfill material compacted to 100 per cent of its standard Proctor maximum dry density [SPMDD]. The subgrade level can then be raised to the design level with granular soils compacted to 100 per cent of its SPMDD. Granular fill such as Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed limestone bedrock) product is preferred within the building footprint due to its relative insensitivity to weather conditions, ease in achieving the required degree of compaction, and its quick repose to applied stresses.

As with all concrete floors, there is a tendency for the floor slabs to crack. The slab thickness, concrete mix design, the amount of steel and/or fiber reinforcement and/or wire mesh placed into the concrete, if any, will therefore be a function of the owner's tolerance for cracks in and movements of, the slabs-on-grade, etc. The 'saw-cuts' in the concrete floors, for crack control, should extend to a minimum depth of 1/3 of the slab thickness.

A moisture barrier will be required under the floor slabs such as the placement of at least 200 millimetres of well compacted 20-millimetre clear crushed stone. At a minimum the moisture barrier material should contain no more than 10 per cent passing the No. 4 sieve. Where 'non-damp' floor slabs are required, as for instance under sheet vinyl floor coverings, etc., extra efforts will be required to damp proof the floor slab, as with the additional provisions of a heavy 'poly' sheet, damp proofing sprays/membranes, drainage board products, etc. Where 'poly' sheets are used care should be taken to prevent puncturing and tearing and/or sufficiently heavy gauge sheeting specified.

Curing of the slab-on-grade must be carefully specified to ensure that slab curl is minimised. This is especially critical during the hot summer months of the year when the surface of the slab tends to dry out quickly while high moisture conditions in; the moisture barrier or water trapped on any 'poly' sheet, at the sawcut joints and cracks, and at the edges of the slabs, maintains the underside of the slab in a moist condition.

It is important that the concrete mix design provide a limiting water/cement ratio and total cement content, which will mitigate moisture related problems with low permeance floor coverings, such as debonding of vinyl and ceramic tile. It is equally important that free excess water not be added to the concrete during its placement as this could increase the potential for shrinkage cracking and curling of the slab.



Where the finished floor elevation is less than 300 millimetres above the finished exterior grade consideration should be given to the provision of a perimeter weeping tile system to prevent the buildup of water against foundations. Where provided, the perimeter drainage system should consist of 100 millimetre perforated pipe, encased in a geofabric sock and covered with a minimum of 200 millimetres of a 20 millimetres clear crushed stone product, in turn encased in a heavy geotextile product. The suppliers of the filter geotextile should be consulted as to the best type suited to this project. This office should examine the installation of the drains. Even a small break in the filtering materials could result in a loss of fines into the drains with attendant performance difficulties, including settlements of the ground surface. The perimeter drains should outlet to a gravity sewer connection, nearby catch basin, or a sump pit a minimum of 150 millimetres below the underside of finished floor. The exterior grade around the structure should be sloped away from the structure to prevent the ponding of water against the foundation walls. The enclosed Drawing No. 2 shows the schematics of the typical requirements for slab-on-grade construction without a basement level.

7. EXCAVATIONS

Excavations for the installations of the foundations and underground services are generally expected to extend to depths of up to about 2 to 3 metres below the existing grade. Excavations through the native sand and silty sand fill materials may be expected to remain stable for the short excavation period at inclinations up to 45 degrees to the horizontal. Where encountered, the presence of old foundations, underground structures, debris, etc., would be expected to slow the rate of construction. Nevertheless, all excavations must comply with the current Occupation Health and Safety Act and Regulations for Construction Projects. In regards to the Safety Act, the encountered silty sand fill and native sand soils would be considered a Type 3 Soil. Excavation slopes steeper than those required in the Safety Act must be supported or a trench box must be provided, and a senior engineer from this office should monitor the work.

As noted above the static groundwater level is estimated at a depth of approximately 7 to 8 metres below the existing ground surface, generally well below the anticipated depths of construction. Regardless, some minor infiltration of perched water through permeable seams, as well as runoff into open excavations, should be anticipated. Although the infiltration rate in high permeable sand is anticipated to be high, any perched water infiltration for the short construction period would be relatively limited such that using conventional construction dewatering methods are anticipated to suffice, such as pumping from sumps in the base of excavations. More groundwater control should be anticipated when making connection to existing services, and excavations through the areas of existing structures and service trenches. Surface water should be directed away from the excavations.



The base of the excavations on the native sand encountered in the boreholes should generally remain compact and stable. Therefore, standard pipe bedding, as typically specified by the Ontario Provincial Standard Specification will be satisfactory, compacted to 95 per cent of its standard Proctor maximum dry density [SPMDD], should suffice.

8. BACKFILL CONSIDERATIONS

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

While the silty sand/sand soils are moderately permeable, they would not strictly be considered 'free draining' and should not be used where this characteristic is necessary. The fine to medium grained soils encountered are generally considered to be near to 'dry' of their standard Proctor optimum moisture content, depending on depth. Some moisture conditioning may be required depending upon the weather conditions at the time of construction.

The use of a free draining, well-graded granular material, such as an Ontario Provincial Standard Specification [OPSS] Granular 'B', Type II (crushed limestone bedrock), is recommended for backfill against foundation walls or to raise the interior grade to the design subgrade level. This material is more readily compacted in restricted access areas, and generally presents a more positive support condition for interior floor slabs and exterior concrete sidewalks.

After a period of heavy precipitation, any near-surface softened material should be allowed to dry or be removed from the fill surface and discarded. The on-site soils encountered are generally considered to be near to 'dry' of their standard Proctor optimum moisture content. Some moisture conditioning may be required depending on the weather conditions at the time of construction.

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. 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. Any imported fill required in the 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'. All structural fill should be compacted to 100 per cent of its SPMDD. Backfill within service trenches, areas to be paved, etc., should be compacted to a minimum of 95 per cent of its SPMDD, and to 100 per cent of its SPMDD in the upper 1 metre below the design subgrade level. 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.

9. PAVEMENT DESIGN CONSIDERATIONS

All areas to be paved should be stripped of all organic or otherwise unsuitable materials. The exposed subgrade should be proof rolled with 3 to 4 passes of a loaded tandem 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 must be sub-excavated and replaced with suitable backfill material. Alternatively, the soft areas may be stabilised by placing coarse crushed stone and 'punching' it into the soft areas. 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. The need for the treatment of softened subgrade will be reduced if construction is undertaken during the dry summer months and careful attention is paid to the compaction operations. The fill over shallow utilities cut into or across paved areas such as telephone, hydro, gas, etc. must also be compacted to 100 per cent if its standard Proctor dry density.

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 mitigate 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, or during colder winter weather, 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 limestone 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 exposed subgrade.

The suggested pavement structures outlined in Table C below are based on subgrade parameters estimated on the basis of visual and tactile examinations of the on-site soils and past experience. The outlined pavement structure may be expected to have an approximate ten to fifteen-year life, assuming that regular maintenance is performed. Should a more detailed pavement structure design be required, site specific traffic information would be needed, together with detailed laboratory testing of the subgrade soils.

TABLE C – RECOMMENDED PAVEMENT STRUCTURES

LAYER DESCRIPTION	COMPACTION REQUIREMENTS	LIGHT DUTY SECTIONS	HEAVY DUTY [TRUCK ROUTE]
Asphaltic Concrete Wearing course OPSS HL 3 or HL 3A	Min. 92 % Marshall MRD	40 millimetres	40 millimetres
Binder Course OPSS HL 8	Min. 92 % Marshall	50 millimetres	80 millimetres
Base Course OPSS Granular A	100% SPMDD	150 millimetres	150 millimetres
Sub-base Course OPSS Granular B Type II	100% SPMDD	300 millimetres	450 millimetres

* Marshall MRD denotes Maximum Relative Density.

* SPMDD denotes Standard Proctor Maximum Dry Density, ASTM-D698.



Depending on the anticipated traffic, a reduced light duty asphalt structure consisting of 65 millimetres of HL3 surface course may also perform sufficiently. This would be reasonable in areas subjected only to light vehicles such as cars for parking. Such a structure may have a reduced lifespan if subjected to heavier vehicles, and would also not allow for 'mill and pave' type operations for future rehabilitation.

To minimise segregation of the finished asphalt mat, the asphalt temperature must be maintained uniform throughout the mat during the 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 racking 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.



10. 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.

Kevin Reid, B.Eng., EIT.

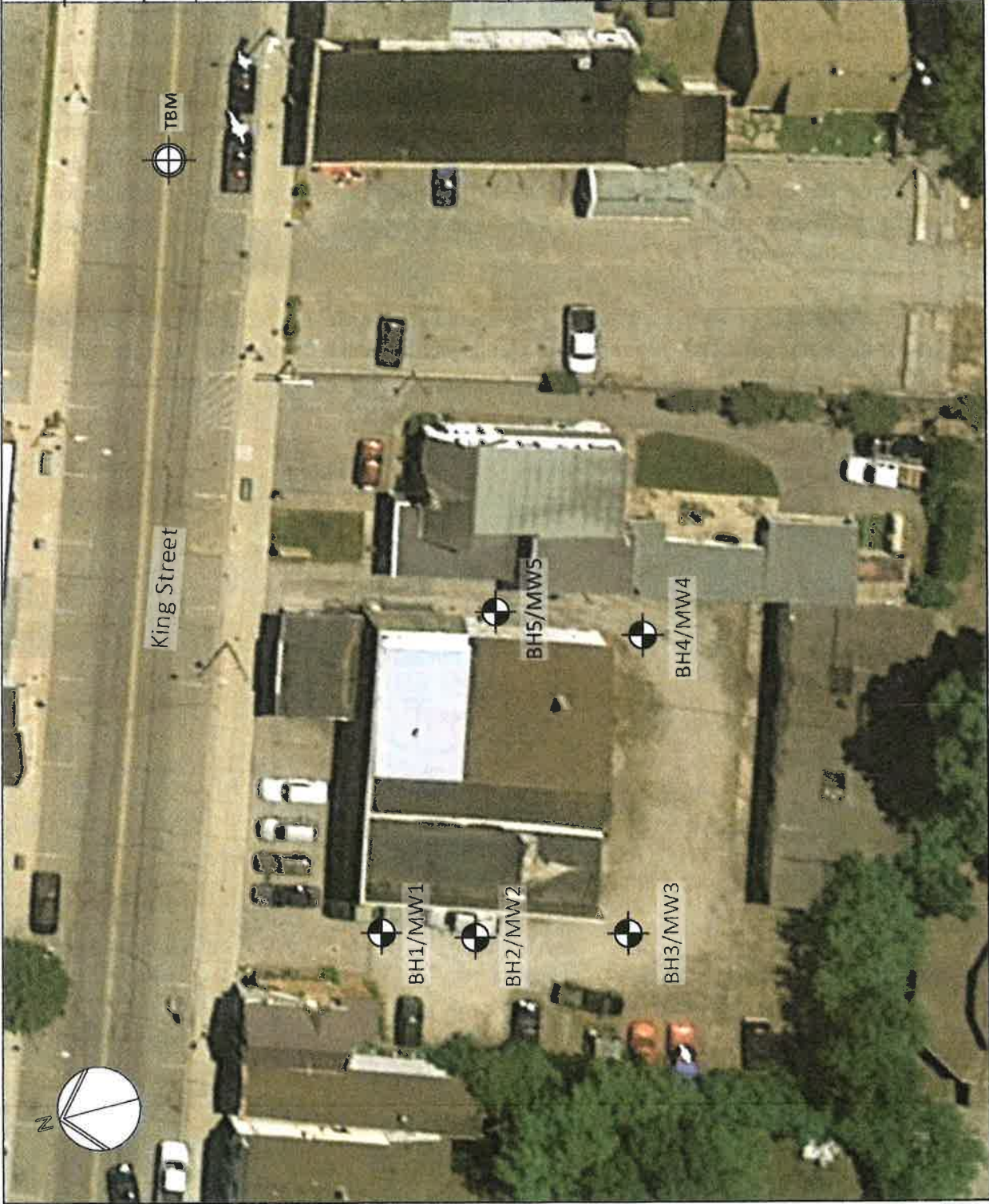
Adam Roemmele, P. Eng.
Project Engineer



Stephen R. Sears, B. Eng. Mgmt., P. Eng., QP_{ESA}
Review Engineer

Enclosures: Drawing No.1, Borehole Location Plan
 Log of Borehole Nos. 1 to 5, inclusive
 Drawing No. 2, Typical Design Requirements – Slab-on-Grade with Perimeter
 Drainage

Distribution: Sentry Property Group [1, plus pdf]



LEGEND



Borehole Location



Temporary Benchmark
Top of Manhole Cover
TBM Assigned Elevation : 100 m

NOTES

1. This drawing should be read in conjunction with SOIL-MAT ENGINEERS & CONSULTANTS LTD. Report No. SM 220178-G.
2. Borehole locations are approximate.

SOIL-MAT

ENGINEERS & CONSULTANTS LTD.

Geotechnical Investigation
Proposed Mixed-Use
Structure
78 King Street
Delhi, Ontario

Borehole Location Plan

Project No. SM 220178-G

Date: April 2022

Drawn: CL Checked: AR
SM 220178-G Borehole Location
Plan

Drawing No. 1

Log of Borehole No. 1

Project No: SM 220178-G

Project: Proposed Mixed-Use Structure

Location: 78 King Street, Delhi

Client: Sentry Property Group

Project Manager: Adam Roemmele, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 541094

E: 4744854



Depth ft m	Elevation (m)	Symbol	Description	Well Data	SAMPLE							Moisture Content w% ▲ 10 20 30 40 ▲						
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)	Standard Penetration Test ● blows/300mm ●						
												20	40	60	80			
0	100.46		Ground Surface															
1	100.16		Pavement Structure Approximately 300 millimetres of compact granular base.		DC	1	4,4,3,2	7										
2			Silty Sand Fill Reddish brown, trace to some gravel, trace clay, occasional construction debris in the upper levels, very loose to compact.		DC	2	1,2,1,1	3										
3				DC	3	2,2,3,2	5											
4				DC	4	3,3,3,3	6											
5				DC	5	4,5,8,8	13											
6	97.40			DC	6	11,11,17,18	28											
7			Sand Brown, trace to some gravel, becoming coarser with depth, occasional sandy silt seams in the upper levels, compact to dense.		DC	7	19,19,12,12	31										
8				DC	8	14,15,22,21	37											
9				DC	9	21,22,12,12	34											
10				DC	10	7,7,9,10	16											
11				DC	11	16,17,18,17	35											
12				DC	12	11,11,21,21	32											
13				DC	13	26,25,21,21	46											
14				DC	14	10,10,14,13	24											
15			Silty Clay/Clayey Silt Brown, trace sand and gravel, very stiff.		DC	15	10,12,11,10	23										
16	91.00			DC	16	9,8,9,8	17											
17	89.90			DC	17	7,12,15,22	27	3.5										
18				DC	18	24,7	31											
19			Transition to grey in color															
20			End of Borehole															
21			NOTES: 1. Borehole was advanced using direct push and dynamic cone equipment on April 11, 2022 to termination at a depth of 10.67 metres. 2. Borehole was recorded as open and 'wet' at a depth of 7.5 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.															
22																		
23																		
24																		
25																		
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28																		
29																		
30																		
31																		

Drill Method: Direct Push/Dynamic Cone **Soil-Mat Engineers & Consultants Ltd.**

Drill Date: April 11, 2022

Hole Size: 200 millimetres

Drilling Contractor: Strata Drilling Group

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: info@soil-mat.ca

Datum: Temporary Benchmark

Field Logged by: CL

Checked by: AR

Sheet: 1 of 1

Log of Borehole No. 2

Project No: SM 220178-G

Project: Proposed Mixed-Use Structure

Location: 78 King Street, Delhi

Client: Sentry Property Group

Project Manager: Adam Roemmele, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 541090

E: 4744846



Depth ft m	Elevation (m)	Symbol	Description	Well Data	SAMPLE							Moisture Content w%			
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)	10	20	30	40
												Standard Penetration Test blows/300mm			
			Ground Surface												
0	100.21		Pavement Structure		DC	1	4,4,1,2	5							
1	99.91		Approximately 300 millimetres of compact granular base.		DC	2	1,1,1,1	2							
2			Silty Sand Fill		DC	3	0,1,2,1	3							
3	98.70		Reddish brown, trace gravel and clay, occasional construction debris in the upper levels, loose to very loose.		DC	4	2,4,5,8	9							
4			Sand		DC	5	7,6,7,8	13							
5			Brown, trace to some gravel, becoming coarser with depth, occasional sandy silt seams in the lower levels, very loose to dense.		DC	6	9,10,11,14	21							
6					DC	7	13,12,11,15	23							
7					DC	8	18,21,19,20	40							
8					DC	9	20,17,24,21	41							
9					DC	10	13,12,14,15	26							
10					DC	11	15,16,20,22	36							
11					DC	12	22,23,19,17	42							
12					DC	13	8,8,5,5	13							
13					DC	14	8,8,9,6	17							
14					DC	15	11,12,11,10	23							
15	90.60		Silty Clay/Clayey Silt		DC	16	10,9,10,12	19							
16	89.80		Brown, trace sand and gravel, hard.		DC	17	15,24,28,17	52		3.0					
17	89.50		Transition to grey in color		DC	18	17,16	33							
18			End of Borehole												
19			NOTES:												
20			1. Borehole was advanced using direct push and dynamic cone equipment on April 11, 2022 to termination at a depth of 10.7 metres.												
21			2. Borehole was recorded as open and 'wet' at a depth of 7.0 metres upon completion and backfilled as per Ontario Regulation 903.												
22			3. Soil samples will be discarded after 3 months unless otherwise directed by our client.												

Drill Method: Direct Push/Dynamic Cone **Soil-Mat Engineers & Consultants Ltd.**

Drill Date: April 11, 2022

Hole Size: 200 millimetres

Drilling Contractor: Strata Drilling Group

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

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Datum: Temporary Benchmark

Field Logged by: CL

Checked by: AR

Sheet: 1 of 1

Log of Borehole No. 3

Project No: SM 220178-G

Project: Proposed Mixed-Use Structure

Location: 78 King Street, Delhi

Client: Sentry Property Group

Project Manager: Adam Roemmele, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 541087

E: 4744837



Depth ft m	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%				Standard Penetration Test blows/300mm	
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt.(kN/m3)	10	20	30		40
												20	40	60		80
0	100.21		Ground Surface													
1			Pavement Structure Approximately 250 millimetres of compact granular base.		DC	1	8,6,3,4	9								
2					DC	2	1,2,4,2	6								
3	98.70		Silty Sand Fill Reddish brown, trace gravel and clay, occasional construction debris in the upper levels, loose.		DC	3	3,2,3,8	5								
4					DC	4	5,6,6,6	12								
5			Sand Brown, trace to some gravel, becoming coarser with depth, occasional sandy silt seams in the lower levels, loose to dense.		DC	5	8,6,6,7	12								
6					DC	6	7,8,10,9	18								
7					DC	7	9,10,14,12	24								
8					DC	8	14,16,15,16	31								
9					DC	9	16,16,16,16	32								
10					DC	10	18,18,19,16	37								
11					DC	11	16,17,17,16	34								
12					DC	12	15,16,17,19	33								
13					DC	13	24,22,24,23	46								
14					DC	14	17,13,10,6	23								
15					DC	15	6,6,5,7	11								
16					DC	16	7,4,5,6	9								
17	89.50				DC	17	8,7,6,6	13								
18					DC	18	7,7	14								
19			End of Borehole													
20			NOTES: 1. Borehole was advanced using direct push and dynamic cone equipment on April 11, 2022 to termination at a depth of 10.7 metres. 2. Borehole was recorded as open and 'wet' at a depth of 7.0 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: Direct Push/Dynamic Cone

Drill Date: April 12, 2022

Hole Size: 200 millimetres

Drilling Contractor: Strata Drilling Group

Soil-Mat Engineers & Consultants Ltd.

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: info@soil-mat.ca

Datum: Temporary Benchmark

Field Logged by: CL

Checked by: AR

Sheet: 1 of 1

Log of Borehole No. 4

Project No: SM 220178-G

Project: Proposed Mixed-Use Structure

Location: 78 King Street, Delhi

Client: Sentry Property Group

Project Manager: Adam Roemmele, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 541112

E: 4744827



Depth	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%					
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm2)	U.Wt. (kN/m3)	Standard Penetration Test blows/300mm				
												10	20	30	40	
0	100.27		Ground Surface													
1			Pavement Structure Approximately 250 millimetres of compact granular base.		DC	1	9,9,10,7	19								
2					DC	2	7,4,2,2	6								
3					DC	3	1,1,2,2	3								
4			Silty Sand Fill Reddish brown, trace gravel and clay, occasional construction debris and in the upper levels, compact to very loose.		DC	4	4,2,2,2	4								
5	97.50				DC	5	3,2,1,2	3								
6					DC	6	2,3,2,4	5								
7			Sand Brown, trace to some gravel, becoming coarser with depth, occasional sandy silt seams in the lower levels, very loose to compact.		DC	7	4,4,6,9	10								
8					DC	8	12,14,15,14	29								
9					DC	9	14,14,13,14	27								
10					DC	10	11,10,9,9	19								
11					DC	11	11,8,6,5	14								
12					DC	12	4,7,8,13	15								
13					DC	13	18,16,13,11	19								
14					DC	14	14,10,8,10	18								
15					DC	15	8,8,9,5	17								
16					DC	16	6,7,7,7	14								
17	90.40		Silty Clay/Clayey Silt Brown, trace sand and gravel, very stiff.		DC	17	7,7,9,10	16		3.0						
18	89.60				DC	18	9,8	17								
19			End of Borehole													
20			NOTES: 1. Borehole was advanced using direct push and dynamic cone equipment on April 12, 2022 to termination at a depth of 10.7 metres. 2. Borehole was recorded as open and 'wet' at a depth of 7.6 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.													

Drill Method: Direct Push/Dynamic Cone **Soil-Mat Engineers & Consultants Ltd.**

Drill Date: April 12, 2022

Hole Size: 200 millimetres

Drilling Contractor: Strata Drilling Group

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: info@soil-mat.ca

Datum: Temporary Benchmark

Field Logged by: CL

Checked by: AR

Sheet: 1 of 1

Log of Borehole No. 5

Project No: SM 220178-G

Project: Proposed Mixed-Use Structure

Location: 78 King Street, Delhi

Client: Sentry Property Group

Project Manager: Adam Roemmele, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 541117

E: 4744835



Depth ft m	Elevation (m)	Symbol	Description	Well Data	SAMPLE						Moisture Content w%	
					Type	Number	Blow Counts	Blows/300mm	Recovery	PP (kgf/cm ²)	U.Wt. (kN/m ³)	Standard Penetration Test blows/300mm
			Ground Surface									
0	100.44											
1	100.06		Pavement Structure Approximately 80 millimetres of asphaltic concrete overlying 300 millimetres of compact granular base.		DC	1	6,4,5,12	9				
2					DC	2	2,0,0,0	0				
3			Silty Sand Fill Reddish brown, trace gravel and clay, occasional construction debris and in the upper levels, very loose to loose.		DC	3	2,1,2,2	3				
4					DC	4	1,4,4,3	8				
5	97.70		Sand Brown, trace to some gravel, becoming coarser with depth, occasional sandy silt seams in the lower levels, very loose to compact.		DC	5	3,1,2,0	3				
6					DC	6	0,1,2,1	3				
7					DC	7	1,2,3,4	5				
8					DC	8	2,5,6,18	11				
9					DC	9	8,12,10,9	22				
10					DC	10	6,4,2,3	6				
11					DC	11	2,3,3,3	6				
12					DC	12	1,2,2,4	4				
13					DC	13	4,3,5,4	8				
14					DC	14	6,6,6,6	12				
15					DC	15	7,8,7,15	15				
16	90.60				DC	16	17,12,10,12	22				
17	89.80		Silty Clay/Clayey Silt Brown, trace sand and gravel, hard.		DC	17	9,8,23,31	31		3.5		
18					DC	18	44,49	93				
19			End of Borehole									
20												
21												
22												
23												
24												
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26												
27												
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NOTES:

- Borehole was advanced using direct push and dynamic cone equipment on April 12, 2022 to termination at a depth of 10.7 metres.
- Borehole was recorded as open and 'wet' at a depth of 7.3 metres upon completion and backfilled as per Ontario Regulation 903.
- Soil samples will be discarded after 3 months unless otherwise directed by our client.

Drill Method: Direct Push/Dynamic Cone

Drill Date: April 12, 2022

Hole Size: 200 millimetres

Drilling Contractor: Strata Drilling Group

Soil-Mat Engineers & Consultants Ltd.

130 Lancing Drive, Hamilton, ON L8W 3A1

T: 905.318.7440 F: 905.318.7455

E: info@soil-mat.ca

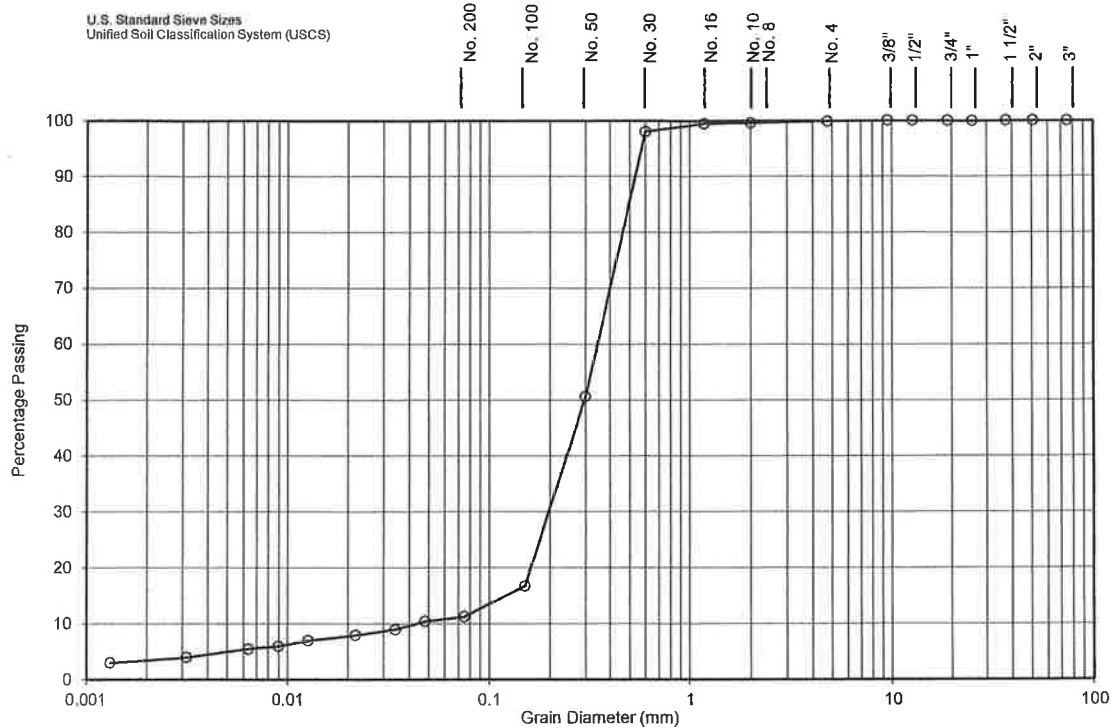
Datum: Temporary Benchmark

Field Logged by: CL

Checked by: AR

Sheet: 1 of 1

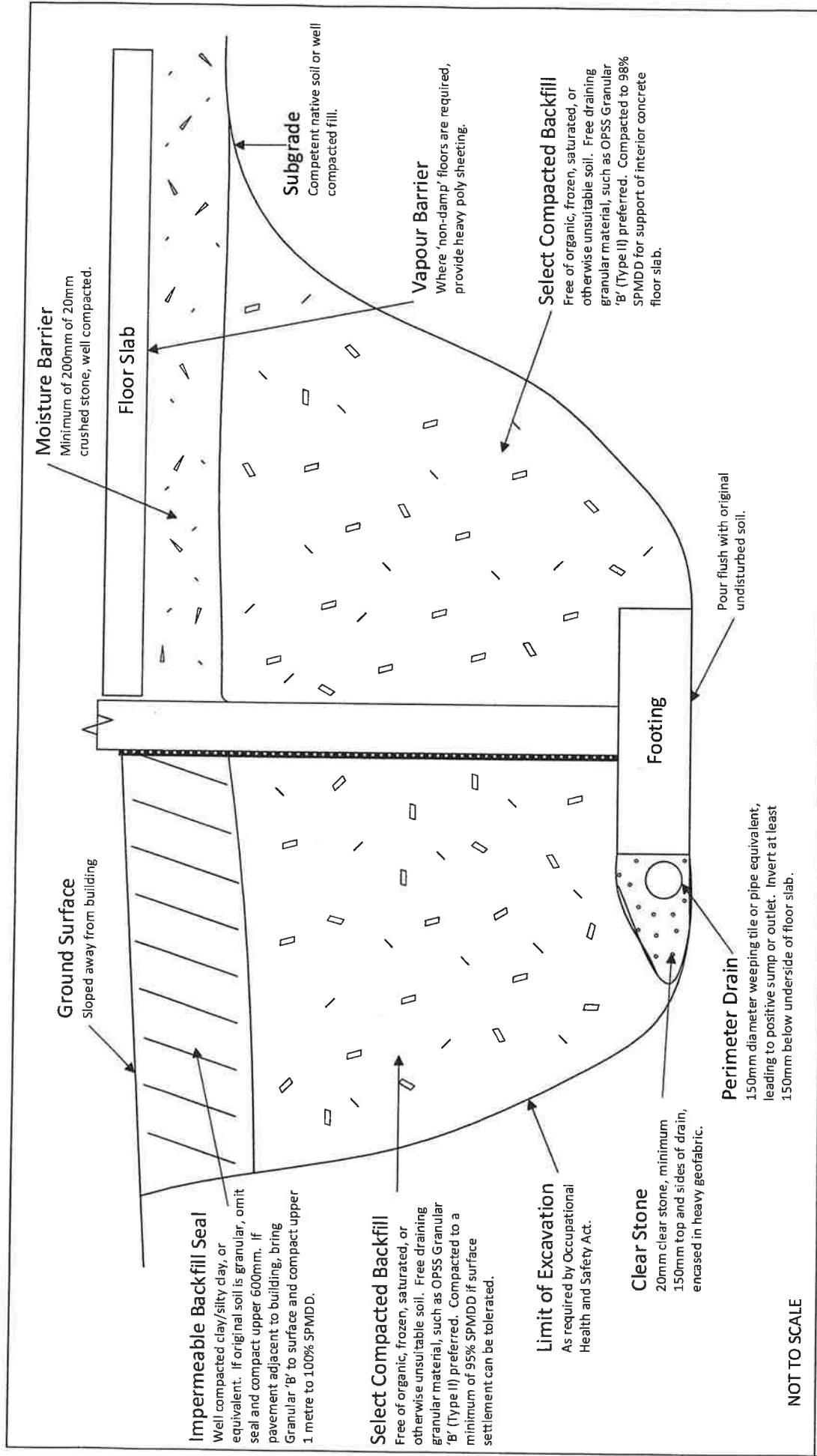
Mechanical & Hydrometer Analyses




CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE
		SAND			GRAVEL	

Lab No.:	22-203	Notes: 5 - 10'			
Borehole No.:	1	Soil Description: Brown Sand w/ traces of Silt and Clay S.W. - Well graded sands to S.M. - Sand-silt mixtures			
Sample No.:	2				
CLAY [%]:	3	Estimated Infiltration Rate [mm/hr]: 70 to 95			
SILT [%]:	8				
SAND [%]:	89	Estimated Permeability, k [cm/s] 10⁻³			
GRAVEL [%]:	0				
D ₁₀ (Effective Diam. in mm):	0.041	Coefficient of Uniformity C _u : 8.5		Coefficient of Curvature C _c : 2.8	
SOIL-MAT ENGINEERS & CONSULTANTS LTD.					
78 King Street, Delhi ON					
May 2022		Grain Size Analysis No. 1		Project No.: SM 220178-T	

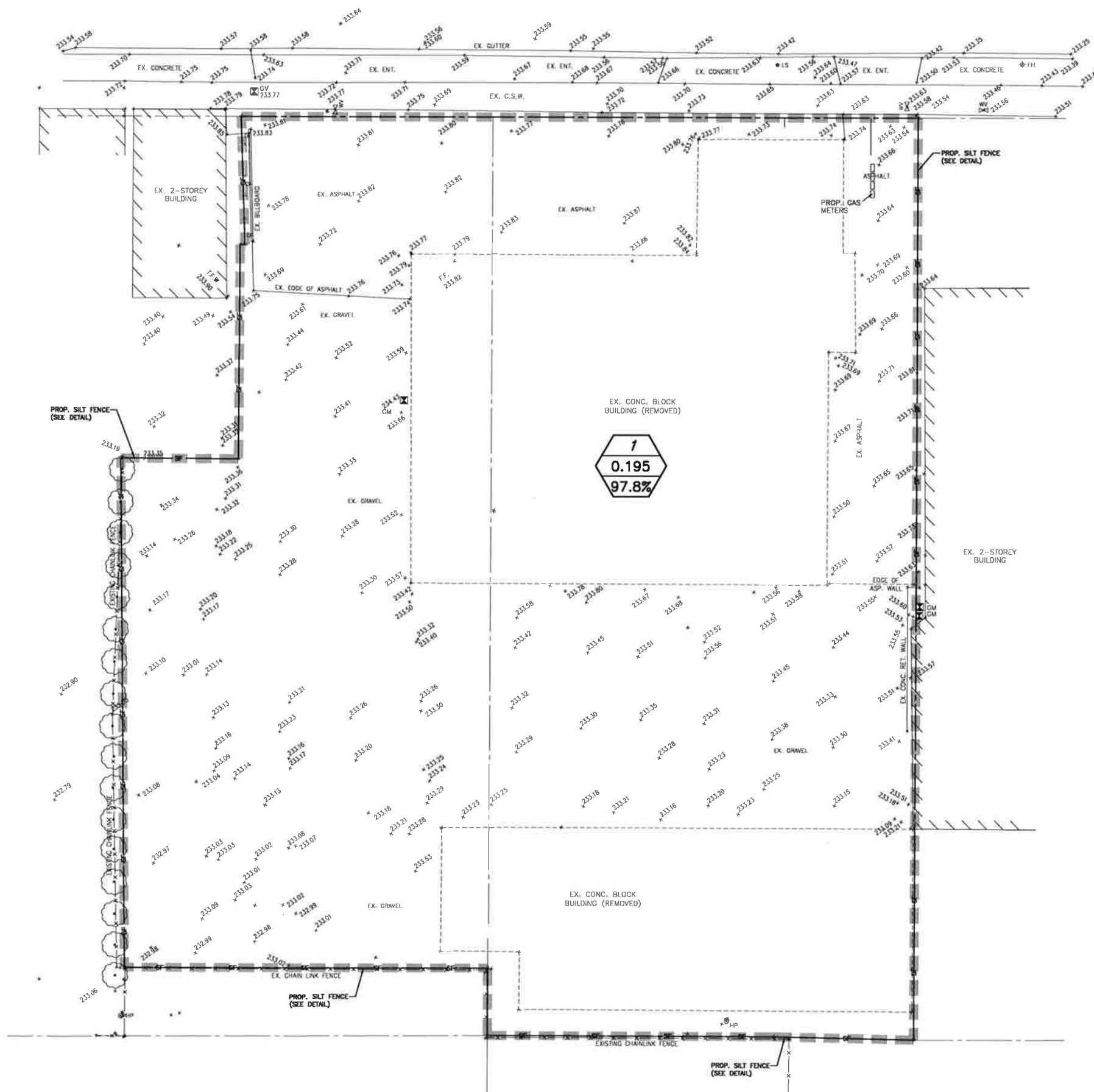






	Soil-Mat Engineers & Consultants Ltd.		Project No.:	SM 220178-G
	Typical Design Requirements Slab-on-Grade with Perimeter Drainage		Date:	June, 2022
			Drawing No. 2	

Appendix 'C'
MIDUSS Stormwater Management Simulation Results
Pre-development Conditions

KING STREET



LEGEND

-  STORM DRAINAGE BOUNDARY
- 
 - ← STORM DRAINAGE NUMBER
 - ← STORM AREA IN HECTARES
 - ← % IMPERVIOUS



PRE DEVELOPMENT STORM DRAINAGE AREAS

PROPOSED MIXED USE BUILDING
78 KING STREET – NORFOLK COUNTY



CLIENT: SENTRY GROUP
SCALE: 1:250

JOB: 16025

```

"          MIDUSS Output ----->"
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"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pre2.out"
"          Licensee name:                      Bob"
"          Company                            "
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" 31      TIME PARAMETERS"
"          10.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          529.711 Coefficient A"
"          4.501 Constant B"
"          0.745 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity                    69.337 mm/hr"
"          Total depth                          32.583 mm"
"          6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2 Rectangular"
"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          97.800 % Impervious"
"          0.195 Total Area"
"          45.252 Flow length"
"          1.400 Overland Slope"
"          0.004 Pervious Area"
"          45.252 Pervious length"
"          1.400 Pervious slope"
"          0.191 Impervious Area"
"          45.252 Impervious length"
"          1.400 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          2.000 Impervious Depression storage"
"          0.037 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.191 0.195 hectare"
"          Time of concentration --- 3.658 3.658 minutes"
"          Time to Centroid 0.000 89.997 89.997 minutes"
"          Rainfall depth 32.583 32.583 32.583 mm"
"          Rainfall volume 1.40 62.14 63.54 c.m"
"          Rainfall losses 32.583 2.000 2.673 mm"
"          Runoff depth 0.000 30.583 29.910 mm"
"          Runoff volume 0.00 58.32 58.32 c.m"
"          Runoff coefficient 0.000 0.939 0.918 "

```

"	Maximum flow	0.000	0.037	0.037	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.037 0.037 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				


```

"      MIDUSS Output ----->"
"      MIDUSS version                      Version 2.25 rev. 473"
"      MIDUSS created                      February-07-10"
"      10 Units used:                      ie METRIC"
"      Job folder:                        C:\swm\MIDUSS\16025"
"      Output filename:                    Pre5.out"
"      Licensee name:                      Bob"
"      Company                            "
"      Date & Time last used:              31/07/2022 at 9:11:43 AM"
" 31      TIME PARAMETERS"
"      10.000 Time Step"
"      180.000 Max. Storm length"
"      1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"      1 Chicago storm"
"      583.017 Coefficient A"
"      3.007 Constant B"
"      0.703 Exponent C"
"      0.400 Fraction R"
"      180.000 Duration"
"      1.000 Time step multiplier"
"      Maximum intensity          92.454 mm/hr"
"      Total depth                44.904 mm"
"      6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"      2 Rectangular"
"      1 Equal length"
"      2 Horton equation"
"      101 No description"
"      97.800 % Impervious"
"      0.195 Total Area"
"      45.252 Flow length"
"      1.400 Overland Slope"
"      0.004 Pervious Area"
"      45.252 Pervious length"
"      1.400 Pervious slope"
"      0.191 Impervious Area"
"      45.252 Impervious length"
"      1.400 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      50.000 Pervious Max.infiltration"
"      10.000 Pervious Min.infiltration"
"      0.500 Pervious Lag constant (hours)"
"      7.500 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.500 Impervious Lag constant (hours)"
"      2.000 Impervious Depression storage"
"      0.049 0.000 0.000 0.000 c.m/sec"
"      Catchment 101 Pervious Impervious Total Area "
"      Surface Area 0.004 0.191 0.195 hectare"
"      Time of concentration 32.251 3.260 3.317 minutes"
"      Time to Centroid 94.595 89.505 89.515 minutes"
"      Rainfall depth 44.904 44.904 44.904 mm"
"      Rainfall volume 1.93 85.64 87.56 c.m"
"      Rainfall losses 41.133 2.000 2.861 mm"
"      Runoff depth 3.771 42.904 42.043 mm"
"      Runoff volume 0.16 81.82 81.98 c.m"
"      Runoff coefficient 0.084 0.955 0.936 "

```

"	Maximum flow	0.000	0.049	0.049	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.049	0.049	0.000	0.000"
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			0.195	hectare"
"	Total Impervious area			0.191	hectare"
"	Total % impervious			97.800"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
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"          Output filename:                    Pre10.out"
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"          1500.000 Max. Hydrograph"
" 32          STORM Chicago storm"
"          1 Chicago storm"
"          670.324 Coefficient A"
"          3.007 Constant B"
"          0.698 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity          107.682 mm/hr"
"          Total depth                52.991 mm"
"          6 005hyd Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"          2 Rectangular"
"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          97.800 % Impervious"
"          0.195 Total Area"
"          45.252 Flow length"
"          1.400 Overland Slope"
"          0.004 Pervious Area"
"          45.252 Pervious length"
"          1.400 Pervious slope"
"          0.191 Impervious Area"
"          45.252 Impervious length"
"          1.400 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          2.000 Impervious Depression storage"
"          0.057 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.191 0.195 hectare"
"          Time of concentration 23.695 3.067 3.146 minutes"
"          Time to Centroid 90.551 89.152 89.157 minutes"
"          Rainfall depth 52.991 52.991 52.991 mm"
"          Rainfall volume 2.27 101.06 103.33 c.m"
"          Rainfall losses 44.350 2.000 2.932 mm"
"          Runoff depth 8.641 50.991 50.059 mm"
"          Runoff volume 0.37 97.25 97.62 c.m"
"          Runoff coefficient 0.163 0.962 0.945 "

```


"	Maximum flow	0.000	0.057	0.057	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.057 0.057 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

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"          MIDUSS Output ----->"
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" 32      STORM Chicago storm"
"          1 Chicago storm"
"          721.533 Coefficient A"
"          2.253 Constant B"
"          0.679 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity          127.011 mm/hr"
"          Total depth                63.151 mm"
"          6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2 Rectangular"
"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          97.800 % Impervious"
"          0.195 Total Area"
"          45.252 Flow length"
"          1.400 Overland Slope"
"          0.004 Pervious Area"
"          45.252 Pervious length"
"          1.400 Pervious slope"
"          0.191 Impervious Area"
"          45.252 Impervious length"
"          1.400 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          2.000 Impervious Depression storage"
"          0.068 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.191 0.195 hectare"
"          Time of concentration 19.336 2.871 2.964 minutes"
"          Time to Centroid 90.364 88.989 88.996 minutes"
"          Rainfall depth 63.151 63.151 63.151 mm"
"          Rainfall volume 2.71 120.44 123.14 c.m"
"          Rainfall losses 47.786 2.000 3.007 mm"
"          Runoff depth 15.365 61.151 60.144 mm"
"          Runoff volume 0.66 116.62 117.28 c.m"
"          Runoff coefficient 0.243 0.968 0.952 "

```

"	Maximum flow	0.000	0.067	0.068	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.068 0.068 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

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"          MIDUSS Output ----->"
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"          Output filename:                   Pre50.out"
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"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32          STORM Chicago storm"
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"          766.038 Coefficient A"
"          1.898 Constant B"
"          0.668 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity          141.545 mm/hr"
"          Total depth          71.090 mm"
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" 33          CATCHMENT 101"
"          2 Rectangular"
"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          97.800 % Impervious"
"          0.195 Total Area"
"          45.252 Flow length"
"          1.400 Overland Slope"
"          0.004 Pervious Area"
"          45.252 Pervious length"
"          1.400 Pervious slope"
"          0.191 Impervious Area"
"          45.252 Impervious length"
"          1.400 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          2.000 Impervious Depression storage"
"          0.076 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.191 0.195 hectare"
"          Time of concentration 17.387 2.750 2.851 minutes"
"          Time to Centroid 92.128 88.885 88.907 minutes"
"          Rainfall depth 71.090 71.090 71.090 mm"
"          Rainfall volume 3.05 135.58 138.62 c.m"
"          Rainfall losses 49.748 2.000 3.050 mm"
"          Runoff depth 21.342 69.090 68.039 mm"
"          Runoff volume 0.92 131.76 132.68 c.m"
"          Runoff coefficient 0.300 0.972 0.957 "

```


"	Maximum flow	0.001	0.075	0.076	c.m/sec"
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"	4 Add Runoff "				
"	0.076 0.076 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

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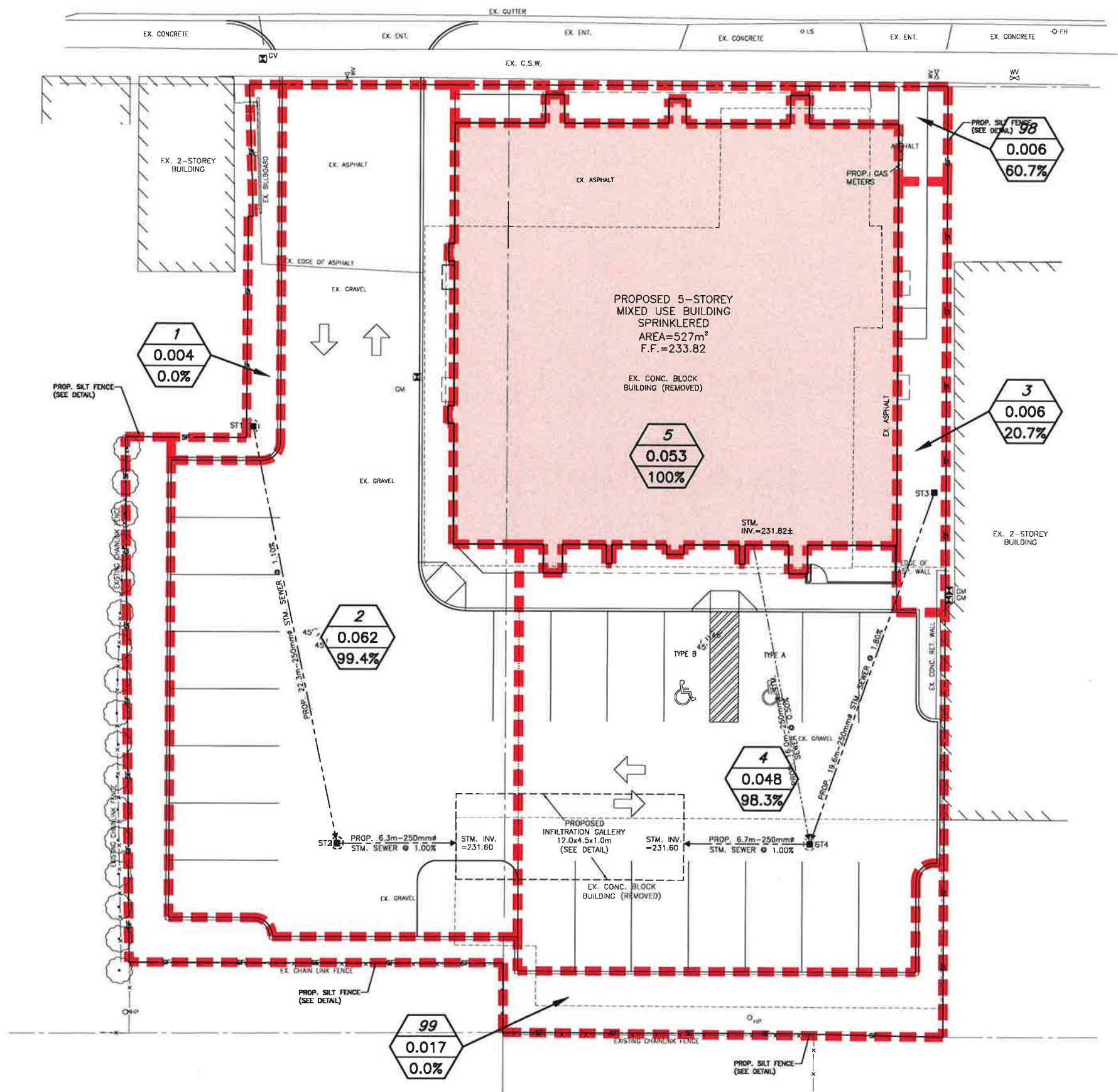
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"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32          STORM Chicago storm"
"          1 Chicago storm"
"          801.041 Coefficient A"
"          1.501 Constant B"
"          0.657 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity          155.782 mm/hr"
"          Total depth                78.830 mm"
"          6 005hyd Hydrograph extension used in this file"
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"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          97.800 % Impervious"
"          0.195 Total Area"
"          45.252 Flow length"
"          1.400 Overland Slope"
"          0.004 Pervious Area"
"          45.252 Pervious length"
"          1.400 Pervious slope"
"          0.191 Impervious Area"
"          45.252 Impervious length"
"          1.400 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          2.000 Impervious Depression storage"
"          0.083 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.191 0.195 hectare"
"          Time of concentration 16.039 2.646 2.754 minutes"
"          Time to Centroid 94.485 88.849 88.894 minutes"
"          Rainfall depth 78.830 78.830 78.830 mm"
"          Rainfall volume 3.38 150.34 153.72 c.m"
"          Rainfall losses 51.075 2.000 3.080 mm"
"          Runoff depth 27.755 76.830 75.751 mm"
"          Runoff volume 1.19 146.52 147.71 c.m"
"          Runoff coefficient 0.352 0.975 0.961 "

```

"	Maximum flow	0.001	0.083	0.083	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"		0.083	0.083	0.000	0.000"
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area			0.195	hectare"
"	Total Impervious area			0.191	hectare"
"	Total % impervious			97.800"	
" 19	EXIT"				

Appendix 'D'
MIDUSS Stormwater Management Simulation Results
Post-development Conditions

KING STREET



LEGEND

STORM DRAINAGE BOUNDARY

STORM DRAINAGE NUMBER
STORM AREA IN HECTARES
% IMPERVIOUS



POST DEVELOPMENT
STORM DRAINAGE AREAS

PROPOSED MIXED USE BUILDING
78 KING STREET – NORFOLK COUNTY

J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
BRANTFORD

CLIENT: SENTRY GROUP
SCALE: 1:250
JOB: 16025

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February-07-10"
"          10  Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pre2.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:12:59 AM"
" 31      TIME PARAMETERS"
"          10.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          529.711  Coefficient A"
"          4.501  Constant B"
"          0.745  Exponent C"
"          0.400  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    69.337  mm/hr"
"          Total depth                        32.583  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2  Rectangular"
"          1  Equal length"
"          2  Horton equation"
"          101  No description"
"          97.800  % Impervious"
"          0.195  Total Area"
"          45.252  Flow length"
"          1.400  Overland Slope"
"          0.004  Pervious Area"
"          45.252  Pervious length"
"          1.400  Pervious slope"
"          0.191  Impervious Area"
"          45.252  Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          50.000  Pervious Max.infiltration"
"          10.000  Pervious Min.infiltration"
"          0.500  Pervious Lag constant (hours)"
"          7.500  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.500  Impervious Lag constant (hours)"
"          2.000  Impervious Depression storage"
"          0.037  0.000  0.000  0.000 c.m/sec"
"          Catchment 101      Pervious  Impervious Total Area "
"          Surface Area      0.004      0.191      0.195      hectare"
"          Time of concentration      ---      3.658      3.658      minutes"
"          Time to Centroid      0.000      89.997      89.997      minutes"
"          Rainfall depth      32.583      32.583      32.583      mm"
"          Rainfall volume      1.40      62.14      63.54      c.m"
"          Rainfall losses      32.583      2.000      2.673      mm"
"          Runoff depth      0.000      30.583      29.910      mm"
"          Runoff volume      0.00      58.32      58.32      c.m"
"          Runoff coefficient      0.000      0.939      0.918      "

```

"	Maximum flow	0.000	0.037	0.037	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.037 0.037 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February-07-10"
"          10  Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pre5.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:11:43 AM"
" 31      TIME PARAMETERS"
"          10.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1      Chicago storm"
"          583.017 Coefficient A"
"          3.007   Constant B"
"          0.703   Exponent C"
"          0.400   Fraction R"
"          180.000 Duration"
"          1.000   Time step multiplier"
"          Maximum intensity          92.454   mm/hr"
"          Total depth                44.904   mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2      Rectangular"
"          1      Equal length"
"          2      Horton equation"
"          101    No description"
"          97.800 % Impervious"
"          0.195  Total Area"
"          45.252 Flow length"
"          1.400  Overland Slope"
"          0.004  Pervious Area"
"          45.252 Pervious length"
"          1.400  Pervious slope"
"          0.191  Impervious Area"
"          45.252 Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500  Pervious Lag constant (hours)"
"          7.500  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.500  Impervious Lag constant (hours)"
"          2.000  Impervious Depression storage"
"          0.049  0.000  0.000  0.000 c.m/sec"
"          Catchment 101      Pervious  Impervious Total Area "
"          Surface Area      0.004      0.191      0.195      hectare"
"          Time of concentration 32.251      3.260      3.317      minutes"
"          Time to Centroid    94.595      89.505      89.515      minutes"
"          Rainfall depth      44.904      44.904      44.904      mm"
"          Rainfall volume      1.93      85.64      87.56      c.m"
"          Rainfall losses      41.133      2.000      2.861      mm"
"          Runoff depth         3.771      42.904      42.043      mm"
"          Runoff volume         0.16      81.82      81.98      c.m"
"          Runoff coefficient    0.084      0.955      0.936      "

```


"	Maximum flow	0.000	0.049	0.049	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.049 0.049 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February-07-10"
"          10  Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pre10.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:10:19 AM"
" 31      TIME PARAMETERS"
"          10.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          670.324  Coefficient A"
"          3.007  Constant B"
"          0.698  Exponent C"
"          0.400  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          107.682  mm/hr"
"          Total depth                52.991  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2  Rectangular"
"          1  Equal length"
"          2  Horton equation"
"          101  No description"
"          97.800  % Impervious"
"          0.195  Total Area"
"          45.252  Flow length"
"          1.400  Overland Slope"
"          0.004  Pervious Area"
"          45.252  Pervious length"
"          1.400  Pervious slope"
"          0.191  Impervious Area"
"          45.252  Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          50.000  Pervious Max.infiltration"
"          10.000  Pervious Min.infiltration"
"          0.500  Pervious Lag constant (hours)"
"          7.500  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.500  Impervious Lag constant (hours)"
"          2.000  Impervious Depression storage"
"          0.057  0.000  0.000  0.000 c.m/sec"
"          Catchment 101      Pervious  Impervious Total Area "
"          Surface Area      0.004      0.191      0.195      hectare"
"          Time of concentration  23.695      3.067      3.146      minutes"
"          Time to Centroid      90.551      89.152      89.157      minutes"
"          Rainfall depth      52.991      52.991      52.991      mm"
"          Rainfall volume      2.27      101.06      103.33      c.m"
"          Rainfall losses      44.350      2.000      2.932      mm"
"          Runoff depth      8.641      50.991      50.059      mm"
"          Runoff volume      0.37      97.25      97.62      c.m"
"          Runoff coefficient      0.163      0.962      0.945      "

```

"	Maximum flow	0.000	0.057	0.057	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.057 0.057 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February-07-10"
"          10  Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pre25.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:09:09 AM"
" 31      TIME PARAMETERS"
"          10.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          721.533  Coefficient A"
"          2.253  Constant B"
"          0.679  Exponent C"
"          0.400  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity      127.011  mm/hr"
"          Total depth            63.151  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2  Rectangular"
"          1  Equal length"
"          2  Horton equation"
"          101  No description"
"          97.800  % Impervious"
"          0.195  Total Area"
"          45.252  Flow length"
"          1.400  Overland Slope"
"          0.004  Pervious Area"
"          45.252  Pervious length"
"          1.400  Pervious slope"
"          0.191  Impervious Area"
"          45.252  Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          50.000  Pervious Max.infiltration"
"          10.000  Pervious Min.infiltration"
"          0.500  Pervious Lag constant (hours)"
"          7.500  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.500  Impervious Lag constant (hours)"
"          2.000  Impervious Depression storage"
"          0.068  0.000  0.000  0.000 c.m/sec"
"          Catchment 101  Pervious  Impervious Total Area "
"          Surface Area      0.004  0.191  0.195  hectare"
"          Time of concentration  19.336  2.871  2.964  minutes"
"          Time to Centroid    90.364  88.989  88.996  minutes"
"          Rainfall depth     63.151  63.151  63.151  mm"
"          Rainfall volume     2.71  120.44  123.14  c.m"
"          Rainfall losses     47.786  2.000  3.007  mm"
"          Runoff depth        15.365  61.151  60.144  mm"
"          Runoff volume       0.66  116.62  117.28  c.m"
"          Runoff coefficient  0.243  0.968  0.952  "

```


"	Maximum flow	0.000	0.067	0.068	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.068 0.068 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February-07-10"
"          10  Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pre50.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:07:51 AM"
" 31      TIME PARAMETERS"
"          10.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          766.038  Coefficient A"
"          1.898  Constant B"
"          0.668  Exponent C"
"          0.400  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          141.545  mm/hr"
"          Total depth          71.090  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2  Rectangular"
"          1  Equal length"
"          2  Horton equation"
"          101  No description"
"          97.800  % Impervious"
"          0.195  Total Area"
"          45.252  Flow length"
"          1.400  Overland Slope"
"          0.004  Pervious Area"
"          45.252  Pervious length"
"          1.400  Pervious slope"
"          0.191  Impervious Area"
"          45.252  Impervious length"
"          1.400  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          50.000  Pervious Max.infiltration"
"          10.000  Pervious Min.infiltration"
"          0.500  Pervious Lag constant (hours)"
"          7.500  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.500  Impervious Lag constant (hours)"
"          2.000  Impervious Depression storage"
"          0.076  0.000  0.000  0.000 c.m/sec"
"          Catchment 101          Pervious  Impervious Total Area "
"          Surface Area          0.004  0.191  0.195  hectare"
"          Time of concentration  17.387  2.750  2.851  minutes"
"          Time to Centroid      92.128  88.885  88.907  minutes"
"          Rainfall depth        71.090  71.090  71.090  mm"
"          Rainfall volume        3.05  135.58  138.62  c.m"
"          Rainfall losses        49.748  2.000  3.050  mm"
"          Runoff depth          21.342  69.090  68.039  mm"
"          Runoff volume          0.92  131.76  132.68  c.m"
"          Runoff coefficient      0.300  0.972  0.957  "

```

"	Maximum flow	0.001	0.075	0.076	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.076 0.076 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 473"
"          MIDUSS created                      February-07-10"
"          10 Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pre100.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:03:36 AM"
" 31      TIME PARAMETERS"
"          10.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          801.041 Coefficient A"
"          1.501 Constant B"
"          0.657 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity                    155.782 mm/hr"
"          Total depth                          78.830 mm"
"          6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2 Rectangular"
"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          97.800 % Impervious"
"          0.195 Total Area"
"          45.252 Flow length"
"          1.400 Overland Slope"
"          0.004 Pervious Area"
"          45.252 Pervious length"
"          1.400 Pervious slope"
"          0.191 Impervious Area"
"          45.252 Impervious length"
"          1.400 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          2.000 Impervious Depression storage"
"          0.083 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.191 0.195 hectare"
"          Time of concentration 16.039 2.646 2.754 minutes"
"          Time to Centroid 94.485 88.849 88.894 minutes"
"          Rainfall depth 78.830 78.830 78.830 mm"
"          Rainfall volume 3.38 150.34 153.72 c.m"
"          Rainfall losses 51.075 2.000 3.080 mm"
"          Runoff depth 27.755 76.830 75.751 mm"
"          Runoff volume 1.19 146.52 147.71 c.m"
"          Runoff coefficient 0.352 0.975 0.961 "

```


"	Maximum flow	0.001	0.083	0.083	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.083 0.083 0.000 0.000"				
" 38	START/RE-START TOTALS 101"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		0.195	hectare"	
"	Total Impervious area		0.191	hectare"	
"	Total % impervious		97.800"		
" 19	EXIT"				

Appendix 'D'
MIDUSS Stormwater Management Simulation Results
Post-development Conditions

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 473"
"          MIDUSS created                      February-07-10"
"          10 Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pst2.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:49:19 AM"
31          TIME PARAMETERS"
"          10.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
32          STORM Chicago storm"
"          1 Chicago storm"
"          529.711 Coefficient A"
"          4.501 Constant B"
"          0.745 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity                    69.337 mm/hr"
"          Total depth                          32.583 mm"
"          6 005hyd Hydrograph extension used in this file"
33          CATCHMENT 101"
"          2 Rectangular"
"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          0.000 % Impervious"
"          0.004 Total Area"
"          20.000 Flow length"
"          1.500 Overland Slope"
"          0.004 Pervious Area"
"          20.000 Pervious length"
"          1.500 Pervious slope"
"          0.000 Impervious Area"
"          20.000 Impervious length"
"          1.500 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          7.500 Impervious Depression storage"
"          0.000 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.000 0.004 hectare"
"          Time of concentration --- 2.195 2.195 minutes"
"          Time to Centroid 0.000 96.515 96.515 minutes"
"          Rainfall depth 32.583 32.583 32.583 mm"
"          Rainfall volume 1.30 0.00 1.30 c.m"
"          Rainfall losses 32.583 7.500 32.583 mm"
"          Runoff depth 0.000 25.083 0.000 mm"
"          Runoff volume 0.00 0.00 0.00 c.m"
"          Runoff coefficient 0.000 0.000 0.000 "

```

"		Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.000	0.000	0.000	0.000"	
" 51		PIPE DESIGN"				
"	0.000	Current peak flow	c.m/sec"			
"	0.013	Manning 'n'"				
"	0.250	Diameter	metre"			
"	1.100	Gradient	%"			
"		Depth of flow	0.000	metre"		
"		Velocity	0.006	m/sec"		
"		Pipe capacity	0.062	c.m/sec"		
"		Critical depth	0.000	metre"		
" 53		ROUTE Pipe Route 22"				
"	22.30	Pipe Route 22 Reach length	(metre)"			
"	0.429	X-factor <= 0.5"				
"	668.317	K-lag	(seconds)"			
"	0.000	Default(0) or user spec.(1) values used"				
"	0.500	X-factor <= 0.5"				
"	30.000	K-lag	(seconds)"			
"	0.500	Beta weighting factor"				
"	600.000	Routing time step	(seconds)"			
"	4	No. of sub-reaches"				
"		Peak outflow	0.000	c.m/sec"		
"		0.000	0.000	0.000	0.000 c.m/sec"	
" 40		HYDROGRAPH Combine	2"			
"	6	Combine "				
"	2	Node #"				
"						
"		Maximum flow	0.000	c.m/sec"		
"		Hydrograph volume	0.000	c.m"		
"		0.000	0.000	0.000	0.000"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.000	0.000	0.000	0.000"	
" 33		CATCHMENT 102"				
"	2	Rectangular"				
"	1	Equal length"				
"	2	Horton equation"				
"	102	No description"				
"	99.400	% Impervious"				
"	0.062	Total Area"				
"	35.227	Flow length"				
"	1.500	Overland Slope"				
"	0.000	Pervious Area"				
"	35.227	Pervious length"				
"	1.500	Pervious slope"				
"	0.062	Impervious Area"				
"	35.227	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	50.000	Pervious Max.infiltration"				
"	10.000	Pervious Min.infiltration"				
"	0.500	Pervious Lag constant (hours)"				
"	7.500	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.500	Impervious Lag constant (hours)"				
"	7.500	Impervious Depression storage"				

"	0.012	0.000	0.000	0.000 c.m/sec"
"	Catchment 102	Pervious	Impervious	Total Area "
"	Surface Area	0.000	0.062	0.062 hectare"
"	Time of concentration	---	3.083	3.083 minutes"
"	Time to Centroid	0.000	96.537	96.537 minutes"
"	Rainfall depth	32.583	32.583	32.583 mm"
"	Rainfall volume	0.12	20.08	20.20 c.m"
"	Rainfall losses	32.583	7.500	7.650 mm"
"	Runoff depth	0.000	25.083	24.933 mm"
"	Runoff volume	0.00	15.46	15.46 c.m"
"	Runoff coefficient	0.000	0.770	0.765 "
"	Maximum flow	0.000	0.012	0.012 c.m/sec"
" 40	HYDROGRAPH Add Runoff "			
"	4	Add Runoff "		
"	0.012	0.012	0.000	0.000"
" 51	PIPE DESIGN"			
"	0.012	Current peak flow	c.m/sec"	
"	0.013	Manning 'n'"		
"	1.000	Diameter	metre"	
"	1.000	Gradient	%"	
"		Depth of flow	0.051	metre"
"		Velocity	0.792	m/sec"
"		Pipe capacity	2.398	c.m/sec"
"		Critical depth	0.059	metre"
" 53	ROUTE Zero Route"			
"	0.00	Zero Route Reach length	(metre)"	
"	0.012	0.012	0.012	0.000 c.m/sec"
" 40	HYDROGRAPH Combine 2"			
"	6	Combine "		
"	2	Node #"		
"				
"		Maximum flow	0.012	c.m/sec"
"		Hydrograph volume	15.458	c.m"
"	0.012	0.012	0.012	0.012"
" 40	HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"		
"	0.012	0.000	0.012	0.012"
" 33	CATCHMENT 103"			
"	2	Rectangular"		
"	1	Equal length"		
"	2	Horton equation"		
"	103	No description"		
"	20.700	% Impervious"		
"	0.006	Total Area"		
"	20.690	Flow length"		
"	1.500	Overland Slope"		
"	0.005	Pervious Area"		
"	20.690	Pervious length"		
"	1.500	Pervious slope"		
"	0.001	Impervious Area"		
"	20.690	Impervious length"		
"	1.500	Impervious slope"		
"	0.250	Pervious Manning 'n'"		
"	50.000	Pervious Max.infiltration"		
"	10.000	Pervious Min.infiltration"		
"	0.500	Pervious Lag constant (hours)"		
"	7.500	Pervious Depression storage"		
"	0.015	Impervious Manning 'n'"		
"	0.000	Impervious Max.infiltration"		
"	0.000	Impervious Min.infiltration"		

```

"      0.500    Impervious Lag constant (hours)"
"      7.500    Impervious Depression storage"
"              0.000    0.000    0.012    0.012 c.m/sec"
"      Catchment 103      Pervious    Impervious Total Area "
"      Surface Area      0.005      0.001      0.006      hectare"
"      Time of concentration      ---      2.240      2.240      minutes"
"      Time to Centroid      0.000      96.515      96.515      minutes"
"      Rainfall depth      32.583      32.583      32.583      mm"
"      Rainfall volume      1.55      0.40      1.95      c.m"
"      Rainfall losses      32.583      7.500      27.391      mm"
"      Runoff depth      0.000      25.083      5.192      mm"
"      Runoff volume      0.00      0.31      0.31      c.m"
"      Runoff coefficient      0.000      0.770      0.159      "
"      Maximum flow      0.000      0.000      0.000      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.000    0.000    0.012    0.012"
" 51      PIPE DESIGN"
"      0.000    Current peak flow      c.m/sec"
"      0.013    Manning 'n'"
"      0.250    Diameter      metre"
"      1.800    Gradient      %"
"      Depth of flow      0.010      metre"
"      Velocity      0.362      m/sec"
"      Pipe capacity      0.080      c.m/sec"
"      Critical depth      0.012      metre"
" 53      ROUTE      Pipe Route 20"
"      19.60      Pipe Route 20 Reach length      ( metre)"
"      0.487      X-factor <= 0.5"
"      40.646      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.500      Beta weighting factor"
"      40.000      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.000      c.m/sec"
"              0.000    0.000    0.000    0.012 c.m/sec"
" 40      HYDROGRAPH      Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.000      c.m/sec"
"      Hydrograph volume      0.312      c.m"
"              0.000    0.000    0.000    0.000"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"              0.000    0.000    0.000    0.000"
" 33      CATCHMENT 104"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      104      No description"
"      98.300      % Impervious"
"      0.048      Total Area"
"      15.094      Flow length"
"      1.500      Overland Slope"
"      0.001      Pervious Area"
"      15.094      Pervious length"
"      1.500      Pervious slope"

```

```

"      0.047  Impervious Area"
"      15.094 Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000 Pervious Max.infiltration"
"      10.000 Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"          0.009      0.000      0.000      0.000 c.m/sec"
"      Catchment 104      Pervious      Impervious      Total Area "
"      Surface Area      0.001      0.047      0.048      hectare"
"      Time of concentration      ---      1.854      1.854      minutes"
"      Time to Centroid      0.000      96.515      96.515      minutes"
"      Rainfall depth      32.583      32.583      32.583      mm"
"      Rainfall volume      0.27      15.37      15.64      c.m"
"      Rainfall losses      32.583      7.500      7.926      mm"
"      Runoff depth      0.000      25.083      24.657      mm"
"      Runoff volume      0.00      11.84      11.84      c.m"
"      Runoff coefficient      0.000      0.770      0.757      "
"      Maximum flow      0.000      0.009      0.009      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.009      0.009      0.000      0.000"
" 51      PIPE DESIGN"
"      0.009      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      1.000      Diameter      metre"
"      1.000      Gradient      %"
"          Depth of flow      0.045      metre"
"          Velocity      0.730      m/sec"
"          Pipe capacity      2.398      c.m/sec"
"          Critical depth      0.052      metre"
" 53      ROUTE Zero Route"
"      0.00      Zero Route Reach length      ( metre)"
"          0.009      0.009      0.009      0.000 c.m/sec"
" 40      HYDROGRAPH Combine      4"
"      6      Combine "
"      4      Node #"
"          "
"          Maximum flow      0.009      c.m/sec"
"          Hydrograph volume      12.147      c.m"
"          0.009      0.009      0.009      0.009"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"          0.009      0.000      0.009      0.009"
" 33      CATCHMENT 105"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      105      No description"
"      100.000      % Impervious"
"      0.053      Total Area"
"      11.522      Flow length"
"      1.500      Overland Slope"
"      0.000      Pervious Area"

```

"	11.522	Pervious length"			
"	1.500	Pervious slope"			
"	0.053	Impervious Area"			
"	11.522	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.010	0.000	0.009	0.009 c.m/sec"
"		Catchment 105	Pervious	Impervious	Total Area "
"		Surface Area	0.000	0.053	0.053 hectare"
"		Time of concentration	---	1.577	1.577 minutes"
"		Time to Centroid	0.000	96.515	96.515 minutes"
"		Rainfall depth	32.583	32.583	32.583 mm"
"		Rainfall volume	0.00	17.27	17.27 c.m"
"		Rainfall losses	32.583	7.500	7.500 mm"
"		Runoff depth	0.000	25.083	25.083 mm"
"		Runoff volume	0.00	13.29	13.29 c.m"
"		Runoff coefficient	0.000	0.770	0.770 "
"		Maximum flow	0.000	0.010	0.010 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.010	0.010	0.009	0.009"
" 51		PIPE DESIGN"			
"	0.010	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	0.200	Diameter	metre"		
"	0.500	Gradient	%"		
"		Depth of flow	0.093	metre"	
"		Velocity	0.715	m/sec"	
"		Pipe capacity	0.023	c.m/sec"	
"		Critical depth	0.085	metre"	
" 53		ROUTE Pipe Route 16"			
"	16.00	Pipe Route 16 Reach length	(metre)"		
"	0.166	X-factor <= 0.5"			
"	16.790	K-lag (seconds)"			
"	0.000	Default(0) or user spec.(1) values used"			
"	0.500	X-factor <= 0.5"			
"	30.000	K-lag (seconds)"			
"	0.500	Beta weighting factor"			
"	27.273	Routing time step (seconds)"			
"	1	No. of sub-reaches"			
"		Peak outflow	0.010	c.m/sec"	
"		0.010	0.010	0.010	0.009 c.m/sec"
" 40		HYDROGRAPH Combine	4"		
"	6	Combine "			
"	4	Node #"			
"		"			
"		Maximum flow	0.019	c.m/sec"	
"		Hydrograph volume	25.441	c.m"	
"		0.010	0.010	0.010	0.019"
" 40		HYDROGRAPH Confluence	2"		
"	7	Confluence "			

```

"      2      Node #"
"
"      Maximum flow      0.012      c.m/sec"
"      Hydrograph volume      15.458      c.m"
"      0.010      0.012      0.010      0.000"
" 51      PIPE DESIGN"
"      0.012      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.250      Diameter      metre"
"      1.000      Gradient      %"
"      Depth of flow      0.076      metre"
"      Velocity      0.945      m/sec"
"      Pipe capacity      0.059      c.m/sec"
"      Critical depth      0.086      metre"
" 53      ROUTE      Pipe Route 5"
"      4.60      Pipe Route 5 Reach length      ( metre)"
"      0.056      X-factor <= 0.5"
"      3.649      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.500      Beta weighting factor"
"      6.818      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.012      c.m/sec"
"      0.010      0.012      0.012      0.000 c.m/sec"
" 40      HYDROGRAPH      Combine      100"
"      6      Combine "
"      100      Node #"
"
"      Maximum flow      0.012      c.m/sec"
"      Hydrograph volume      15.458      c.m"
"      0.010      0.012      0.012      0.012"
" 40      HYDROGRAPH      Confluence      4"
"      7      Confluence "
"      4      Node #"
"
"      Maximum flow      0.019      c.m/sec"
"      Hydrograph volume      25.441      c.m"
"      0.010      0.019      0.012      0.000"
" 51      PIPE DESIGN"
"      0.019      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.250      Diameter      metre"
"      1.000      Gradient      %"
"      Depth of flow      0.098      metre"
"      Velocity      1.082      m/sec"
"      Pipe capacity      0.059      c.m/sec"
"      Critical depth      0.111      metre"
" 53      ROUTE      Pipe Route 5"
"      5.10      Pipe Route 5 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      3.536      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.518      Beta weighting factor"
"      7.317      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.019      c.m/sec"

```


"		0.010	0.019	0.019	0.000 c.m/sec"
" 40	HYDROGRAPH	Combine	100"		
"	6	Combine "			
"	100	Node #"			
"		"			
"		Maximum flow	0.031	c.m/sec"	
"		Hydrograph volume	40.899	c.m"	
"		0.010	0.019	0.019	0.031"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.010	0.000	0.019	0.031"
" 33	CATCHMENT	98"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	98	No description"			
"	60.700	% Impervious"			
"	0.006	Total Area"			
"	2.353	Flow length"			
"	1.500	Overland Slope"			
"	0.002	Pervious Area"			
"	2.353	Pervious length"			
"	1.500	Pervious slope"			
"	0.004	Impervious Area"			
"	2.353	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.001	0.000	0.019	0.031 c.m/sec"
"	Catchment 98	Pervious	Impervious	Total Area	"
"	Surface Area	0.002	0.004	0.006	hectare"
"	Time of concentration	---	0.608	0.608	minutes"
"	Time to Centroid	0.000	96.515	96.515	minutes"
"	Rainfall depth	32.583	32.583	32.583	mm"
"	Rainfall volume	0.77	1.19	1.95	c.m"
"	Rainfall losses	32.583	7.500	17.358	mm"
"	Runoff depth	0.000	25.083	15.225	mm"
"	Runoff volume	0.00	0.91	0.91	c.m"
"	Runoff coefficient	0.000	0.770	0.467	"
"	Maximum flow	0.000	0.001	0.001	c.m/sec"
" 40	HYDROGRAPH	Add Runoff "			
"	4	Add Runoff "			
"		0.001	0.001	0.019	0.031"
" 51	PIPE DESIGN"				
"	0.001	Current peak flow	c.m/sec"		
"	0.013	Manning 'n' "			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.014	metre"	
"		Velocity	0.333	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.014	metre"	

```

" 53      ROUTE Zero Route"
"      0.00  Zero Route Reach length  ( metre)"
"              0.001      0.001      0.001      0.031 c.m/sec"
" 40      HYDROGRAPH  Combine      101"
"      6  Combine "
"      101  Node #"
"      "
"      Maximum flow      0.001      c.m/sec"
"      Hydrograph volume      0.914      c.m"
"              0.001      0.001      0.001      0.001"
" 40      HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"
"              0.001      0.000      0.001      0.001"
" 33      CATCHMENT 99"
"      2  Rectangular"
"      1  Equal length"
"      2  Horton equation"
"      99  No description"
"      0.000  % Impervious"
"      0.017  Total Area"
"      4.048  Flow length"
"      1.500  Overland Slope"
"      0.017  Pervious Area"
"      4.048  Pervious length"
"      1.500  Pervious slope"
"      0.000  Impervious Area"
"      4.048  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000  Pervious Max.infiltration"
"      10.000  Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"              0.000      0.000      0.001      0.001 c.m/sec"
"      Catchment 99      Pervious      Impervious      Total Area  "
"      Surface Area      0.017      0.000      0.017      hectare"
"      Time of concentration      ---      0.842      0.842      minutes"
"      Time to Centroid      0.000      96.515      96.515      minutes"
"      Rainfall depth      32.583      32.583      32.583      mm"
"      Rainfall volume      5.54      0.00      5.54      c.m"
"      Rainfall losses      32.583      7.500      32.583      mm"
"      Runoff depth      0.000      25.083      0.000      mm"
"      Runoff volume      0.00      0.00      0.00      c.m"
"      Runoff coefficient      0.000      0.000      0.000      "
"      Maximum flow      0.000      0.000      0.000      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"              0.000      0.000      0.001      0.001"
" 51      PIPE DESIGN"
"      0.000  Current peak flow      c.m/sec"
"      0.013  Manning 'n'"
"      1.000  Diameter      metre"
"      1.000  Gradient      %"
"      Depth of flow      0.000      metre"
"      Velocity      0.008      m/sec"

```

"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.000	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.000 0.000 0.000 0.001 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.001	c.m/sec"
"	Hydrograph volume	0.914	c.m"
"	0.000 0.000 0.000 0.001"		
" 40	HYDROGRAPH Confluence 100"		
"	7 Confluence "		
"	100 Node #"		
"	"		
"	Maximum flow	0.031	c.m/sec"
"	Hydrograph volume	40.899	c.m"
"	0.000 0.031 0.000 0.000"		
" 56	DIVERSION"		
"	100 Node number"		
"	0.004 Overflow threshold"		
"	1.000 Required diverted fraction"		
"	0 Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.027	c.m/sec"
"	Volume of diverted flow	20.863	c.m"
"	DIV00100.005hyd"		
"	Divert to Underground Storage 20.863 cu.m. (21.6 cu.m.)"		
"	0.000 0.031 0.004 0.000 c.m/sec"		
" 40	HYDROGRAPH Next link "		
"	5 Next link "		
"	0.000 0.004 0.004 0.000"		
" 51	PIPE DESIGN"		
"	0.004 Current peak flow c.m/sec"		
"	0.013 Manning 'n'"		
"	1.000 Diameter metre"		
"	1.000 Gradient %"		
"	Depth of flow	0.031	metre"
"	Velocity	0.568	m/sec"
"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.034	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.000 0.004 0.004 0.000 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.005	c.m/sec"
"	Hydrograph volume	20.950	c.m"
"	0.000 0.004 0.004 0.005"		
" 40	HYDROGRAPH Confluence 101"		
"	7 Confluence "		
"	101 Node #"		
"	"		
"	Maximum flow	0.005	c.m/sec"
"	Hydrograph volume	20.950	c.m"
"	0.000 0.005 0.004 0.000"		
" 38	START/RE-START TOTALS 101"		
"	3 Runoff Totals on EXIT"		

"	Total Catchment area	0.196	hectare"
"	Total Impervious area	0.167	hectare"
"	Total % impervious	85.049"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 473"
"          MIDUSS created                      February-07-10"
"          10 Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pst5.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:46:43 AM"
" 31      TIME PARAMETERS"
"          10.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          583.017 Coefficient A"
"          3.007 Constant B"
"          0.703 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity                    92.454 mm/hr"
"          Total depth                          44.904 mm"
"          6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2 Rectangular"
"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          0.000 % Impervious"
"          0.004 Total Area"
"          20.000 Flow length"
"          1.500 Overland Slope"
"          0.004 Pervious Area"
"          20.000 Pervious length"
"          1.500 Pervious slope"
"          0.000 Impervious Area"
"          20.000 Impervious length"
"          1.500 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          7.500 Impervious Depression storage"
"          0.000 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.000 0.004 hectare"
"          Time of concentration 19.355 1.957 19.355 minutes"
"          Time to Centroid 87.157 95.540 87.157 minutes"
"          Rainfall depth 44.904 44.904 44.904 mm"
"          Rainfall volume 1.80 0.00 1.80 c.m"
"          Rainfall losses 41.133 7.500 41.133 mm"
"          Runoff depth 3.771 37.404 3.771 mm"
"          Runoff volume 0.15 0.00 0.15 c.m"
"          Runoff coefficient 0.084 0.000 0.084 "

```


"		Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.000	0.000	0.000	0.000"	
" 51		PIPE DESIGN"				
"	0.000	Current peak flow	c.m/sec"			
"	0.013	Manning 'n'"				
"	0.250	Diameter	metre"			
"	1.100	Gradient	%"			
"		Depth of flow	0.008	metre"		
"		Velocity	0.245	m/sec"		
"		Pipe capacity	0.062	c.m/sec"		
"		Critical depth	0.008	metre"		
" 53		ROUTE Pipe Route 22"				
"	22.30	Pipe Route 22 Reach length	(metre)"			
"	0.481	X-factor <= 0.5"				
"	68.212	K-lag (seconds)"				
"	0.000	Default(0) or user spec.(1) values used"				
"	0.500	X-factor <= 0.5"				
"	30.000	K-lag (seconds)"				
"	0.500	Beta weighting factor"				
"	66.667	Routing time step (seconds)"				
"	1	No. of sub-reaches"				
"		Peak outflow	0.000	c.m/sec"		
"		0.000	0.000	0.000	0.000 c.m/sec"	
" 40		HYDROGRAPH Combine 2"				
"	6	Combine "				
"	2	Node #"				
"						
"		Maximum flow	0.000	c.m/sec"		
"		Hydrograph volume	0.151	c.m"		
"		0.000	0.000	0.000	0.000"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.000	0.000	0.000	0.000"	
" 33		CATCHMENT 102"				
"	2	Rectangular"				
"	1	Equal length"				
"	2	Horton equation"				
"	102	No description"				
"	99.400	% Impervious"				
"	0.062	Total Area"				
"	35.227	Flow length"				
"	1.500	Overland Slope"				
"	0.000	Pervious Area"				
"	35.227	Pervious length"				
"	1.500	Pervious slope"				
"	0.062	Impervious Area"				
"	35.227	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	50.000	Pervious Max.infiltration"				
"	10.000	Pervious Min.infiltration"				
"	0.500	Pervious Lag constant (hours)"				
"	7.500	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.500	Impervious Lag constant (hours)"				
"	7.500	Impervious Depression storage"				

"		0.016	0.000	0.000	0.000 c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area "
"	Surface Area		0.000	0.062	0.062 hectare"
"	Time of concentration	27.183	2.748	2.763	minutes"
"	Time to Centroid	91.809	95.551	95.549	minutes"
"	Rainfall depth	44.904	44.904	44.904	mm"
"	Rainfall volume	0.17	27.67	27.84	c.m"
"	Rainfall losses	41.133	7.500	7.702	mm"
"	Runoff depth	3.771	37.404	37.202	mm"
"	Runoff volume	0.01	23.05	23.07	c.m"
"	Runoff coefficient	0.084	0.833	0.828	"
"	Maximum flow	0.000	0.016	0.016	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.016	0.016	0.000	0.000"
" 51	PIPE DESIGN"				
"	0.016	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.058	metre"	
"		Velocity	0.864	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.069	metre"	
" 53	ROUTE Zero Route"				
"	0.00	Zero Route Reach length	(metre)"		
"		0.016	0.016	0.016	0.000 c.m/sec"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"					
"		Maximum flow	0.016	c.m/sec"	
"		Hydrograph volume	23.216	c.m"	
"		0.016	0.016	0.016	0.016"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.016	0.000	0.016	0.016"
" 33	CATCHMENT 103"				
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	103	No description"			
"	20.700	% Impervious"			
"	0.006	Total Area"			
"	20.690	Flow length"			
"	1.500	Overland Slope"			
"	0.005	Pervious Area"			
"	20.690	Pervious length"			
"	1.500	Pervious slope"			
"	0.001	Impervious Area"			
"	20.690	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			

```

"      0.500    Impervious Lag constant (hours)"
"      7.500    Impervious Depression storage"
"              0.000      0.000      0.016      0.016 c.m/sec"
"      Catchment 103      Pervious    Impervious    Total Area  "
"      Surface Area      0.005      0.001      0.006      hectare"
"      Time of concentration 19.753      1.997      6.944      minutes"
"      Time to Centroid      87.292      95.540      93.242      minutes"
"      Rainfall depth      44.904      44.904      44.904      mm"
"      Rainfall volume      2.14      0.56      2.69      c.m"
"      Rainfall losses      41.133      7.500      34.171      mm"
"      Runoff depth      3.771      37.404      10.733      mm"
"      Runoff volume      0.18      0.46      0.64      c.m"
"      Runoff coefficient      0.084      0.833      0.239      "
"      Maximum flow      0.000      0.000      0.000      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.000      0.000      0.016      0.016"
" 51      PIPE DESIGN"
"      0.000    Current peak flow      c.m/sec"
"      0.013    Manning 'n'"
"      0.250    Diameter      metre"
"      1.800    Gradient      %"
"      Depth of flow      0.014      metre"
"      Velocity      0.440      m/sec"
"      Pipe capacity      0.080      c.m/sec"
"      Critical depth      0.016      metre"
" 53      ROUTE      Pipe Route 20"
"      19.60      Pipe Route 20 Reach length      ( metre)"
"      0.486      X-factor <= 0.5"
"      33.395      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.500      Beta weighting factor"
"      33.333      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.000      c.m/sec"
"              0.000      0.000      0.000      0.016 c.m/sec"
" 40      HYDROGRAPH      Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.000      c.m/sec"
"      Hydrograph volume      0.644      c.m"
"              0.000      0.000      0.000      0.000"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"              0.000      0.000      0.000      0.000"
" 33      CATCHMENT 104"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      104      No description"
"      98.300      % Impervious"
"      0.048      Total Area"
"      15.094      Flow length"
"      1.500      Overland Slope"
"      0.001      Pervious Area"
"      15.094      Pervious length"
"      1.500      Pervious slope"

```

"	0.047	Impervious Area"			
"	15.094	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.012	0.000	0.000	0.000 c.m/sec"
"		Catchment 104	Pervious	Impervious	Total Area "
"		Surface Area	0.001	0.047	0.048 hectare"
"		Time of concentration	16.348	1.653	1.678 minutes"
"		Time to Centroid	85.923	95.540	95.523 minutes"
"		Rainfall depth	44.904	44.904	44.904 mm"
"		Rainfall volume	0.37	21.19	21.55 c.m"
"		Rainfall losses	41.133	7.500	8.072 mm"
"		Runoff depth	3.771	37.404	36.833 mm"
"		Runoff volume	0.03	17.65	17.68 c.m"
"		Runoff coefficient	0.084	0.833	0.820 "
"		Maximum flow	0.000	0.012	0.012 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.012	0.012	0.000	0.000"
" 51		PIPE DESIGN"			
"	0.012	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.051	metre"	
"		Velocity	0.797	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.060	metre"	
" 53		ROUTE Zero Route"			
"	0.00	Zero Route Reach length	(metre)"		
"		0.012	0.012	0.012	0.000 c.m/sec"
" 40		HYDROGRAPH Combine	4"		
"	6	Combine "			
"	4	Node #"			
"		"			
"		Maximum flow	0.013	c.m/sec"	
"		Hydrograph volume	18.324	c.m"	
"		0.012	0.012	0.012	0.013"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.012	0.000	0.012	0.013"
" 33		CATCHMENT 105"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	105	No description"			
"	100.000	% Impervious"			
"	0.053	Total Area"			
"	11.522	Flow length"			
"	1.500	Overland Slope"			
"	0.000	Pervious Area"			

```

"      11.522  Pervious length"
"      1.500  Pervious slope"
"      0.053  Impervious Area"
"      11.522  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000  Pervious Max.infiltration"
"      10.000  Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"          0.014      0.000      0.012      0.013 c.m/sec"
"      Catchment 105      Pervious      Impervious      Total Area "
"      Surface Area      0.000      0.053      0.053      hectare"
"      Time of concentration      13.902      1.405      1.405      minutes"
"      Time to Centroid      84.696      95.540      95.540      minutes"
"      Rainfall depth      44.904      44.904      44.904      mm"
"      Rainfall volume      0.00      23.80      23.80      c.m"
"      Rainfall losses      41.133      7.500      7.500      mm"
"      Runoff depth      3.771      37.404      37.404      mm"
"      Runoff volume      0.00      19.82      19.82      c.m"
"      Runoff coefficient      0.000      0.833      0.833      "
"      Maximum flow      0.000      0.014      0.014      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.014      0.014      0.012      0.013"
" 51      PIPE DESIGN"
"      0.014      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.200      Diameter      metre"
"      0.500      Gradient      %"
"      Depth of flow      0.110      metre"
"      Velocity      0.768      m/sec"
"      Pipe capacity      0.023      c.m/sec"
"      Critical depth      0.099      metre"
" 53      ROUTE      Pipe Route 16"
"      16.00      Pipe Route 16 Reach length      ( metre)"
"      0.077      X-factor <= 0.5"
"      15.633      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.500      Beta weighting factor"
"      28.571      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.013      c.m/sec"
"          0.014      0.014      0.013      0.013 c.m/sec"
" 40      HYDROGRAPH      Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.026      c.m/sec"
"      Hydrograph volume      38.148      c.m"
"          0.014      0.014      0.013      0.026"
" 40      HYDROGRAPH      Confluence      2"
"      7      Confluence "

```



```

"      2   Node #"
"
"      Maximum flow          0.016   c.m/sec"
"      Hydrograph volume     23.216   c.m"
"      0.014   0.016   0.013   0.000"
" 51      PIPE DESIGN"
"      0.016   Current peak flow   c.m/sec"
"      0.013   Manning 'n'"
"      0.250   Diameter   metre"
"      1.000   Gradient   %"
"      Depth of flow          0.088   metre"
"      Velocity               1.027   m/sec"
"      Pipe capacity          0.059   c.m/sec"
"      Critical depth         0.101   metre"
" 53      ROUTE   Pipe Route 5"
"      4.60      Pipe Route 5 Reach length   ( metre)"
"      0.000   X-factor <= 0.5"
"      3.360   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"      30.000  K-lag   ( seconds)"
"      0.515   Beta weighting factor"
"      6.897   Routing time step   ( seconds)"
"      1       No. of sub-reaches"
"      Peak outflow          0.016   c.m/sec"
"      0.014   0.016   0.016   0.000 c.m/sec"
" 40      HYDROGRAPH   Combine   100"
"      6       Combine "
"      100     Node #"
"      "
"      Maximum flow          0.016   c.m/sec"
"      Hydrograph volume     23.216   c.m"
"      0.014   0.016   0.016   0.016"
" 40      HYDROGRAPH   Confluence   4"
"      7       Confluence "
"      4       Node #"
"      "
"      Maximum flow          0.026   c.m/sec"
"      Hydrograph volume     38.148   c.m"
"      0.014   0.026   0.016   0.000"
" 51      PIPE DESIGN"
"      0.026   Current peak flow   c.m/sec"
"      0.013   Manning 'n'"
"      0.250   Diameter   metre"
"      1.000   Gradient   %"
"      Depth of flow          0.116   metre"
"      Velocity               1.170   m/sec"
"      Pipe capacity          0.059   c.m/sec"
"      Critical depth         0.130   metre"
" 53      ROUTE   Pipe Route 5"
"      5.10      Pipe Route 5 Reach length   ( metre)"
"      0.000   X-factor <= 0.5"
"      3.268   K-lag   ( seconds)"
"      0.000   Default(0) or user spec.(1) values used"
"      0.500   X-factor <= 0.5"
"      30.000  K-lag   ( seconds)"
"      0.566   Beta weighting factor"
"      7.500   Routing time step   ( seconds)"
"      1       No. of sub-reaches"
"      Peak outflow          0.026   c.m/sec"

```

"		0.014	0.026	0.026	0.000 c.m/sec"
" 40	HYDROGRAPH	Combine	100"		
"	6	Combine	"		
"	100	Node #"			
"		"			
"		Maximum flow	0.042	c.m/sec"	
"		Hydrograph volume	61.364	c.m"	
"		0.014	0.026	0.026	0.042"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.014	0.000	0.026	0.042"
" 33	CATCHMENT	98"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	98	No description"			
"	60.700	% Impervious"			
"	0.006	Total Area"			
"	2.353	Flow length"			
"	1.500	Overland Slope"			
"	0.002	Pervious Area"			
"	2.353	Pervious length"			
"	1.500	Pervious slope"			
"	0.004	Impervious Area"			
"	2.353	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.001	0.000	0.026	0.042 c.m/sec"
"	Catchment 98	Pervious	Impervious	Total Area	"
"	Surface Area	0.002	0.004	0.006	hectare"
"	Time of concentration	5.360	0.542	0.837	minutes"
"	Time to Centroid	81.196	95.540	94.661	minutes"
"	Rainfall depth	44.904	44.904	44.904	mm"
"	Rainfall volume	1.06	1.64	2.69	c.m"
"	Rainfall losses	41.133	7.500	20.718	mm"
"	Runoff depth	3.771	37.404	24.186	mm"
"	Runoff volume	0.09	1.36	1.45	c.m"
"	Runoff coefficient	0.084	0.833	0.539	"
"	Maximum flow	0.000	0.001	0.001	c.m/sec"
" 40	HYDROGRAPH	Add Runoff	"		
"	4	Add Runoff	"		
"		0.001	0.001	0.026	0.042"
" 51	PIPE DESIGN"				
"	0.001	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.017	metre"	
"		Velocity	0.379	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.018	metre"	

```

" 53      ROUTE Zero Route"
"      0.00      Zero Route Reach length      ( metre)"
"              0.001      0.001      0.001      0.042 c.m/sec"
" 40      HYDROGRAPH      Combine      101"
"      6      Combine "
"      101      Node #"
"      "
"      Maximum flow      0.001      c.m/sec"
"      Hydrograph volume      1.451      c.m"
"              0.001      0.001      0.001      0.001"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"              0.001      0.000      0.001      0.001"
" 33      CATCHMENT 99"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      99      No description"
"      0.000      % Impervious"
"      0.017      Total Area"
"      4.048      Flow length"
"      1.500      Overland Slope"
"      0.017      Pervious Area"
"      4.048      Pervious length"
"      1.500      Pervious slope"
"      0.000      Impervious Area"
"      4.048      Impervious length"
"      1.500      Impervious slope"
"      0.250      Pervious Manning 'n'"
"      50.000      Pervious Max.infiltration"
"      10.000      Pervious Min.infiltration"
"      0.500      Pervious Lag constant (hours)"
"      7.500      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.500      Impervious Lag constant (hours)"
"      7.500      Impervious Depression storage"
"              0.001      0.000      0.001      0.001 c.m/sec"
"      Catchment 99      Pervious      Impervious      Total Area "
"      Surface Area      0.017      0.000      0.017      hectare"
"      Time of concentration      7.422      0.750      7.422      minutes"
"      Time to Centroid      81.401      95.540      81.401      minutes"
"      Rainfall depth      44.904      44.904      44.904      mm"
"      Rainfall volume      7.63      0.00      7.63      c.m"
"      Rainfall losses      41.133      7.500      41.133      mm"
"      Runoff depth      3.771      37.404      3.771      mm"
"      Runoff volume      0.64      0.00      0.64      c.m"
"      Runoff coefficient      0.084      0.000      0.084      "
"      Maximum flow      0.001      0.000      0.001      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.001      0.001      0.001      0.001"
" 51      PIPE DESIGN"
"      0.001      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      1.000      Diameter      metre"
"      1.000      Gradient      %"
"      Depth of flow      0.016      metre"
"      Velocity      0.367      m/sec"

```

"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.017	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.001 0.001 0.001 0.001 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.002	c.m/sec"
"	Hydrograph volume	2.092	c.m"
"	0.001 0.001 0.001 0.002"		
" 40	HYDROGRAPH Confluence 100"		
"	7 Confluence "		
"	100 Node #"		
"	"		
"	Maximum flow	0.042	c.m/sec"
"	Hydrograph volume	61.364	c.m"
"	0.001 0.042 0.001 0.000"		
" 56	DIVERSION"		
"	100 Node number"		
"	0.011 Overflow threshold"		
"	1.000 Required diverted fraction"		
"	0 Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.031	c.m/sec"
"	Volume of diverted flow	21.153	c.m"
"	DIV00100.005hyd"		
"	Divert to Underground Storage 21.153 cu.m. (21.6 cu.m.)"		
"	0.001 0.042 0.011 0.000 c.m/sec"		
" 40	HYDROGRAPH Next link "		
"	5 Next link "		
"	0.001 0.011 0.011 0.000"		
" 51	PIPE DESIGN"		
"	0.011 Current peak flow c.m/sec"		
"	0.013 Manning 'n'"		
"	1.000 Diameter metre"		
"	1.000 Gradient %"		
"	Depth of flow	0.049	metre"
"	Velocity	0.773	m/sec"
"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.057	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.001 0.011 0.011 0.000 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.013	c.m/sec"
"	Hydrograph volume	42.303	c.m"
"	0.001 0.011 0.011 0.013"		
" 40	HYDROGRAPH Confluence 101"		
"	7 Confluence "		
"	101 Node #"		
"	"		
"	Maximum flow	0.013	c.m/sec"
"	Hydrograph volume	42.303	c.m"
"	0.001 0.013 0.011 0.000"		
" 38	START/RE-START TOTALS 101"		
"	3 Runoff Totals on EXIT"		

"	Total Catchment area	0.196	hectare"
"	Total Impervious area	0.167	hectare"
"	Total % impervious	85.049"	
" 19	EXIT"		


```

"      MIDUSS Output ----->"
"      MIDUSS version                      Version 2.25 rev. 473"
"      MIDUSS created                      February-07-10"
"      10 Units used:                      ie METRIC"
"      Job folder:                        C:\swm\MIDUSS\16025"
"      Output filename:                    Pst10.out"
"      Licensee name:                      Bob"
"      Company                            "
"      Date & Time last used:              31/07/2022 at 9:41:35 AM"
" 31      TIME PARAMETERS"
"      10.000 Time Step"
"      180.000 Max. Storm length"
"      1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"      1 Chicago storm"
"      670.324 Coefficient A"
"      3.007 Constant B"
"      0.698 Exponent C"
"      0.400 Fraction R"
"      180.000 Duration"
"      1.000 Time step multiplier"
"      Maximum intensity                    107.682 mm/hr"
"      Total depth                          52.991 mm"
"      6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"      2 Rectangular"
"      1 Equal length"
"      2 Horton equation"
"      101 No description"
"      0.000 % Impervious"
"      0.004 Total Area"
"      20.000 Flow length"
"      1.500 Overland Slope"
"      0.004 Pervious Area"
"      20.000 Pervious length"
"      1.500 Pervious slope"
"      0.000 Impervious Area"
"      20.000 Impervious length"
"      1.500 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      50.000 Pervious Max.infiltration"
"      10.000 Pervious Min.infiltration"
"      0.500 Pervious Lag constant (hours)"
"      7.500 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.500 Impervious Lag constant (hours)"
"      7.500 Impervious Depression storage"
"      0.000 0.000 0.000 0.000 c.m/sec"
"      Catchment 101 Pervious Impervious Total Area "
"      Surface Area 0.004 0.000 0.004 hectare"
"      Time of concentration 14.220 1.841 14.220 minutes"
"      Time to Centroid 85.418 94.639 85.418 minutes"
"      Rainfall depth 52.991 52.991 52.991 mm"
"      Rainfall volume 2.12 0.00 2.12 c.m"
"      Rainfall losses 44.350 7.500 44.350 mm"
"      Runoff depth 8.641 45.491 8.641 mm"
"      Runoff volume 0.35 0.00 0.35 c.m"
"      Runoff coefficient 0.163 0.000 0.163 "

```

"		Maximum flow	0.000	0.000	0.000	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.000	0.000	0.000	0.000"	
" 51		PIPE DESIGN"				
"	0.000	Current peak flow	c.m/sec"			
"	0.013	Manning 'n'"				
"	0.250	Diameter	metre"			
"	1.100	Gradient	%"			
"		Depth of flow	0.013	metre"		
"		Velocity	0.341	m/sec"		
"		Pipe capacity	0.062	c.m/sec"		
"		Critical depth	0.014	metre"		
" 53		ROUTE Pipe Route 22"				
"	22.30	Pipe Route 22 Reach length	(metre)"			
"	0.480	X-factor <= 0.5"				
"	49.073	K-lag	(seconds)"			
"	0.000	Default(0) or user spec.(1) values used"				
"	0.500	X-factor <= 0.5"				
"	30.000	K-lag	(seconds)"			
"	0.500	Beta weighting factor"				
"	50.000	Routing time step	(seconds)"			
"	1	No. of sub-reaches"				
"		Peak outflow	0.000	c.m/sec"		
"		0.000	0.000	0.000	0.000 c.m/sec"	
" 40		HYDROGRAPH Combine	2"			
"	6	Combine "				
"	2	Node #"				
"		"				
"		Maximum flow	0.000	c.m/sec"		
"		Hydrograph volume	0.346	c.m"		
"		0.000	0.000	0.000	0.000"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.000	0.000	0.000	0.000"	
" 33		CATCHMENT 102"				
"	2	Rectangular"				
"	1	Equal length"				
"	2	Horton equation"				
"	102	No description"				
"	99.400	% Impervious"				
"	0.062	Total Area"				
"	35.227	Flow length"				
"	1.500	Overland Slope"				
"	0.000	Pervious Area"				
"	35.227	Pervious length"				
"	1.500	Pervious slope"				
"	0.062	Impervious Area"				
"	35.227	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	50.000	Pervious Max.infiltration"				
"	10.000	Pervious Min.infiltration"				
"	0.500	Pervious Lag constant (hours)"				
"	7.500	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.500	Impervious Lag constant (hours)"				
"	7.500	Impervious Depression storage"				

"		0.018	0.000	0.000	0.000 c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area "
"	Surface Area		0.000	0.062	0.062 hectare"
"	Time of concentration	19.971	2.585	2.605	minutes"
"	Time to Centroid	87.974	94.639	94.631	minutes"
"	Rainfall depth	52.991	52.991	52.991	mm"
"	Rainfall volume	0.20	32.66	32.85	c.m"
"	Rainfall losses	44.350	7.500	7.721	mm"
"	Runoff depth	8.641	45.491	45.270	mm"
"	Runoff volume	0.03	28.04	28.07	c.m"
"	Runoff coefficient	0.163	0.858	0.854	"
"	Maximum flow	0.000	0.018	0.018	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.018	0.018	0.000	0.000"
" 51	PIPE DESIGN"				
"	0.018	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.062	metre"	
"		Velocity	0.905	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.074	metre"	
" 53	ROUTE Zero Route"				
"	0.00	Zero Route Reach length	(metre)"		
"		0.018	0.018	0.018	0.000 c.m/sec"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"					
"		Maximum flow	0.019	c.m/sec"	
"		Hydrograph volume	28.413	c.m"	
"		0.018	0.018	0.018	0.019"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.018	0.000	0.018	0.019"
" 33	CATCHMENT 103"				
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	103	No description"			
"	20.700	% Impervious"			
"	0.006	Total Area"			
"	20.690	Flow length"			
"	1.500	Overland Slope"			
"	0.005	Pervious Area"			
"	20.690	Pervious length"			
"	1.500	Pervious slope"			
"	0.001	Impervious Area"			
"	20.690	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			

```

"      0.500    Impervious Lag constant (hours)"
"      7.500    Impervious Depression storage"
"              0.001      0.000      0.018      0.019 c.m/sec"
"      Catchment 103      Pervious    Impervious Total Area "
"      Surface Area      0.005      0.001      0.006      hectare"
"      Time of concentration 14.512      1.879      7.200      minutes"
"      Time to Centroid      85.570      94.639      90.819      minutes"
"      Rainfall depth      52.991      52.991      52.991      mm"
"      Rainfall volume      2.52      0.66      3.18      c.m"
"      Rainfall losses      44.350      7.500      36.722      mm"
"      Runoff depth      8.641      45.491      16.269      mm"
"      Runoff volume      0.41      0.57      0.98      c.m"
"      Runoff coefficient      0.163      0.858      0.307      "
"      Maximum flow      0.000      0.000      0.001      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.001      0.001      0.018      0.019"
" 51      PIPE DESIGN"
"      0.001      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.250      Diameter      metre"
"      1.800      Gradient      %"
"      Depth of flow      0.017      metre"
"      Velocity      0.517      m/sec"
"      Pipe capacity      0.080      c.m/sec"
"      Critical depth      0.021      metre"
" 53      ROUTE      Pipe Route 20"
"      19.60      Pipe Route 20 Reach length      ( metre)"
"      0.485      X-factor <= 0.5"
"      28.430      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.500      Beta weighting factor"
"      28.571      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.001      c.m/sec"
"              0.001      0.001      0.001      0.019 c.m/sec"
" 40      HYDROGRAPH      Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.001      c.m/sec"
"      Hydrograph volume      0.976      c.m"
"              0.001      0.001      0.001      0.001"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"              0.001      0.000      0.001      0.001"
" 33      CATCHMENT 104"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      104      No description"
"      98.300      % Impervious"
"      0.048      Total Area"
"      15.094      Flow length"
"      1.500      Overland Slope"
"      0.001      Pervious Area"
"      15.094      Pervious length"
"      1.500      Pervious slope"

```

"	0.047	Impervious Area"				
"	15.094	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	50.000	Pervious Max.infiltration"				
"	10.000	Pervious Min.infiltration"				
"	0.500	Pervious Lag constant (hours)"				
"	7.500	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.500	Impervious Lag constant (hours)"				
"	7.500	Impervious Depression storage"				
"		0.014	0.000	0.001	0.001 c.m/sec"	
"		Catchment 104	Pervious	Impervious	Total Area	"
"		Surface Area	0.001	0.047	0.048	hectare"
"		Time of concentration	12.010	1.555	1.589	minutes"
"		Time to Centroid	84.030	94.639	94.604	minutes"
"		Rainfall depth	52.991	52.991	52.991	mm"
"		Rainfall volume	0.43	25.00	25.44	c.m"
"		Rainfall losses	44.350	7.500	8.126	mm"
"		Runoff depth	8.641	45.491	44.865	mm"
"		Runoff volume	0.07	21.46	21.54	c.m"
"		Runoff coefficient	0.163	0.858	0.847	"
"		Maximum flow	0.000	0.014	0.014	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.014	0.014	0.001	0.001"	
" 51		PIPE DESIGN"				
"	0.014	Current peak flow	c.m/sec"			
"	0.013	Manning 'n'"				
"	1.000	Diameter	metre"			
"	1.000	Gradient	%"			
"		Depth of flow	0.055	metre"		
"		Velocity	0.836	m/sec"		
"		Pipe capacity	2.398	c.m/sec"		
"		Critical depth	0.065	metre"		
" 53		ROUTE Zero Route"				
"	0.00	Zero Route Reach length	(metre)"			
"		0.014	0.014	0.014	0.001 c.m/sec"	
" 40		HYDROGRAPH Combine	4"			
"	6	Combine "				
"	4	Node #"				
"		"				
"		Maximum flow	0.015	c.m/sec"		
"		Hydrograph volume	22.511	c.m"		
"		0.014	0.014	0.014	0.015"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.014	0.000	0.014	0.015"	
" 33		CATCHMENT 105"				
"	2	Rectangular"				
"	1	Equal length"				
"	2	Horton equation"				
"	105	No description"				
"	100.000	% Impervious"				
"	0.053	Total Area"				
"	11.522	Flow length"				
"	1.500	Overland Slope"				
"	0.000	Pervious Area"				


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"      11.522  Pervious length"
"      1.500  Pervious slope"
"      0.053  Impervious Area"
"      11.522  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000  Pervious Max.infiltration"
"      10.000  Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"              0.016      0.000      0.014      0.015 c.m/sec"
"      Catchment 105      Pervious      Impervious      Total Area "
"      Surface Area      0.000      0.053      0.053      hectare"
"      Time of concentration 10.214      1.322      1.322      minutes"
"      Time to Centroid      82.460      94.639      94.639      minutes"
"      Rainfall depth      52.991      52.991      52.991      mm"
"      Rainfall volume      0.00      28.09      28.09      c.m"
"      Rainfall losses      44.350      7.500      7.500      mm"
"      Runoff depth      8.641      45.491      45.491      mm"
"      Runoff volume      0.00      24.11      24.11      c.m"
"      Runoff coefficient      0.000      0.858      0.858      "
"      Maximum flow      0.000      0.016      0.016      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.016      0.016      0.014      0.015"
" 51      PIPE DESIGN"
"      0.016      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.200      Diameter      metre"
"      0.500      Gradient      %"
"      Depth of flow      0.121      metre"
"      Velocity      0.795      m/sec"
"      Pipe capacity      0.023      c.m/sec"
"      Critical depth      0.108      metre"
" 53      ROUTE      Pipe Route 16"
"      16.00      Pipe Route 16 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      15.100      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.501      Beta weighting factor"
"      30.000      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.016      c.m/sec"
"              0.016      0.016      0.016      0.015 c.m/sec"
" 40      HYDROGRAPH      Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.031      c.m/sec"
"      Hydrograph volume      46.622      c.m"
"              0.016      0.016      0.016      0.031"
" 40      HYDROGRAPH      Confluence      2"
"      7      Confluence "

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"      2      Node #"
"
"      Maximum flow      0.019      c.m/sec"
"      Hydrograph volume      28.413      c.m"
"      0.016      0.019      0.016      0.000"
" 51      PIPE DESIGN"
"      0.019      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.250      Diameter      metre"
"      1.000      Gradient      %"
"      Depth of flow      0.097      metre"
"      Velocity      1.074      m/sec"
"      Pipe capacity      0.059      c.m/sec"
"      Critical depth      0.110      metre"
" 53      ROUTE      Pipe Route 5"
"      4.60      Pipe Route 5 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      3.213      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.540      Beta weighting factor"
"      6.977      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.019      c.m/sec"
"      0.016      0.019      0.019      0.000 c.m/sec"
" 40      HYDROGRAPH      Combine      100"
"      6      Combine "
"      100      Node #"
"      "
"      Maximum flow      0.019      c.m/sec"
"      Hydrograph volume      28.413      c.m"
"      0.016      0.019      0.019      0.019"
" 40      HYDROGRAPH      Confluence      4"
"      7      Confluence "
"      4      Node #"
"      "
"      Maximum flow      0.031      c.m/sec"
"      Hydrograph volume      46.622      c.m"
"      0.016      0.031      0.019      0.000"
" 51      PIPE DESIGN"
"      0.031      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.250      Diameter      metre"
"      1.000      Gradient      %"
"      Depth of flow      0.127      metre"
"      Velocity      1.220      m/sec"
"      Pipe capacity      0.059      c.m/sec"
"      Critical depth      0.142      metre"
" 53      ROUTE      Pipe Route 5"
"      5.10      Pipe Route 5 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      3.136      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.596      Beta weighting factor"
"      7.692      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.030      c.m/sec"

```

"		0.016	0.031	0.030	0.000 c.m/sec"
" 40	HYDROGRAPH	Combine	100"		
"	6	Combine "			
"	100	Node #"			
"		"			
"		Maximum flow	0.049	c.m/sec"	
"		Hydrograph volume	75.035	c.m"	
"		0.016	0.031	0.030	0.049"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.016	0.000	0.030	0.049"
" 33	CATCHMENT	98"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	98	No description"			
"	60.700	% Impervious"			
"	0.006	Total Area"			
"	2.353	Flow length"			
"	1.500	Overland Slope"			
"	0.002	Pervious Area"			
"	2.353	Pervious length"			
"	1.500	Pervious slope"			
"	0.004	Impervious Area"			
"	2.353	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.001	0.000	0.030	0.049 c.m/sec"
"	Catchment 98	Pervious	Impervious	Total Area	"
"	Surface Area	0.002	0.004	0.006	hectare"
"	Time of concentration	3.938	0.510	0.885	minutes"
"	Time to Centroid	81.480	94.639	93.198	minutes"
"	Rainfall depth	52.991	52.991	52.991	mm"
"	Rainfall volume	1.25	1.93	3.18	c.m"
"	Rainfall losses	44.350	7.500	21.982	mm"
"	Runoff depth	8.641	45.491	31.009	mm"
"	Runoff volume	0.20	1.66	1.86	c.m"
"	Runoff coefficient	0.163	0.858	0.585	"
"	Maximum flow	0.000	0.001	0.001	c.m/sec"
" 40	HYDROGRAPH	Add Runoff "			
"	4	Add Runoff "			
"		0.001	0.001	0.030	0.049"
" 51	PIPE DESIGN"				
"	0.001	Current peak flow	c.m/sec"		
"	0.013	Manning 'n' "			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.019	metre"	
"		Velocity	0.410	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.020	metre"	

```

" 53      ROUTE Zero Route"
"      0.00 Zero Route Reach length ( metre)"
"      0.001 0.001 0.001 0.049 c.m/sec"
" 40      HYDROGRAPH Combine 101"
"      6 Combine "
"      101 Node #"
"      "
"      Maximum flow 0.001 c.m/sec"
"      Hydrograph volume 1.861 c.m"
"      0.001 0.001 0.001 0.001"
" 40      HYDROGRAPH Start - New Tributary"
"      2 Start - New Tributary"
"      0.001 0.000 0.001 0.001"
" 33      CATCHMENT 99"
"      2 Rectangular"
"      1 Equal length"
"      2 Horton equation"
"      99 No description"
"      0.000 % Impervious"
"      0.017 Total Area"
"      4.048 Flow length"
"      1.500 Overland Slope"
"      0.017 Pervious Area"
"      4.048 Pervious length"
"      1.500 Pervious slope"
"      0.000 Impervious Area"
"      4.048 Impervious length"
"      1.500 Impervious slope"
"      0.250 Pervious Manning 'n'"
"      50.000 Pervious Max.infiltration"
"      10.000 Pervious Min.infiltration"
"      0.500 Pervious Lag constant (hours)"
"      7.500 Pervious Depression storage"
"      0.015 Impervious Manning 'n'"
"      0.000 Impervious Max.infiltration"
"      0.000 Impervious Min.infiltration"
"      0.500 Impervious Lag constant (hours)"
"      7.500 Impervious Depression storage"
"      0.002 0.000 0.001 0.001 c.m/sec"
"      Catchment 99 Pervious Impervious Total Area "
"      Surface Area 0.017 0.000 0.017 hectare"
"      Time of concentration 5.453 0.706 5.453 minutes"
"      Time to Centroid 81.612 94.639 81.612 minutes"
"      Rainfall depth 52.991 52.991 52.991 mm"
"      Rainfall volume 9.01 0.00 9.01 c.m"
"      Rainfall losses 44.350 7.500 44.350 mm"
"      Runoff depth 8.641 45.491 8.641 mm"
"      Runoff volume 1.47 0.00 1.47 c.m"
"      Runoff coefficient 0.163 0.000 0.163 "
"      Maximum flow 0.002 0.000 0.002 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"      0.002 0.002 0.001 0.001"
" 51      PIPE DESIGN"
"      0.002 Current peak flow c.m/sec"
"      0.013 Manning 'n'"
"      1.000 Diameter metre"
"      1.000 Gradient %"
"      Depth of flow 0.023 metre"
"      Velocity 0.465 m/sec"

```

"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.025	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.002 0.002 0.002 0.001 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.003	c.m/sec"
"	Hydrograph volume	3.330	c.m"
"	0.002 0.002 0.002 0.003"		
" 40	HYDROGRAPH Confluence 100"		
"	7 Confluence "		
"	100 Node #"		
"	"		
"	Maximum flow	0.049	c.m/sec"
"	Hydrograph volume	75.035	c.m"
"	0.002 0.049 0.002 0.000"		
" 56	DIVERSION"		
"	100 Node number"		
"	0.016 Overflow threshold"		
"	1.000 Required diverted fraction"		
"	0 Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.033	c.m/sec"
"	Volume of diverted flow	20.698	c.m"
"	DIV00100.005hyd"		
"	Divert to Underground Storage 20.638 cu.m. (21.6 cu.m.)"		
"	0.002 0.049 0.016 0.000 c.m/sec"		
" 40	HYDROGRAPH Next link "		
"	5 Next link "		
"	0.002 0.016 0.016 0.000"		
" 51	PIPE DESIGN"		
"	0.016 Current peak flow c.m/sec"		
"	0.013 Manning 'n'"		
"	1.000 Diameter metre"		
"	1.000 Gradient %"		
"	Depth of flow	0.058	metre"
"	Velocity	0.867	m/sec"
"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.069	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.002 0.016 0.016 0.000 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.019	c.m/sec"
"	Hydrograph volume	57.667	c.m"
"	0.002 0.016 0.016 0.019"		
" 40	HYDROGRAPH Confluence 101"		
"	7 Confluence "		
"	101 Node #"		
"	"		
"	Maximum flow	0.019	c.m/sec"
"	Hydrograph volume	57.667	c.m"
"	0.002 0.019 0.016 0.000"		
" 38	START/RE-START TOTALS 101"		
"	3 Runoff Totals on EXIT"		

"	Total Catchment area	0.196	hectare"
"	Total Impervious area	0.167	hectare"
"	Total % impervious	85.049"	
" 19	EXIT"		


```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25 rev. 473"
"          MIDUSS created                      February-07-10"
"          10 Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pst25.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:39:02 AM"
" 31      TIME PARAMETERS"
"          10.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          721.533 Coefficient A"
"          2.253 Constant B"
"          0.679 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity          127.011 mm/hr"
"          Total depth                63.151 mm"
"          6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2 Rectangular"
"          1 Equal length"
"          2 Horton equation"
"          101 No description"
"          0.000 % Impervious"
"          0.004 Total Area"
"          20.000 Flow length"
"          1.500 Overland Slope"
"          0.004 Pervious Area"
"          20.000 Pervious length"
"          1.500 Pervious slope"
"          0.000 Impervious Area"
"          20.000 Impervious length"
"          1.500 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          50.000 Pervious Max.infiltration"
"          10.000 Pervious Min.infiltration"
"          0.500 Pervious Lag constant (hours)"
"          7.500 Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.500 Impervious Lag constant (hours)"
"          7.500 Impervious Depression storage"
"          0.001 0.000 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.004 0.000 0.004 hectare"
"          Time of concentration 11.604 1.723 11.604 minutes"
"          Time to Centroid 85.752 94.030 85.752 minutes"
"          Rainfall depth 63.151 63.151 63.151 mm"
"          Rainfall volume 2.53 0.00 2.53 c.m"
"          Rainfall losses 47.786 7.500 47.786 mm"
"          Runoff depth 15.365 55.651 15.365 mm"
"          Runoff volume 0.61 0.00 0.61 c.m"
"          Runoff coefficient 0.243 0.000 0.243 "

```

"		Maximum flow	0.001	0.000	0.001	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.001	0.001	0.000	0.000"	
" 51		PIPE DESIGN"				
"	0.001	Current peak flow	c.m/sec"			
"	0.013	Manning 'n'"				
"	0.250	Diameter	metre"			
"	1.100	Gradient	%"			
"		Depth of flow	0.019	metre"		
"		Velocity	0.423	m/sec"		
"		Pipe capacity	0.062	c.m/sec"		
"		Critical depth	0.020	metre"		
" 53		ROUTE Pipe Route 22"				
"	22.30	Pipe Route 22 Reach length	(metre)"			
"	0.478	X-factor <= 0.5"				
"	39.533	K-lag (seconds)"				
"	0.000	Default(0) or user spec.(1) values used"				
"	0.500	X-factor <= 0.5"				
"	30.000	K-lag (seconds)"				
"	0.500	Beta weighting factor"				
"	40.000	Routing time step (seconds)"				
"	1	No. of sub-reaches"				
"		Peak outflow	0.001	c.m/sec"		
"		0.001	0.001	0.001	0.000 c.m/sec"	
" 40		HYDROGRAPH Combine 2"				
"	6	Combine "				
"	2	Node #"				
"						
"		Maximum flow	0.001	c.m/sec"		
"		Hydrograph volume	0.615	c.m"		
"		0.001	0.001	0.001	0.001"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.001	0.000	0.001	0.001"	
" 33		CATCHMENT 102"				
"	2	Rectangular"				
"	1	Equal length"				
"	2	Horton equation"				
"	102	No description"				
"	99.400	% Impervious"				
"	0.062	Total Area"				
"	35.227	Flow length"				
"	1.500	Overland Slope"				
"	0.000	Pervious Area"				
"	35.227	Pervious length"				
"	1.500	Pervious slope"				
"	0.062	Impervious Area"				
"	35.227	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	50.000	Pervious Max.infiltration"				
"	10.000	Pervious Min.infiltration"				
"	0.500	Pervious Lag constant (hours)"				
"	7.500	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.500	Impervious Lag constant (hours)"				
"	7.500	Impervious Depression storage"				

"		0.022	0.000	0.001	0.001 c.m/sec"	
"	Catchment 102		Pervious	Impervious	Total Area	"
"	Surface Area	0.000	0.062	0.062	hectare"	
"	Time of concentration	16.298	2.420	2.443	minutes"	
"	Time to Centroid	88.853	94.030	94.021	minutes"	
"	Rainfall depth	63.151	63.151	63.151	mm"	
"	Rainfall volume	0.23	38.92	39.15	c.m"	
"	Rainfall losses	47.786	7.500	7.742	mm"	
"	Runoff depth	15.365	55.651	55.409	mm"	
"	Runoff volume	0.06	34.30	34.35	c.m"	
"	Runoff coefficient	0.243	0.881	0.877	"	
"	Maximum flow	0.000	0.022	0.022	c.m/sec"	
" 40	HYDROGRAPH Add Runoff "					
"	4 Add Runoff "					
"		0.022	0.022	0.001	0.001"	
" 51	PIPE DESIGN"					
"	0.022 Current peak flow	c.m/sec"				
"	0.013 Manning 'n'"					
"	1.000 Diameter	metre"				
"	1.000 Gradient	%"				
"	Depth of flow		0.067	metre"		
"	Velocity		0.952	m/sec"		
"	Pipe capacity		2.398	c.m/sec"		
"	Critical depth		0.081	metre"		
" 53	ROUTE Zero Route"					
"	0.00 Zero Route Reach length	(metre)"				
"		0.022	0.022	0.022	0.001 c.m/sec"	
" 40	HYDROGRAPH Combine	2"				
"	6 Combine "					
"	2 Node #"					
"	"					
"	Maximum flow		0.022	c.m/sec"		
"	Hydrograph volume		34.968	c.m"		
"		0.022	0.022	0.022	0.022"	
" 40	HYDROGRAPH Start - New Tributary"					
"	2 Start - New Tributary"					
"		0.022	0.000	0.022	0.022"	
" 33	CATCHMENT 103"					
"	2 Rectangular"					
"	1 Equal length"					
"	2 Horton equation"					
"	103 No description"					
"	20.700 % Impervious"					
"	0.006 Total Area"					
"	20.690 Flow length"					
"	1.500 Overland Slope"					
"	0.005 Pervious Area"					
"	20.690 Pervious length"					
"	1.500 Pervious slope"					
"	0.001 Impervious Area"					
"	20.690 Impervious length"					
"	1.500 Impervious slope"					
"	0.250 Pervious Manning 'n'"					
"	50.000 Pervious Max.infiltration"					
"	10.000 Pervious Min.infiltration"					
"	0.500 Pervious Lag constant (hours)"					
"	7.500 Pervious Depression storage"					
"	0.015 Impervious Manning 'n'"					
"	0.000 Impervious Max.infiltration"					
"	0.000 Impervious Min.infiltration"					

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"      0.500    Impervious Lag constant (hours)"
"      7.500    Impervious Depression storage"
"              0.001      0.000      0.022      0.022 c.m/sec"
"      Catchment 103      Pervious    Impervious Total Area "
"      Surface Area      0.005      0.001      0.006      hectare"
"      Time of concentration 11.843      1.759      6.942      minutes"
"      Time to Centroid      85.952      94.030      89.878      minutes"
"      Rainfall depth      63.151      63.151      63.151      mm"
"      Rainfall volume      3.00      0.78      3.79      c.m"
"      Rainfall losses      47.786      7.500      39.447      mm"
"      Runoff depth      15.365      55.651      23.704      mm"
"      Runoff volume      0.73      0.69      1.42      c.m"
"      Runoff coefficient      0.243      0.881      0.375      "
"      Maximum flow      0.001      0.000      0.001      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.001      0.001      0.022      0.022"
" 51      PIPE DESIGN"
"      0.001      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.250      Diameter      metre"
"      1.800      Gradient      %"
"      Depth of flow      0.022      metre"
"      Velocity      0.599      m/sec"
"      Pipe capacity      0.080      c.m/sec"
"      Critical depth      0.027      metre"
" 53      ROUTE      Pipe Route 20"
"      19.60      Pipe Route 20 Reach length      ( metre)"
"      0.483      X-factor <= 0.5"
"      24.541      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.500      Beta weighting factor"
"      25.000      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.001      c.m/sec"
"              0.001      0.001      0.001      0.022 c.m/sec"
" 40      HYDROGRAPH Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.001      c.m/sec"
"      Hydrograph volume      1.422      c.m"
"              0.001      0.001      0.001      0.001"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"              0.001      0.000      0.001      0.001"
" 33      CATCHMENT 104"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      104      No description"
"      98.300      % Impervious"
"      0.048      Total Area"
"      15.094      Flow length"
"      1.500      Overland Slope"
"      0.001      Pervious Area"
"      15.094      Pervious length"
"      1.500      Pervious slope"

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```

"      0.047  Impervious Area"
"      15.094 Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000 Pervious Max.infiltration"
"      10.000 Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"          0.017      0.000      0.001      0.001 c.m/sec"
"      Catchment 104      Pervious      Impervious Total Area "
"      Surface Area      0.001      0.047      0.048      hectare"
"      Time of concentration 9.801      1.455      1.495      minutes"
"      Time to Centroid      84.160      94.030      93.983      minutes"
"      Rainfall depth      63.151      63.151      63.151      mm"
"      Rainfall volume      0.52      29.80      30.31      c.m"
"      Rainfall losses      47.786      7.500      8.185      mm"
"      Runoff depth      15.365      55.651      54.966      mm"
"      Runoff volume      0.13      26.26      26.38      c.m"
"      Runoff coefficient      0.243      0.881      0.870      "
"      Maximum flow      0.000      0.017      0.017      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.017      0.017      0.001      0.001"
" 51      PIPE DESIGN"
"      0.017  Current peak flow      c.m/sec"
"      0.013  Manning 'n'"
"      1.000  Diameter      metre"
"      1.000  Gradient      %"
"      Depth of flow      0.060      metre"
"      Velocity      0.880      m/sec"
"      Pipe capacity      2.398      c.m/sec"
"      Critical depth      0.071      metre"
" 53      ROUTE Zero Route"
"      0.00  Zero Route Reach length      ( metre)"
"          0.017      0.017      0.017      0.001 c.m/sec"
" 40      HYDROGRAPH Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.018      c.m/sec"
"      Hydrograph volume      27.806      c.m"
"          0.017      0.017      0.017      0.018"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"          0.017      0.000      0.017      0.018"
" 33      CATCHMENT 105"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      105      No description"
"      100.000 % Impervious"
"      0.053  Total Area"
"      11.522  Flow length"
"      1.500  Overland Slope"
"      0.000  Pervious Area"

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"      11.522  Pervious length"
"      1.500  Pervious slope"
"      0.053  Impervious Area"
"      11.522  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000  Pervious Max.infiltration"
"      10.000  Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"              0.019      0.000      0.017      0.018 c.m/sec"
"      Catchment 105      Pervious      Impervious      Total Area "
"      Surface Area      0.000      0.053      0.053      hectare"
"      Time of concentration 8.335      1.238      1.238      minutes"
"      Time to Centroid      83.889      94.030      94.030      minutes"
"      Rainfall depth      63.151      63.151      63.151      mm"
"      Rainfall volume      0.00      33.47      33.47      c.m"
"      Rainfall losses      47.786      7.500      7.500      mm"
"      Runoff depth      15.365      55.651      55.651      mm"
"      Runoff volume      0.00      29.49      29.49      c.m"
"      Runoff coefficient      0.000      0.881      0.881      "
"      Maximum flow      0.000      0.019      0.019      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.019      0.019      0.017      0.018"
" 51      PIPE DESIGN"
"      0.019      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.200      Diameter      metre"
"      0.500      Gradient      %"
"      Depth of flow      0.136      metre"
"      Velocity      0.821      m/sec"
"      Pipe capacity      0.023      c.m/sec"
"      Critical depth      0.117      metre"
" 53      ROUTE      Pipe Route 16"
"      16.00      Pipe Route 16 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      14.611      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.563      Beta weighting factor"
"      31.579      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.018      c.m/sec"
"              0.019      0.019      0.018      0.018 c.m/sec"
" 40      HYDROGRAPH      Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.036      c.m/sec"
"      Hydrograph volume      57.301      c.m"
"              0.019      0.019      0.018      0.036"
" 40      HYDROGRAPH      Confluence      2"
"      7      Confluence "

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"          2   Node #"
"
"          Maximum flow          0.022   c.m/sec"
"          Hydrograph volume      34.968   c.m"
"          0.019   0.022   0.018   0.000"
" 51      PIPE DESIGN"
"          0.022   Current peak flow   c.m/sec"
"          0.013   Manning 'n'"
"          0.250   Diameter   metre"
"          1.000   Gradient   %"
"          Depth of flow          0.106   metre"
"          Velocity              1.127   m/sec"
"          Pipe capacity          0.059   c.m/sec"
"          Critical depth         0.120   metre"
" 53      ROUTE   Pipe Route 5"
"          4.60      Pipe Route 5 Reach length   ( metre)"
"          0.000   X-factor <= 0.5"
"          3.062   K-lag   ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000  K-lag   ( seconds)"
"          0.567   Beta weighting factor"
"          7.059   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"          Peak outflow          0.022   c.m/sec"
"          0.019   0.022   0.022   0.000 c.m/sec"
" 40      HYDROGRAPH   Combine   100"
"          6   Combine "
"          100   Node #"
"          "
"          Maximum flow          0.022   c.m/sec"
"          Hydrograph volume      34.968   c.m"
"          0.019   0.022   0.022   0.022"
" 40      HYDROGRAPH   Confluence   4"
"          7   Confluence "
"          4   Node #"
"          "
"          Maximum flow          0.036   c.m/sec"
"          Hydrograph volume      57.301   c.m"
"          0.019   0.036   0.022   0.000"
" 51      PIPE DESIGN"
"          0.036   Current peak flow   c.m/sec"
"          0.013   Manning 'n'"
"          0.250   Diameter   metre"
"          1.000   Gradient   %"
"          Depth of flow          0.141   metre"
"          Velocity              1.272   m/sec"
"          Pipe capacity          0.059   c.m/sec"
"          Critical depth         0.155   metre"
" 53      ROUTE   Pipe Route 5"
"          5.10      Pipe Route 5 Reach length   ( metre)"
"          0.000   X-factor <= 0.5"
"          3.006   K-lag   ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000  K-lag   ( seconds)"
"          0.636   Beta weighting factor"
"          8.108   Routing time step   ( seconds)"
"          1   No. of sub-reaches"
"          Peak outflow          0.036   c.m/sec"

```

"		0.019	0.036	0.036	0.000 c.m/sec"
" 40	HYDROGRAPH	Combine	100"		
"	6	Combine "			
"	100	Node #"			
"					
"		Maximum flow	0.059	c.m/sec"	
"		Hydrograph volume	92.269	c.m"	
"		0.019	0.036	0.036	0.059"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.019	0.000	0.036	0.059"
" 33	CATCHMENT	98"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	98	No description"			
"	60.700	% Impervious"			
"	0.006	Total Area"			
"	2.353	Flow length"			
"	1.500	Overland Slope"			
"	0.002	Pervious Area"			
"	2.353	Pervious length"			
"	1.500	Pervious slope"			
"	0.004	Impervious Area"			
"	2.353	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.002	0.000	0.036	0.059 c.m/sec"
"	Catchment 98	Pervious	Impervious	Total Area	"
"	Surface Area	0.002	0.004	0.006	hectare"
"	Time of concentration	3.213	0.477	0.892	minutes"
"	Time to Centroid	82.778	94.030	92.323	minutes"
"	Rainfall depth	63.151	63.151	63.151	mm"
"	Rainfall volume	1.49	2.30	3.79	c.m"
"	Rainfall losses	47.786	7.500	23.332	mm"
"	Runoff depth	15.365	55.651	39.819	mm"
"	Runoff volume	0.36	2.03	2.39	c.m"
"	Runoff coefficient	0.243	0.881	0.631	"
"	Maximum flow	0.000	0.001	0.002	c.m/sec"
" 40	HYDROGRAPH	Add Runoff "			
"	4	Add Runoff "			
"		0.002	0.002	0.036	0.059"
" 51	PIPE DESIGN"				
"	0.002	Current peak flow	c.m/sec"		
"	0.013	Manning 'n' "			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.021	metre"	
"		Velocity	0.442	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.023	metre"	

" 53	ROUTE Zero Route"				
"	0.00	Zero Route Reach length	(metre)"		
"		0.002	0.002	0.002	0.059 c.m/sec"
" 40	HYDROGRAPH Combine 101"				
"	6	Combine "			
"	101	Node #"			
"					
"		Maximum flow	0.002	c.m/sec"	
"		Hydrograph volume	2.389	c.m"	
"		0.002	0.002	0.002	0.002"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.002	0.000	0.002	0.002"
" 33	CATCHMENT 99"				
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	99	No description"			
"	0.000	% Impervious"			
"	0.017	Total Area"			
"	4.048	Flow length"			
"	1.500	Overland Slope"			
"	0.017	Pervious Area"			
"	4.048	Pervious length"			
"	1.500	Pervious slope"			
"	0.000	Impervious Area"			
"	4.048	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.003	0.000	0.002	0.002 c.m/sec"
"	Catchment 99	Pervious	Impervious	Total Area	"
"	Surface Area	0.017	0.000	0.017	hectare"
"	Time of concentration	4.450	0.661	4.450	minutes"
"	Time to Centroid	82.939	94.030	82.939	minutes"
"	Rainfall depth	63.151	63.151	63.151	mm"
"	Rainfall volume	10.74	0.00	10.74	c.m"
"	Rainfall losses	47.786	7.500	47.786	mm"
"	Runoff depth	15.365	55.651	15.365	mm"
"	Runoff volume	2.61	0.00	2.61	c.m"
"	Runoff coefficient	0.243	0.000	0.243	"
"	Maximum flow	0.003	0.000	0.003	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.003	0.003	0.002	0.002"
" 51	PIPE DESIGN"				
"	0.003	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.029	metre"	
"		Velocity	0.544	m/sec"	

"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.032	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.003 0.003 0.003 0.002 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.005	c.m/sec"
"	Hydrograph volume	5.001	c.m"
"	0.003 0.003 0.003 0.005"		
" 40	HYDROGRAPH Confluence 100"		
"	7 Confluence "		
"	100 Node #"		
"	"		
"	Maximum flow	0.059	c.m/sec"
"	Hydrograph volume	92.269	c.m"
"	0.003 0.059 0.003 0.000"		
" 56	DIVERSION"		
"	100 Node number"		
"	0.023 Overflow threshold"		
"	1.000 Required diverted fraction"		
"	0 Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.036	c.m/sec"
"	Volume of diverted flow	21.407	c.m"
"	DIV00100.005hyd"		
"	Divert to Underground Storage 21.407 cu.m. (21.6 cu.m.)"		
"	0.003 0.059 0.023 0.000 c.m/sec"		
" 40	HYDROGRAPH Next link "		
"	5 Next link "		
"	0.003 0.023 0.023 0.000"		
" 51	PIPE DESIGN"		
"	0.023 Current peak flow c.m/sec"		
"	0.013 Manning 'n'"		
"	1.000 Diameter metre"		
"	1.000 Gradient %"		
"	Depth of flow	0.069	metre"
"	Velocity	0.968	m/sec"
"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.083	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.003 0.023 0.023 0.000 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.028	c.m/sec"
"	Hydrograph volume	75.864	c.m"
"	0.003 0.023 0.023 0.028"		
" 40	HYDROGRAPH Confluence 101"		
"	7 Confluence "		
"	101 Node #"		
"	"		
"	Maximum flow	0.028	c.m/sec"
"	Hydrograph volume	75.864	c.m"
"	0.003 0.028 0.023 0.000"		
" 38	START/RE-START TOTALS 101"		
"	3 Runoff Totals on EXIT"		

"	Total Catchment area	0.196	hectare"
"	Total Impervious area	0.167	hectare"
"	Total % impervious	85.049"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February-07-10"
"          10  Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pst50.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:36:13 AM"
" 31      TIME PARAMETERS"
"          10.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          766.038  Coefficient A"
"          1.898  Constant B"
"          0.668  Exponent C"
"          0.400  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          141.545  mm/hr"
"          Total depth                71.090  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2  Rectangular"
"          1  Equal length"
"          2  Horton equation"
"          101  No description"
"          0.000  % Impervious"
"          0.004  Total Area"
"          20.000  Flow length"
"          1.500  Overland Slope"
"          0.004  Pervious Area"
"          20.000  Pervious length"
"          1.500  Pervious slope"
"          0.000  Impervious Area"
"          20.000  Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          50.000  Pervious Max.infiltration"
"          10.000  Pervious Min.infiltration"
"          0.500  Pervious Lag constant (hours)"
"          7.500  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.500  Impervious Lag constant (hours)"
"          7.500  Impervious Depression storage"
"          0.001  0.000  0.000  0.000 c.m/sec"
"          Catchment 101      Pervious  Impervious Total Area "
"          Surface Area      0.004      0.000      0.004      hectare"
"          Time of concentration  10.434      1.650      10.434      minutes"
"          Time to Centroid      86.925      93.609      86.925      minutes"
"          Rainfall depth      71.090      71.090      71.090      mm"
"          Rainfall volume      2.84      0.00      2.84      c.m"
"          Rainfall losses      49.748      7.500      49.748      mm"
"          Runoff depth      21.342      63.590      21.342      mm"
"          Runoff volume      0.85      0.00      0.85      c.m"
"          Runoff coefficient      0.300      0.000      0.300      "

```


"		Maximum flow	0.001	0.000	0.001	c.m/sec"
" 40		HYDROGRAPH Add Runoff "				
"	4	Add Runoff "				
"		0.001	0.001	0.000	0.000"	
" 51		PIPE DESIGN"				
"	0.001	Current peak flow	c.m/sec"			
"	0.013	Manning 'n'"				
"	0.250	Diameter	metre"			
"	1.100	Gradient	%"			
"		Depth of flow	0.022	metre"		
"		Velocity	0.473	m/sec"		
"		Pipe capacity	0.062	c.m/sec"		
"		Critical depth	0.025	metre"		
" 53		ROUTE Pipe Route 22"				
"	22.30	Pipe Route 22 Reach length	(metre)"			
"	0.476	X-factor <= 0.5"				
"	35.324	K-lag (seconds)"				
"	0.000	Default(0) or user spec.(1) values used"				
"	0.500	X-factor <= 0.5"				
"	30.000	K-lag (seconds)"				
"	0.500	Beta weighting factor"				
"	35.294	Routing time step (seconds)"				
"	1	No. of sub-reaches"				
"		Peak outflow	0.001	c.m/sec"		
"		0.001	0.001	0.001	0.000 c.m/sec"	
" 40		HYDROGRAPH Combine 2"				
"	6	Combine "				
"	2	Node #"				
"						
"		Maximum flow	0.001	c.m/sec"		
"		Hydrograph volume	0.854	c.m"		
"		0.001	0.001	0.001	0.001"	
" 40		HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"				
"		0.001	0.000	0.001	0.001"	
" 33		CATCHMENT 102"				
"	2	Rectangular"				
"	1	Equal length"				
"	2	Horton equation"				
"	102	No description"				
"	99.400	% Impervious"				
"	0.062	Total Area"				
"	35.227	Flow length"				
"	1.500	Overland Slope"				
"	0.000	Pervious Area"				
"	35.227	Pervious length"				
"	1.500	Pervious slope"				
"	0.062	Impervious Area"				
"	35.227	Impervious length"				
"	1.500	Impervious slope"				
"	0.250	Pervious Manning 'n'"				
"	50.000	Pervious Max.infiltration"				
"	10.000	Pervious Min.infiltration"				
"	0.500	Pervious Lag constant (hours)"				
"	7.500	Pervious Depression storage"				
"	0.015	Impervious Manning 'n'"				
"	0.000	Impervious Max.infiltration"				
"	0.000	Impervious Min.infiltration"				
"	0.500	Impervious Lag constant (hours)"				
"	7.500	Impervious Depression storage"				

	0.024	0.000	0.001	0.001 c.m/sec"	
"	Catchment 102	Pervious	Impervious	Total Area	"
"	Surface Area	0.000	0.062	0.062	hectare"
"	Time of concentration	14.655	2.317	2.342	minutes"
"	Time to Centroid	90.401	93.609	93.603	minutes"
"	Rainfall depth	71.090	71.090	71.090	mm"
"	Rainfall volume	0.26	43.81	44.08	c.m"
"	Rainfall losses	49.748	7.500	7.753	mm"
"	Runoff depth	21.342	63.590	63.336	mm"
"	Runoff volume	0.08	39.19	39.27	c.m"
"	Runoff coefficient	0.300	0.894	0.891	"
"	Maximum flow	0.000	0.024	0.024	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"	0.024	0.024	0.001	0.001"	
" 51	PIPE DESIGN"				
"	0.024	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.071	metre"	
"		Velocity	0.984	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.085	metre"	
" 53	ROUTE Zero Route"				
"	0.00	Zero Route Reach length	(metre)"		
"	0.024	0.024	0.024	0.001 c.m/sec"	
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"					
"		Maximum flow	0.025	c.m/sec"	
"		Hydrograph volume	40.122	c.m"	
"	0.024	0.024	0.024	0.025"	
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"	0.024	0.000	0.024	0.025"	
" 33	CATCHMENT 103"				
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	103	No description"			
"	20.700	% Impervious"			
"	0.006	Total Area"			
"	20.690	Flow length"			
"	1.500	Overland Slope"			
"	0.005	Pervious Area"			
"	20.690	Pervious length"			
"	1.500	Pervious slope"			
"	0.001	Impervious Area"			
"	20.690	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			

"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.002	0.000	0.024	0.025 c.m/sec"
"		Catchment 103	Pervious	Impervious	Total Area "
"		Surface Area	0.005	0.001	0.006 hectare"
"		Time of concentration	10.649	1.684	6.727 minutes"
"		Time to Centroid	87.146	93.609	89.974 minutes"
"		Rainfall depth	71.090	71.090	71.090 mm"
"		Rainfall volume	3.38	0.88	4.27 c.m"
"		Rainfall losses	49.748	7.500	41.003 mm"
"		Runoff depth	21.342	63.590	30.087 mm"
"		Runoff volume	1.02	0.79	1.81 c.m"
"		Runoff coefficient	0.300	0.894	0.423 "
"		Maximum flow	0.001	0.000	0.002 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.002	0.002	0.024	0.025"
" 51		PIPE DESIGN"			
"	0.002	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	0.250	Diameter	metre"		
"	1.800	Gradient	%"		
"		Depth of flow	0.025	metre"	
"		Velocity	0.653	m/sec"	
"		Pipe capacity	0.080	c.m/sec"	
"		Critical depth	0.032	metre"	
" 53		ROUTE Pipe Route 20"			
"	19.60	Pipe Route 20 Reach length	(metre)"		
"	0.482	X-factor <= 0.5"			
"	22.499	K-lag (seconds)"			
"	0.000	Default(0) or user spec.(1) values used"			
"	0.500	X-factor <= 0.5"			
"	30.000	K-lag (seconds)"			
"	0.500	Beta weighting factor"			
"	23.077	Routing time step (seconds)"			
"	1	No. of sub-reaches"			
"		Peak outflow	0.002	c.m/sec"	
"		0.002	0.002	0.002	0.025 c.m/sec"
" 40		HYDROGRAPH Combine 4"			
"	6	Combine "			
"	4	Node #"			
"					
"		Maximum flow	0.002	c.m/sec"	
"		Hydrograph volume	1.805	c.m"	
"		0.002	0.002	0.002	0.002"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.002	0.000	0.002	0.002"
" 33		CATCHMENT 104"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	104	No description"			
"	98.300	% Impervious"			
"	0.048	Total Area"			
"	15.094	Flow length"			
"	1.500	Overland Slope"			
"	0.001	Pervious Area"			
"	15.094	Pervious length"			
"	1.500	Pervious slope"			

"	0.047	Impervious Area"			
"	15.094	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.019	0.000	0.002	0.002 c.m/sec"
"		Catchment 104	Pervious	Impervious	Total Area "
"		Surface Area	0.001	0.047	0.048 hectare"
"		Time of concentration	8.813	1.394	1.437 minutes"
"		Time to Centroid	86.177	93.609	93.566 minutes"
"		Rainfall depth	71.090	71.090	71.090 mm"
"		Rainfall volume	0.58	33.54	34.12 c.m"
"		Rainfall losses	49.748	7.500	8.218 mm"
"		Runoff depth	21.342	63.590	62.871 mm"
"		Runoff volume	0.17	30.00	30.18 c.m"
"		Runoff coefficient	0.300	0.894	"
"		Maximum flow	0.000	0.019	0.019 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.019	0.019	0.002	0.002"
" 51		PIPE DESIGN"			
"	0.019	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.063	metre"	
"		Velocity	0.910	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.075	metre"	
" 53		ROUTE Zero Route"			
"	0.00	Zero Route Reach length	(metre)"		
"		0.019	0.019	0.019	0.002 c.m/sec"
" 40		HYDROGRAPH Combine	4"		
"	6	Combine "			
"	4	Node #"			
"		"			
"		Maximum flow	0.020	c.m/sec"	
"		Hydrograph volume	31.984	c.m"	
"		0.019	0.019	0.019	0.020"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.019	0.000	0.019	0.020"
" 33		CATCHMENT 105"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	105	No description"			
"	100.000	% Impervious"			
"	0.053	Total Area"			
"	11.522	Flow length"			
"	1.500	Overland Slope"			
"	0.000	Pervious Area"			

```

"      11.522  Pervious length"
"      1.500  Pervious slope"
"      0.053  Impervious Area"
"      11.522  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000  Pervious Max.infiltration"
"      10.000  Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"          0.021      0.000      0.019      0.020 c.m/sec"
"      Catchment 105      Pervious      Impervious      Total Area      "
"      Surface Area      0.000      0.053      0.053      hectare"
"      Time of concentration      7.495      1.185      1.185      minutes"
"      Time to Centroid      85.764      93.609      93.609      minutes"
"      Rainfall depth      71.090      71.090      71.090      mm"
"      Rainfall volume      0.00      37.68      37.68      c.m"
"      Rainfall losses      49.748      7.500      7.500      mm"
"      Runoff depth      21.342      63.590      63.590      mm"
"      Runoff volume      0.00      33.70      33.70      c.m"
"      Runoff coefficient      0.000      0.894      0.894      "
"      Maximum flow      0.000      0.021      0.021      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.021      0.021      0.019      0.020"
" 51      PIPE DESIGN"
"      0.021      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.200      Diameter      metre"
"      0.500      Gradient      %"
"      Depth of flow      0.148      metre"
"      Velocity      0.835      m/sec"
"      Pipe capacity      0.023      c.m/sec"
"      Critical depth      0.124      metre"
" 53      ROUTE      Pipe Route 16"
"      16.00      Pipe Route 16 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      14.367      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.610      Beta weighting factor"
"      35.294      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.021      c.m/sec"
"          0.021      0.021      0.021      0.020 c.m/sec"
" 40      HYDROGRAPH      Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.041      c.m/sec"
"      Hydrograph volume      65.686      c.m"
"          0.021      0.021      0.021      0.041"
" 40      HYDROGRAPH      Confluence      2"
"      7      Confluence "

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```

"      2   Node #"
"
"      Maximum flow      0.025      c.m/sec"
"      Hydrograph volume 40.122      c.m"
"      0.021      0.025      0.021      0.000"
" 51      PIPE DESIGN"
"      0.025      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.250      Diameter      metre"
"      1.000      Gradient      %"
"      Depth of flow      0.114      metre"
"      Velocity      1.162      m/sec"
"      Pipe capacity      0.059      c.m/sec"
"      Critical depth      0.128      metre"
" 53      ROUTE      Pipe Route 5"
"      4.60      Pipe Route 5 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      2.969      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.587      Beta weighting factor"
"      7.143      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.025      c.m/sec"
"      0.021      0.025      0.025      0.000 c.m/sec"
" 40      HYDROGRAPH      Combine      100"
"      6      Combine "
"      100      Node #"
"      "
"      Maximum flow      0.025      c.m/sec"
"      Hydrograph volume 40.122      c.m"
"      0.021      0.025      0.025      0.025"
" 40      HYDROGRAPH      Confluence      4"
"      7      Confluence "
"      4      Node #"
"      "
"      Maximum flow      0.041      c.m/sec"
"      Hydrograph volume 65.686      c.m"
"      0.021      0.041      0.025      0.000"
" 51      PIPE DESIGN"
"      0.041      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.250      Diameter      metre"
"      1.000      Gradient      %"
"      Depth of flow      0.152      metre"
"      Velocity      1.306      m/sec"
"      Pipe capacity      0.059      c.m/sec"
"      Critical depth      0.165      metre"
" 53      ROUTE      Pipe Route 5"
"      5.10      Pipe Route 5 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      2.929      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.665      Beta weighting factor"
"      8.696      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.041      c.m/sec"

```


"		0.021	0.041	0.041	0.000 c.m/sec"
" 40	HYDROGRAPH	Combine	100"		
"	6	Combine "			
"	100	Node #"			
"					
"		Maximum flow	0.066	c.m/sec"	
"		Hydrograph volume	105.808	c.m"	
"		0.021	0.041	0.041	0.066"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.021	0.000	0.041	0.066"
" 33	CATCHMENT	98"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	98	No description"			
"	60.700	% Impervious"			
"	0.006	Total Area"			
"	2.353	Flow length"			
"	1.500	Overland Slope"			
"	0.002	Pervious Area"			
"	2.353	Pervious length"			
"	1.500	Pervious slope"			
"	0.004	Impervious Area"			
"	2.353	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.002	0.000	0.041	0.066 c.m/sec"
"	Catchment 98	Pervious	Impervious	Total Area "	
"	Surface Area	0.002	0.004	0.006	hectare"
"	Time of concentration	2.889	0.457	0.891	minutes"
"	Time to Centroid	84.486	93.609	91.981	minutes"
"	Rainfall depth	71.090	71.090	71.090	mm"
"	Rainfall volume	1.68	2.59	4.27	c.m"
"	Rainfall losses	49.748	7.500	24.103	mm"
"	Runoff depth	21.342	63.590	46.986	mm"
"	Runoff volume	0.50	2.32	2.82	c.m"
"	Runoff coefficient	0.300	0.894	0.661	"
"	Maximum flow	0.001	0.001	0.002	c.m/sec"
" 40	HYDROGRAPH	Add Runoff "			
"	4	Add Runoff "			
"		0.002	0.002	0.041	0.066"
" 51	PIPE DESIGN"				
"	0.002	Current peak flow	c.m/sec"		
"	0.013	Manning 'n' "			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.022	metre"	
"		Velocity	0.463	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.025	metre"	

```

" 53      ROUTE Zero Route"
"      0.00      Zero Route Reach length      ( metre)"
"              0.002      0.002      0.002      0.066 c.m/sec"
" 40      HYDROGRAPH      Combine      101"
"      6      Combine "
"      101      Node #"
"      "
"      Maximum flow      0.002      c.m/sec"
"      Hydrograph volume      2.819      c.m"
"              0.002      0.002      0.002      0.002"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"              0.002      0.000      0.002      0.002"
" 33      CATCHMENT 99"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      99      No description"
"      0.000      % Impervious"
"      0.017      Total Area"
"      4.048      Flow length"
"      1.500      Overland Slope"
"      0.017      Pervious Area"
"      4.048      Pervious length"
"      1.500      Pervious slope"
"      0.000      Impervious Area"
"      4.048      Impervious length"
"      1.500      Impervious slope"
"      0.250      Pervious Manning 'n'"
"      50.000      Pervious Max.infiltration"
"      10.000      Pervious Min.infiltration"
"      0.500      Pervious Lag constant (hours)"
"      7.500      Pervious Depression storage"
"      0.015      Impervious Manning 'n'"
"      0.000      Impervious Max.infiltration"
"      0.000      Impervious Min.infiltration"
"      0.500      Impervious Lag constant (hours)"
"      7.500      Impervious Depression storage"
"              0.005      0.000      0.002      0.002 c.m/sec"
"      Catchment 99      Pervious      Impervious      Total Area "
"      Surface Area      0.017      0.000      0.017      hectare"
"      Time of concentration      4.001      0.633      4.001      minutes"
"      Time to Centroid      84.677      93.609      84.677      minutes"
"      Rainfall depth      71.090      71.090      71.090      mm"
"      Rainfall volume      12.09      0.00      12.09      c.m"
"      Rainfall losses      49.748      7.500      49.748      mm"
"      Runoff depth      21.342      63.590      21.342      mm"
"      Runoff volume      3.63      0.00      3.63      c.m"
"      Runoff coefficient      0.300      0.000      0.300      "
"      Maximum flow      0.005      0.000      0.005      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.005      0.005      0.002      0.002"
" 51      PIPE DESIGN"
"      0.005      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      1.000      Diameter      metre"
"      1.000      Gradient      %"
"      Depth of flow      0.032      metre"
"      Velocity      0.590      m/sec"

```

```

"          Pipe capacity          2.398    c.m/sec"
"          Critical depth          0.037    metre"
" 53      ROUTE Zero Route"
"          0.00  Zero Route Reach length  ( metre)"
"                  0.005    0.005    0.005    0.002 c.m/sec"
" 40      HYDROGRAPH  Combine      101"
"          6  Combine "
"          101  Node #"
"          "
"          Maximum flow          0.007    c.m/sec"
"          Hydrograph volume      6.447    c.m"
"                  0.005    0.005    0.005    0.007"
" 40      HYDROGRAPH  Confluence    100"
"          7  Confluence "
"          100  Node #"
"          "
"          Maximum flow          0.066    c.m/sec"
"          Hydrograph volume      105.808  c.m"
"                  0.005    0.066    0.005    0.000"
" 56      DIVERSION"
"          100  Node number"
"          0.030  Overflow threshold"
"          1.000  Required diverted fraction"
"          0  Conduit type; 1=Pipe;2=Channel"
"          Peak of diverted flow    0.036    c.m/sec"
"          Volume of diverted flow  21.566    c.m"
"          DIV00100.005hyd"
"          Divert to Underground Storage 21.566 cu.m. (21.6 cu.m.)"
"                  0.005    0.066    0.030    0.000 c.m/sec"
" 40      HYDROGRAPH Next link "
"          5  Next link "
"                  0.005    0.030    0.030    0.000"
" 51      PIPE DESIGN"
"          0.030  Current peak flow    c.m/sec"
"          0.013  Manning 'n'"
"          1.000  Diameter    metre"
"          1.000  Gradient    %"
"          Depth of flow          0.078    metre"
"          Velocity              1.049    m/sec"
"          Pipe capacity          2.398    c.m/sec"
"          Critical depth          0.095    metre"
" 53      ROUTE Zero Route"
"          0.00  Zero Route Reach length  ( metre)"
"                  0.005    0.030    0.030    0.000 c.m/sec"
" 40      HYDROGRAPH  Combine      101"
"          6  Combine "
"          101  Node #"
"          "
"          Maximum flow          0.037    c.m/sec"
"          Hydrograph volume      90.690    c.m"
"                  0.005    0.030    0.030    0.037"
" 40      HYDROGRAPH  Confluence    101"
"          7  Confluence "
"          101  Node #"
"          "
"          Maximum flow          0.037    c.m/sec"
"          Hydrograph volume      90.690    c.m"
"                  0.005    0.037    0.030    0.000"
" 38      START/RE-START TOTALS 101"
"          3  Runoff Totals on EXIT"

```

"	Total Catchment area	0.196	hectare"
"	Total Impervious area	0.167	hectare"
"	Total % impervious	85.049"	
" 19	EXIT"		

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      February-07-10"
"          10  Units used:                      ie METRIC"
"          Job folder:                        C:\swm\MIDUSS\16025"
"          Output filename:                    Pst100.out"
"          Licensee name:                      Bob"
"          Company                            "
"          Date & Time last used:              31/07/2022 at 9:14:22 AM"
" 31      TIME PARAMETERS"
"          10.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          801.044  Coefficient A"
"          1.501  Constant B"
"          0.657  Exponent C"
"          0.400  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity          155.783  mm/hr"
"          Total depth                78.830  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 101"
"          2  Rectangular"
"          1  Equal length"
"          2  Horton equation"
"          101  No description"
"          0.000  % Impervious"
"          0.004  Total Area"
"          20.000  Flow length"
"          1.500  Overland Slope"
"          0.004  Pervious Area"
"          20.000  Pervious length"
"          1.500  Pervious slope"
"          0.000  Impervious Area"
"          20.000  Impervious length"
"          1.500  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          50.000  Pervious Max.infiltration"
"          10.000  Pervious Min.infiltration"
"          0.500  Pervious Lag constant (hours)"
"          7.500  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.500  Impervious Lag constant (hours)"
"          7.500  Impervious Depression storage"
"          0.001  0.000  0.000  0.000 c.m/sec"
"          Catchment 101      Pervious  Impervious Total Area "
"          Surface Area      0.004      0.000      0.004      hectare"
"          Time of concentration  9.625      1.588      9.625      minutes"
"          Time to Centroid      89.241      0.000      89.241      minutes"
"          Rainfall depth      78.830      78.830      78.830      mm"
"          Rainfall volume      3.15      0.00      3.15      c.m"
"          Rainfall losses      51.075      78.830      51.075      mm"
"          Runoff depth      27.755      0.000      27.755      mm"
"          Runoff volume      1.11      0.00      1.11      c.m"
"          Runoff coefficient      0.352      0.000      0.352      "

```

"	Maximum flow	0.001	0.000	0.001	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.001 0.001 0.000 0.000"				
" 51	PIPE DESIGN"				
"	0.001 Current peak flow c.m/sec"				
"	0.013 Manning 'n'"				
"	0.250 Diameter metre"				
"	1.100 Gradient %"				
"	Depth of flow 0.025 metre"				
"	Velocity 0.510 m/sec"				
"	Pipe capacity 0.062 c.m/sec"				
"	Critical depth 0.028 metre"				
" 53	ROUTE Pipe Route 22"				
"	22.30 Pipe Route 22 Reach length (metre)"				
"	0.474 X-factor <= 0.5"				
"	32.813 K-lag (seconds)"				
"	0.000 Default(0) or user spec.(1) values used"				
"	0.500 X-factor <= 0.5"				
"	30.000 K-lag (seconds)"				
"	0.500 Beta weighting factor"				
"	33.333 Routing time step (seconds)"				
"	1 No. of sub-reaches"				
"	Peak outflow 0.001 c.m/sec"				
"	0.001 0.001 0.001 0.000 c.m/sec"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	"				
"	Maximum flow 0.001 c.m/sec"				
"	Hydrograph volume 1.110 c.m"				
"	0.001 0.001 0.001 0.001"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.001 0.000 0.001 0.001"				
" 33	CATCHMENT 102"				
"	2 Rectangular"				
"	1 Equal length"				
"	2 Horton equation"				
"	102 No description"				
"	99.400 % Impervious"				
"	0.062 Total Area"				
"	35.227 Flow length"				
"	1.500 Overland Slope"				
"	0.000 Pervious Area"				
"	35.227 Pervious length"				
"	1.500 Pervious slope"				
"	0.062 Impervious Area"				
"	35.227 Impervious length"				
"	1.500 Impervious slope"				
"	0.250 Pervious Manning 'n'"				
"	50.000 Pervious Max.infiltration"				
"	10.000 Pervious Min.infiltration"				
"	0.500 Pervious Lag constant (hours)"				
"	7.500 Pervious Depression storage"				
"	0.015 Impervious Manning 'n'"				
"	0.000 Impervious Max.infiltration"				
"	0.000 Impervious Min.infiltration"				
"	0.500 Impervious Lag constant (hours)"				
"	7.500 Impervious Depression storage"				

"		0.027	0.000	0.001	0.001 c.m/sec"
"	Catchment 102		Pervious	Impervious	Total Area "
"	Surface Area	0.000	0.062	0.062	hectare"
"	Time of concentration	13.518	2.230	2.257	minutes"
"	Time to Centroid	92.687	93.300	93.299	minutes"
"	Rainfall depth	78.830	78.830	78.830	mm"
"	Rainfall volume	0.29	48.58	48.87	c.m"
"	Rainfall losses	51.075	7.500	7.761	mm"
"	Runoff depth	27.755	71.330	71.069	mm"
"	Runoff volume	0.10	43.96	44.06	c.m"
"	Runoff coefficient	0.352	0.905	0.902	"
"	Maximum flow	0.000	0.027	0.027	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.027	0.027	0.001	0.001"
" 51	PIPE DESIGN"				
"	0.027	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.074	metre"	
"		Velocity	1.013	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.089	metre"	
" 53	ROUTE Zero Route"				
"	0.00	Zero Route Reach length	(metre)"		
"		0.027	0.027	0.027	0.001 c.m/sec"
" 40	HYDROGRAPH Combine 2"				
"	6	Combine "			
"	2	Node #"			
"					
"		Maximum flow	0.028	c.m/sec"	
"		Hydrograph volume	45.173	c.m"	
"		0.027	0.027	0.027	0.028"
" 40	HYDROGRAPH Start - New Tributary"				
"	2	Start - New Tributary"			
"		0.027	0.000	0.027	0.028"
" 33	CATCHMENT 103"				
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	103	No description"			
"	20.700	% Impervious"			
"	0.006	Total Area"			
"	20.690	Flow length"			
"	1.500	Overland Slope"			
"	0.005	Pervious Area"			
"	20.690	Pervious length"			
"	1.500	Pervious slope"			
"	0.001	Impervious Area"			
"	20.690	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			

```

"      0.500    Impervious Lag constant (hours)"
"      7.500    Impervious Depression storage"
"              0.002      0.000      0.027      0.028 c.m/sec"
"      Catchment 103      Pervious    Impervious Total Area "
"      Surface Area      0.005      0.001      0.006      hectare"
"      Time of concentration 9.823      1.621      6.530      minutes"
"      Time to Centroid 89.313      93.290      90.910      minutes"
"      Rainfall depth 78.830      78.830      78.830      mm"
"      Rainfall volume 3.75      0.98      4.73      c.m"
"      Rainfall losses 51.075      7.500      42.055      mm"
"      Runoff depth 27.755      71.330      36.775      mm"
"      Runoff volume 1.32      0.89      2.21      c.m"
"      Runoff coefficient 0.352      0.905      0.467      "
"      Maximum flow 0.002      0.001      0.002      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.002      0.002      0.027      0.028"
" 51      PIPE DESIGN"
"      0.002    Current peak flow      c.m/sec"
"      0.013    Manning 'n'"
"      0.250    Diameter      metre"
"      1.800    Gradient      %"
"      Depth of flow      0.028      metre"
"      Velocity      0.698      m/sec"
"      Pipe capacity      0.080      c.m/sec"
"      Critical depth      0.035      metre"
" 53      ROUTE      Pipe Route 20"
"      19.60    Pipe Route 20 Reach length      ( metre)"
"      0.480    X-factor <= 0.5"
"      21.068    K-lag      ( seconds)"
"      0.000    Default(0) or user spec.(1) values used"
"      0.500    X-factor <= 0.5"
"      30.000    K-lag      ( seconds)"
"      0.500    Beta weighting factor"
"      21.429    Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.002      c.m/sec"
"              0.002      0.002      0.002      0.028 c.m/sec"
" 40      HYDROGRAPH Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.002      c.m/sec"
"      Hydrograph volume      2.207      c.m"
"              0.002      0.002      0.002      0.002"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"              0.002      0.000      0.002      0.002"
" 33      CATCHMENT 104"
"      2      Rectangular"
"      1      Equal length"
"      2      Horton equation"
"      104    No description"
"      98.300    % Impervious"
"      0.048    Total Area"
"      15.094    Flow length"
"      1.500    Overland Slope"
"      0.001    Pervious Area"
"      15.094    Pervious length"
"      1.500    Pervious slope"

```

"	0.047	Impervious Area"			
"	15.094	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n'"			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n'"			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.021	0.000	0.002	0.002 c.m/sec"
"		Catchment 104	Pervious	Impervious	Total Area "
"		Surface Area	0.001	0.047	0.048 hectare"
"		Time of concentration	8.130	1.341	1.387 minutes"
"		Time to Centroid	88.679	93.290	93.259 minutes"
"		Rainfall depth	78.830	78.830	78.830 mm"
"		Rainfall volume	0.64	37.20	37.84 c.m"
"		Rainfall losses	51.075	7.500	8.241 mm"
"		Runoff depth	27.755	71.330	70.590 mm"
"		Runoff volume	0.23	33.66	33.88 c.m"
"		Runoff coefficient	0.352	0.905	0.895 "
"		Maximum flow	0.000	0.020	0.021 c.m/sec"
" 40		HYDROGRAPH Add Runoff "			
"	4	Add Runoff "			
"		0.021	0.021	0.002	0.002"
" 51		PIPE DESIGN"			
"	0.021	Current peak flow	c.m/sec"		
"	0.013	Manning 'n'"			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.066	metre"	
"		Velocity	0.937	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.079	metre"	
" 53		ROUTE Zero Route"			
"	0.00	Zero Route Reach length	(metre)"		
"		0.021	0.021	0.021	0.002 c.m/sec"
" 40		HYDROGRAPH Combine	4"		
"	6	Combine "			
"	4	Node #"			
"		"			
"		Maximum flow	0.023	c.m/sec"	
"		Hydrograph volume	36.090	c.m"	
"		0.021	0.021	0.021	0.023"
" 40		HYDROGRAPH Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.021	0.000	0.021	0.023"
" 33		CATCHMENT 105"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	105	No description"			
"	100.000	% Impervious"			
"	0.053	Total Area"			
"	11.522	Flow length"			
"	1.500	Overland Slope"			
"	0.000	Pervious Area"			

```

"      11.522  Pervious length"
"      1.500  Pervious slope"
"      0.053  Impervious Area"
"      11.522  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000  Pervious Max.infiltration"
"      10.000  Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"          0.023      0.000      0.021      0.023 c.m/sec"
"      Catchment 105      Pervious      Impervious      Total Area "
"      Surface Area      0.000      0.053      0.053      hectare"
"      Time of concentration 6.914      1.141      1.141      minutes"
"      Time to Centroid      0.000      93.290      93.290      minutes"
"      Rainfall depth      78.830      78.830      78.830      mm"
"      Rainfall volume      0.00      41.78      41.78      c.m"
"      Rainfall losses      78.830      7.500      7.500      mm"
"      Runoff depth      0.000      71.330      71.330      mm"
"      Runoff volume      0.00      37.81      37.81      c.m"
"      Runoff coefficient      0.000      0.905      0.905      "
"      Maximum flow      0.000      0.023      0.023      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.023      0.023      0.021      0.023"
" 51      PIPE DESIGN"
"      0.023      Current peak flow      c.m/sec"
"      0.013      Manning 'n'"
"      0.200      Diameter      metre"
"      0.500      Gradient      %"
"      Depth of flow      0.162      metre"
"      Velocity      0.842      m/sec"
"      Pipe capacity      0.023      c.m/sec"
"      Critical depth      0.130      metre"
" 53      ROUTE      Pipe Route 16"
"      16.00      Pipe Route 16 Reach length      ( metre)"
"      0.000      X-factor <= 0.5"
"      14.259      K-lag      ( seconds)"
"      0.000      Default(0) or user spec.(1) values used"
"      0.500      X-factor <= 0.5"
"      30.000      K-lag      ( seconds)"
"      0.656      Beta weighting factor"
"      40.000      Routing time step      ( seconds)"
"      1      No. of sub-reaches"
"      Peak outflow      0.023      c.m/sec"
"          0.023      0.023      0.023      0.023 c.m/sec"
" 40      HYDROGRAPH      Combine      4"
"      6      Combine "
"      4      Node #"
"      "
"      Maximum flow      0.045      c.m/sec"
"      Hydrograph volume      73.895      c.m"
"          0.023      0.023      0.023      0.045"
" 40      HYDROGRAPH      Confluence      2"
"      7      Confluence "

```

```

"          2   Node #"
"          "
"          Maximum flow          0.028   c.m/sec"
"          Hydrograph volume     45.173   c.m"
"          0.023   0.028   0.023   0.000"
" 51      PIPE DESIGN"
"          0.028   Current peak flow   c.m/sec"
"          0.013   Manning 'n'"
"          0.250   Diameter   metre"
"          1.000   Gradient   %"
"          Depth of flow          0.121   metre"
"          Velocity                1.193   m/sec"
"          Pipe capacity          0.059   c.m/sec"
"          Critical depth         0.135   metre"
" 53      ROUTE   Pipe Route 5"
"          4.60    Pipe Route 5 Reach length   ( metre)"
"          0.000   X-factor <= 0.5"
"          2.892   K-lag   ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000  K-lag   ( seconds)"
"          0.605   Beta weighting factor"
"          7.229   Routing time step   ( seconds)"
"          1       No. of sub-reaches"
"          Peak outflow          0.028   c.m/sec"
"          0.023   0.028   0.028   0.000 c.m/sec"
" 40      HYDROGRAPH   Combine   100"
"          6       Combine "
"          100     Node #"
"          "
"          Maximum flow          0.028   c.m/sec"
"          Hydrograph volume     45.173   c.m"
"          0.023   0.028   0.028   0.028"
" 40      HYDROGRAPH   Confluence  4"
"          7       Confluence "
"          4       Node #"
"          "
"          Maximum flow          0.045   c.m/sec"
"          Hydrograph volume     73.895   c.m"
"          0.023   0.045   0.028   0.000"
" 51      PIPE DESIGN"
"          0.045   Current peak flow   c.m/sec"
"          0.013   Manning 'n'"
"          0.250   Diameter   metre"
"          1.000   Gradient   %"
"          Depth of flow          0.163   metre"
"          Velocity                1.333   m/sec"
"          Pipe capacity          0.059   c.m/sec"
"          Critical depth         0.174   metre"
" 53      ROUTE   Pipe Route 5"
"          5.10    Pipe Route 5 Reach length   ( metre)"
"          0.000   X-factor <= 0.5"
"          2.868   K-lag   ( seconds)"
"          0.000   Default(0) or user spec.(1) values used"
"          0.500   X-factor <= 0.5"
"          30.000  K-lag   ( seconds)"
"          0.696   Beta weighting factor"
"          9.375   Routing time step   ( seconds)"
"          1       No. of sub-reaches"
"          Peak outflow          0.045   c.m/sec"

```

"		0.023	0.045	0.045	0.000 c.m/sec"
" 40	HYDROGRAPH	Combine	100"		
"	6	Combine "			
"	100	Node #"			
"					
"		Maximum flow	0.073	c.m/sec"	
"		Hydrograph volume	119.068	c.m"	
"		0.023	0.045	0.045	0.073"
" 40	HYDROGRAPH	Start - New Tributary"			
"	2	Start - New Tributary"			
"		0.023	0.000	0.045	0.073"
" 33	CATCHMENT	98"			
"	2	Rectangular"			
"	1	Equal length"			
"	2	Horton equation"			
"	98	No description"			
"	60.700	% Impervious"			
"	0.006	Total Area"			
"	2.353	Flow length"			
"	1.500	Overland Slope"			
"	0.002	Pervious Area"			
"	2.353	Pervious length"			
"	1.500	Pervious slope"			
"	0.004	Impervious Area"			
"	2.353	Impervious length"			
"	1.500	Impervious slope"			
"	0.250	Pervious Manning 'n' "			
"	50.000	Pervious Max.infiltration"			
"	10.000	Pervious Min.infiltration"			
"	0.500	Pervious Lag constant (hours)"			
"	7.500	Pervious Depression storage"			
"	0.015	Impervious Manning 'n' "			
"	0.000	Impervious Max.infiltration"			
"	0.000	Impervious Min.infiltration"			
"	0.500	Impervious Lag constant (hours)"			
"	7.500	Impervious Depression storage"			
"		0.002	0.000	0.045	0.073 c.m/sec"
"	Catchment 98	Pervious	Impervious	Total Area "	
"	Surface Area	0.002	0.004	0.006	hectare"
"	Time of concentration	2.665	0.440	0.888	minutes"
"	Time to Centroid	86.750	93.290	91.974	minutes"
"	Rainfall depth	78.830	78.830	78.830	mm"
"	Rainfall volume	1.86	2.87	4.73	c.m"
"	Rainfall losses	51.075	7.500	24.625	mm"
"	Runoff depth	27.755	71.330	54.205	mm"
"	Runoff volume	0.65	2.60	3.25	c.m"
"	Runoff coefficient	0.352	0.905	0.688	"
"	Maximum flow	0.001	0.002	0.002	c.m/sec"
" 40	HYDROGRAPH	Add Runoff "			
"	4	Add Runoff "			
"		0.002	0.002	0.045	0.073"
" 51	PIPE DESIGN"				
"	0.002	Current peak flow	c.m/sec"		
"	0.013	Manning 'n' "			
"	1.000	Diameter	metre"		
"	1.000	Gradient	%"		
"		Depth of flow	0.024	metre"	
"		Velocity	0.482	m/sec"	
"		Pipe capacity	2.398	c.m/sec"	
"		Critical depth	0.026	metre"	

```

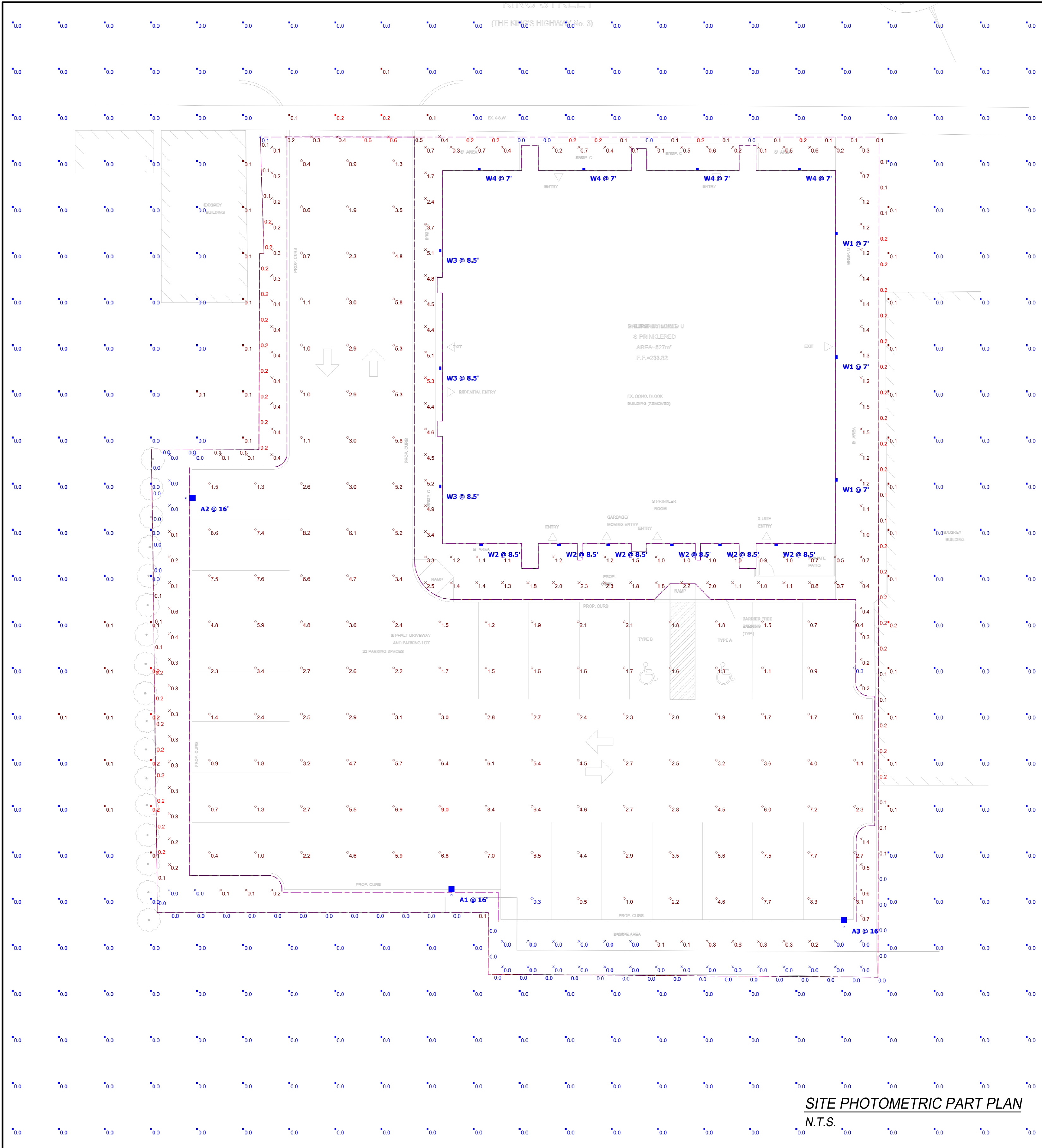
" 53      ROUTE Zero Route"
"      0.00  Zero Route Reach length  ( metre)"
"      0.002      0.002      0.002      0.073 c.m/sec"
" 40      HYDROGRAPH Combine 101"
"      6  Combine "
"      101  Node #"
"      "
"      Maximum flow      0.002      c.m/sec"
"      Hydrograph volume      3.252      c.m"
"      0.002      0.002      0.002      0.002"
" 40      HYDROGRAPH Start - New Tributary"
"      2  Start - New Tributary"
"      0.002      0.000      0.002      0.002"
" 33      CATCHMENT 99"
"      2  Rectangular"
"      1  Equal length"
"      2  Horton equation"
"      99  No description"
"      0.000  % Impervious"
"      0.017  Total Area"
"      4.048  Flow length"
"      1.500  Overland Slope"
"      0.017  Pervious Area"
"      4.048  Pervious length"
"      1.500  Pervious slope"
"      0.000  Impervious Area"
"      4.048  Impervious length"
"      1.500  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      50.000  Pervious Max.infiltration"
"      10.000  Pervious Min.infiltration"
"      0.500  Pervious Lag constant (hours)"
"      7.500  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.500  Impervious Lag constant (hours)"
"      7.500  Impervious Depression storage"
"      0.006      0.000      0.002      0.002 c.m/sec"
"      Catchment 99      Pervious      Impervious      Total Area "
"      Surface Area      0.017      0.000      0.017      hectare"
"      Time of concentration      3.691      0.609      3.691      minutes"
"      Time to Centroid      86.961      0.000      86.961      minutes"
"      Rainfall depth      78.830      78.830      78.830      mm"
"      Rainfall volume      13.40      0.00      13.40      c.m"
"      Rainfall losses      51.075      78.830      51.075      mm"
"      Runoff depth      27.755      0.000      27.755      mm"
"      Runoff volume      4.72      0.00      4.72      c.m"
"      Runoff coefficient      0.352      0.000      0.352      "
"      Maximum flow      0.006      0.000      0.006      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"      0.006      0.006      0.002      0.002"
" 51      PIPE DESIGN"
"      0.006  Current peak flow      c.m/sec"
"      0.013  Manning 'n'"
"      1.000  Diameter      metre"
"      1.000  Gradient      %"
"      Depth of flow      0.036      metre"
"      Velocity      0.627      m/sec"

```


"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.040	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.006 0.006 0.006 0.002 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.008	c.m/sec"
"	Hydrograph volume	7.971	c.m"
"	0.006 0.006 0.006 0.008"		
" 40	HYDROGRAPH Confluence 100"		
"	7 Confluence "		
"	100 Node #"		
"	"		
"	Maximum flow	0.073	c.m/sec"
"	Hydrograph volume	119.068	c.m"
"	0.006 0.073 0.006 0.000"		
" 56	DIVERSION"		
"	100 Node number"		
"	0.037 Overflow threshold"		
"	1.000 Required diverted fraction"		
"	0 Conduit type; 1=Pipe;2=Channel"		
"	Peak of diverted flow	0.036	c.m/sec"
"	Volume of diverted flow	21.617	c.m"
"	DIV00100.005hyd"		
"	Divert to Underground Storage 21.617 cu.m. (21.6 cu.m.)"		
"	0.006 0.073 0.037 0.000 c.m/sec"		
" 40	HYDROGRAPH Next link "		
"	5 Next link "		
"	0.006 0.037 0.037 0.000"		
" 51	PIPE DESIGN"		
"	0.037 Current peak flow c.m/sec"		
"	0.013 Manning 'n'"		
"	1.000 Diameter metre"		
"	1.000 Gradient %"		
"	Depth of flow	0.087	metre"
"	Velocity	1.118	m/sec"
"	Pipe capacity	2.398	c.m/sec"
"	Critical depth	0.105	metre"
" 53	ROUTE Zero Route"		
"	0.00 Zero Route Reach length (metre)"		
"	0.006 0.037 0.037 0.000 c.m/sec"		
" 40	HYDROGRAPH Combine 101"		
"	6 Combine "		
"	101 Node #"		
"	"		
"	Maximum flow	0.045	c.m/sec"
"	Hydrograph volume	105.421	c.m"
"	0.006 0.037 0.037 0.045"		
" 40	HYDROGRAPH Confluence 101"		
"	7 Confluence "		
"	101 Node #"		
"	"		
"	Maximum flow	0.045	c.m/sec"
"	Hydrograph volume	105.421	c.m"
"	0.006 0.045 0.037 0.000"		
" 38	START/RE-START TOTALS 101"		
"	3 Runoff Totals on EXIT"		

"	Total Catchment area	0.196	hectare"
"	Total Impervious area	0.167	hectare"
"	Total % impervious	85.049"	
" 19	EXIT"		














Appendix 'E'
Preliminary Storm Sewer Design Calculations



SITE PHOTOMETRIC PART PLAN
N.T.S.

Note
1 - Calc zone is at ground level
2 - Fixture mounting height as indicated

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Grass	✗	1.0 fc	5.3 fc	0.0 fc	N/A	N/A
Light Spill	■	0.0 fc	0.2 fc	0.0 fc	N/A	N/A
Property Line	+	0.1 fc	0.2 fc	0.0 fc	N/A	N/A
Property line at entrance	✗	0.4 fc	0.6 fc	0.1 fc	6.0:1	4.0:1
Driveway/Parking Lot	■	3.4 fc	9.0 fc	0.3 fc	30.0:1	11.3:1

Schedule										
Symbol	Label	Image	QTY	Manufacturer	Catalog	Description	Number Lamps	Lamp Output	LLF	Input Power
	W1		3	Lithonia Lighting	WDGE2 LED P0 40K 80CRI T15	WDGE2 LED WITH P0 - PERFORMANCE PACKAGE, 4000K, 80CRI, TYPE 1 SHORT OPTIC	1	699	0.5	6.8946
	W2		6	Lithonia Lighting	WDGE2 LED P0 40K 80CRI T15M	WDGE2 LED WITH P0 - PERFORMANCE PACKAGE, 4000K, 80CRI, TYPE FORWARD THROW MEDIUM OPTIC	1	717	0.9	6.8946
	W3		3	Lithonia Lighting	WDGE2 LED P3 40K 70CRI T15M	WDGE2 LED WITH P3 - PERFORMANCE PACKAGE, 4000K, 70CRI, TYPE FORWARD THROW MEDIUM OPTIC	1	3573	0.9	32.1375
	W4		4	EUREKA LIGHTING	3413-2XLED 2 40 120 2FL BLK CLR	SLANT-3413-LED40X2 2x TEMPERED GLASS OPENINGS	2	226	0.9	4
	A1		1	Lithonia Lighting	DSX1 LED P7 40K 70CRI RLCC EGS	D-Series Size 1 Area Luminaire P7 Performance Package 4000K CCT 70 CRI Type 3 Extreme Backlight Control External Glare Shield	1	15033	0.9	184.43
	A2		1	Lithonia Lighting	DSX1 LED P3 40K 70CRI RLCC EGS	D-Series Size 1 Area Luminaire P3 Performance Package 4000K CCT 70 CRI Left Corner Cutoff Extreme Backlight Control External Glare Shield	1	10016	0.9	102.17
	A3		1	Lithonia Lighting	DSX1 LED P3 40K 70CRI RLCC EGS	D-Series Size 1 Area Luminaire P3 Performance Package 4000K CCT 70 CRI Right Corner Cutoff Extreme Backlight Control External Glare Shield	1	10016	0.9	102.17

D-Series Size 1 LED Area Luminaire

Specifications

Beam Angle	30°
Beam Spread	12°
Height	11.5"
Width	11.5"
Depth	11.5"

Introduction

The modern styling of the D-Series features a highly refined aesthetic that blends seamlessly with the environment. The D-Series offers the benefits of the latest in LED technology into a high performance, high efficiency, long life luminaire.

The photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. D-Series outdoor lighting photometry aids in reducing the number of poles required in area lighting applications with typical average savings of 60% and extended service life of over 100,000 hours.

EXAMPLE: DSX1 LED P7 40K 70CRI T15M MVOLT SPAN/SLANT PERM CODED

Beam Angle	Beam Spread	Height	Width	Depth	Power	Light Output	Input Power	Efficiency	Life
30°	12°	11.5"	11.5"	11.5"	15033	15033	15033	100%	100,000

WDGE2 LED Architectural Wall Sconce Precision Refractive Optic

Specifications

Beam Angle	7°
Beam Spread	1.2°
Height	9"
Width	11.5"
Depth	11.5"

Introduction

The WDGE2 LED family is designed to meet specific wall and sconce lighting needs in a variety of applications that demand high performance. The family includes wall sconces in four sizes with lenses providing a wide range of beam spread. Extended wall sconce lighting is available in the WDGE2 family providing additional average energy and code compliance.

WDGE2 family industry leading precision refractive optics provide great uniform distribution and control. When combined with multiple integrated energy saving features, including an 18W LED and precision optics, the WDGE2 becomes the most efficient lighting solution for wall sconce applications in any environment.

EXAMPLE: WDGE2 LED P3 40K 80CRI V1 MVOLT 58M CODED

Beam Angle	Beam Spread	Height	Width	Depth	Power	Light Output	Input Power	Efficiency	Life
7°	1.2°	9"	11.5"	11.5"	15033	15033	15033	100%	100,000

SLANT 3413

Specifications

Beam Angle	30°
Beam Spread	12°
Height	11.5"
Width	11.5"
Depth	11.5"

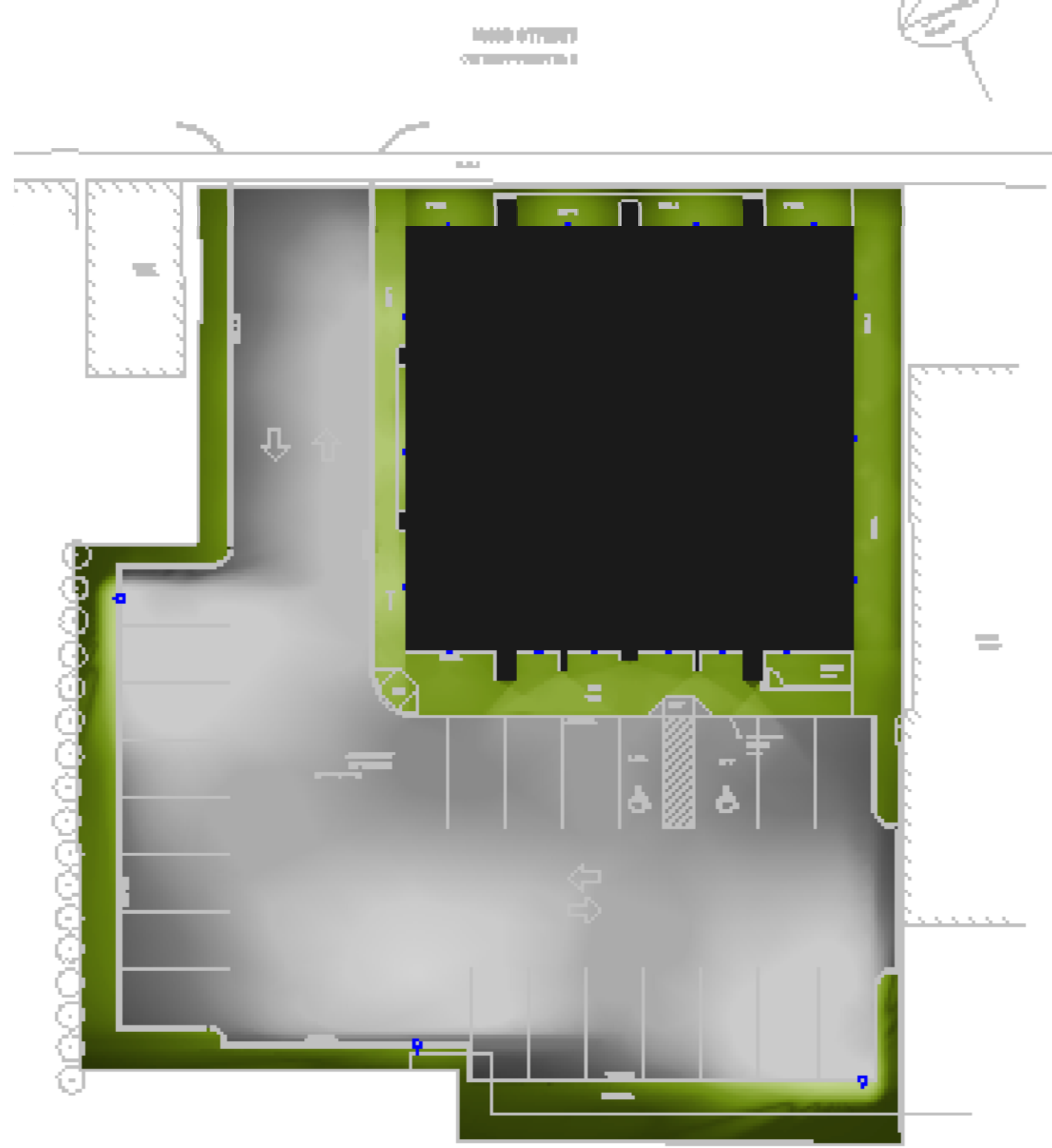
Introduction

The SLANT 3413 is a high performance, high efficiency, long life luminaire. The SLANT 3413 offers the benefits of the latest in LED technology into a high performance, high efficiency, long life luminaire.

The photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. D-Series outdoor lighting photometry aids in reducing the number of poles required in area lighting applications with typical average savings of 60% and extended service life of over 100,000 hours.

EXAMPLE: SLANT 3413 LED P7 40K 70CRI T15M MVOLT SPAN/SLANT PERM CODED

Beam Angle	Beam Spread	Height	Width	Depth	Power	Light Output	Input Power	Efficiency	Life
30°	12°	11.5"	11.5"	11.5"	15033	15033	15033	100%	100,000



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PROJECT:

PROPOSED
MIXED USE BUILDING
LOTS 2 & 3, BLOCK 16
R-PLAN 189
78 KING STREET, DELHI
NORFOLK COUNTY

DRAWING TITLE:

SITE PHOTOMETRIC PLAN

DRAWN BY:	M.H.	CHECKED BY:	E.B./G.C.
SCALE:	AS NOTED	DWG #:	SE01
DATE:	APRIL 13, 2023		