



Date: May 19, 2023

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*

ARCHITECTURE

3077 New Street
Burlington, ON L7N1M6
Website: czarchitect.com

INTERIOR DESIGN

PLANNING

Phone: 905-331-4480
Email: cz@czarchitect.com

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, m ² or %		
Lot frontage	n/a	36.83 m
Lot depth	n/a	49.9 m
Lot width	n/a	36.83 m
Lot area	n/a	1,957 m ²
Lot coverage	80 %	27 %
Front yard	0.0 m min - 3.0 m max	0.50 m
Rear yard	0.0 m	21.98 m
Left Interior side yard	0.0 m	10.62 m
Right Interior side yard	0.0 m	2.27 m
Exterior side yard (corner lot)	n/a	n/a
Landscaped open space	n/a	
Entrance access width	7.30 m	7.30 m
Exit access width	n/a	
Size of fencing or screening	n/a	Existing Fence
Type of fencing	n/a	Ex. Chainlink fence

10. Building Size

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

11. Off Street Parking and Loading Facilities

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

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

Municipal piped water
 Individual wells

Communal wells
 Other (describe below)

Sewage Treatment

Municipal sewers
 Septic tank and tile bed in good working order Other (describe below)

Storm Drainage

Storm sewers
 Other (describe below)

2. Existing or proposed access to subject lands:

Municipal road
 Unopened road Provincial highway
 Other (describe below)

Name of road/street: _____

G. Other Information

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

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

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

H. Supporting Material to be submitted by Applicant

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

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

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

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

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

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

Site Plan applications will require the following supporting materials:

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

Standard condominium exemptions will require the following supporting materials:

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

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

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

I. Development Agreements

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

J. Transfers, Easements and Postponement of Interest

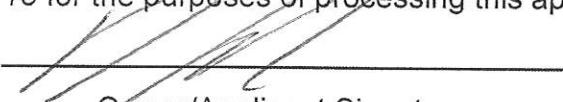
The owner acknowledges and agrees that if required it is their solicitor's responsibility on behalf of the owner for the registration of all transfer(s) of land to the County, and/or transfer(s) of easement in favour of the County and/or utilities. Also, the owner further acknowledges and agrees that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

K. Permission to Enter Subject Lands

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

L. Freedom of Information

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



Owner/Applicant Signature



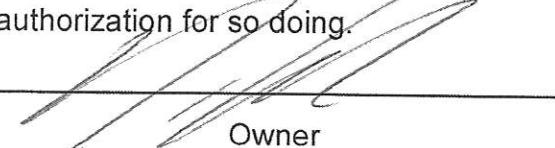
Date

M. Owner's Authorization

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

I/We 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



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:

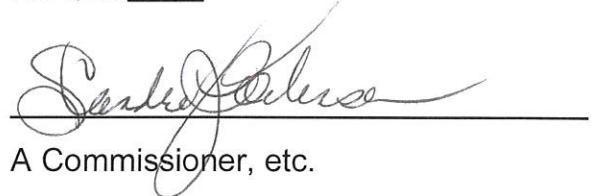
THE CITY OF BURLINGTON
IN THE REGIONAL MUNICIPALITY
OF HALTON
In PROVINCE OF ONTARIO



Owner/Applicant Signature

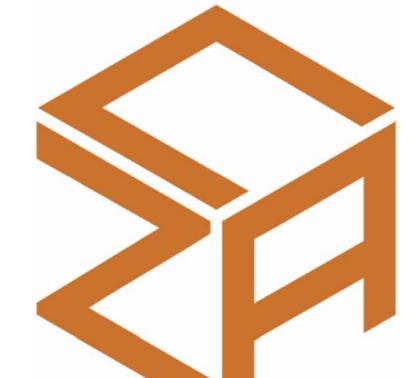
This 17 day of MAY

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



**CYNTHIA
ZAHORUK
ARCHITECTS**

3077 NEW STREET,
BURLINGTON, ON L7N1M6
905.331.4480



NOTES:

1. THE CONTRACTOR OR PROJECT MANAGER WILL CHECK AND VERIFY ALL DIMENSIONS AND JOB CONDITIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO COMMENCEMENT OF CONSTRUCTION.
COORDINATION OF WORK IS THE RESPONSIBILITY OF THE CONTRACTOR OR OWNER/CONTRACTOR.

2. THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED BY THE ARCHITECT.

3. ALL DRAWINGS ARE THE PROPERTY OF THE

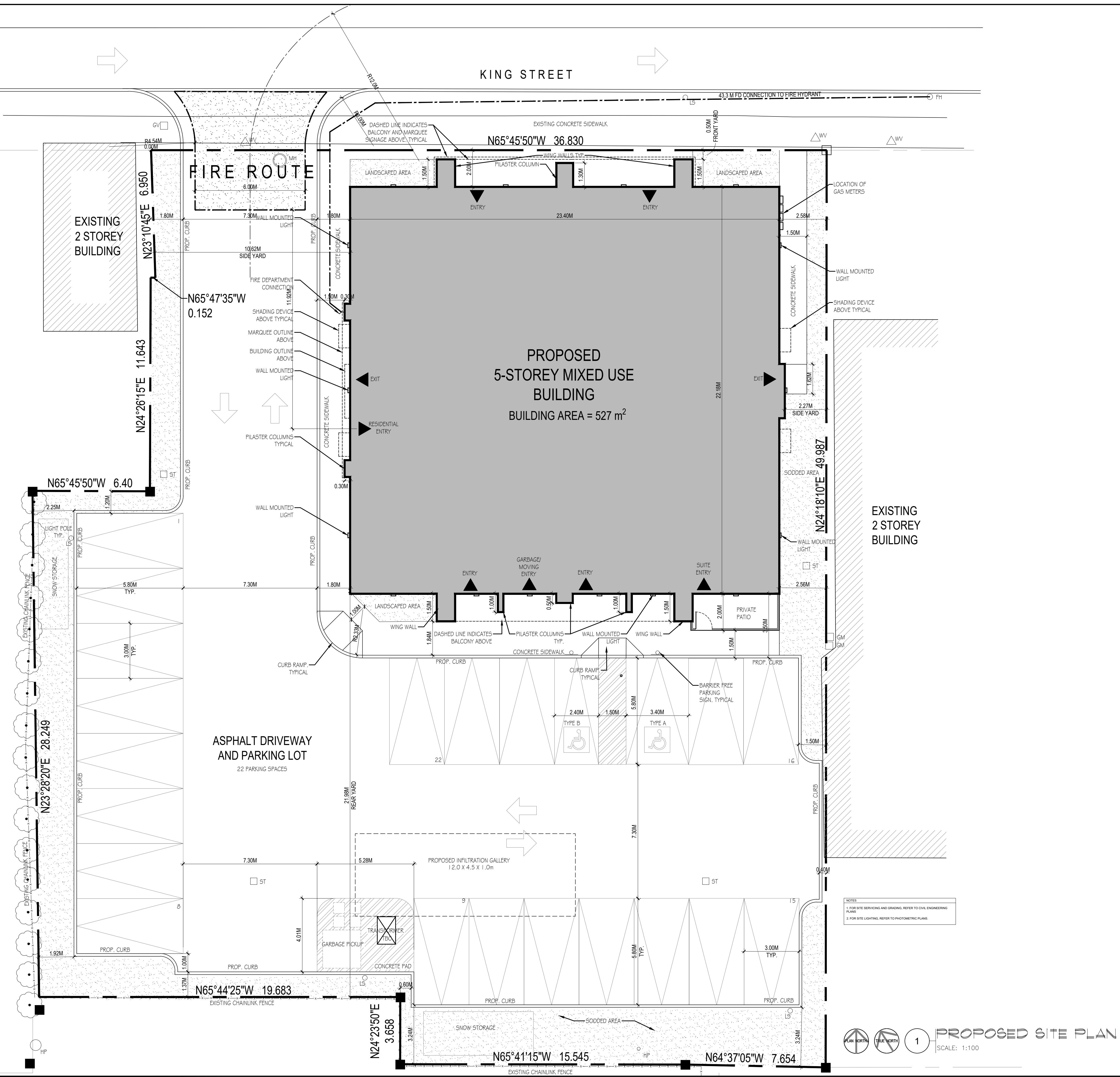
NEW MIXED USE BUILDING

RESIDENTIAL AND COMMERCIAL

778 KING STREET
WINDSOR, ONTARIO N4B 1X6

PROPOSED

A 0.1



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 U/S 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
DWG/DETAIL REFERENCE  DWG. REF. NO.  DWG. ON PAGE	 WINDOW IDENTIFICATION  DOOR IDENTIFICATION  SCREEN IDENTIFICATION  WALL IDENTIFICATION  GRID MARKER  REVISION NUMBER  ROOM NUMBER
SECTION/DWG REFERENCE  DWG. REF. NO.  DWG. ON PAGE	
ELEVATION REFERENCE  DWG. REF. NO.  DWG. ON PAGE	 INTERCONNECTED SMOKE & CO ALARM  INTERCONNECTED SMOKE ALARM  EXHAUST FAN  EMERGENCY LIGHT  PORTABLE FIRE EXTINGUISHER

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 in Norfolk County			
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)	0.0 m min., 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 5.80 m 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 in Norfolk County			
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 L7N1M6
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NOTE:
THE CONTRACTOR WILL CHECK AND
VERIFY DIMENSIONS AND
CONDITIONS ON THE PROJECT AND
REPORT ANY DISCREPANCY TO THE
ARCHITECT PRIOR TO THE COMM-
ENCEMENT OF CONSTRUCTION. THIS
DRAWING IS NOT BE USED FOR
CONSTRUCTION PURPOSES UNLESS
SIGNED BY THE ARCHITECT. ALL
DRAWINGS ARE THE PROPERTY OF THE
ARCHITECT AND MAY NOT BE COPIED,
REPRODUCED OR ALTERED WITHOUT
WRITTEN PERMISSION FROM THE
ARCHITECT. DO NOT SCALE THE
DRAWING.

DD/MM/YY	REVISION
16/05/23	ISSUED FOR SPA

DRAWN BY: Author
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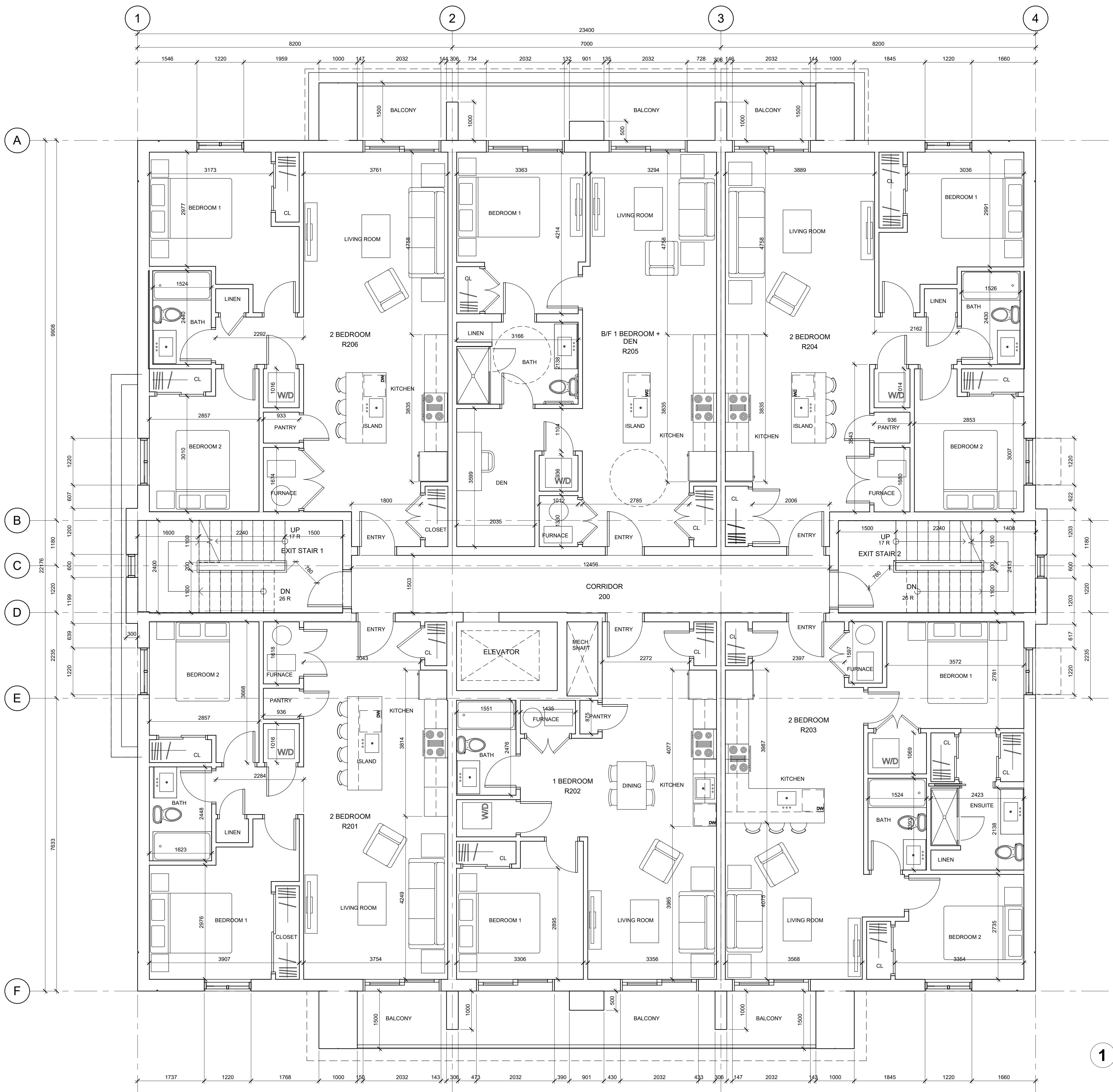
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SECOND/ THIRD
FLOOR PLAN

A1.2

GENERAL NOTES:	
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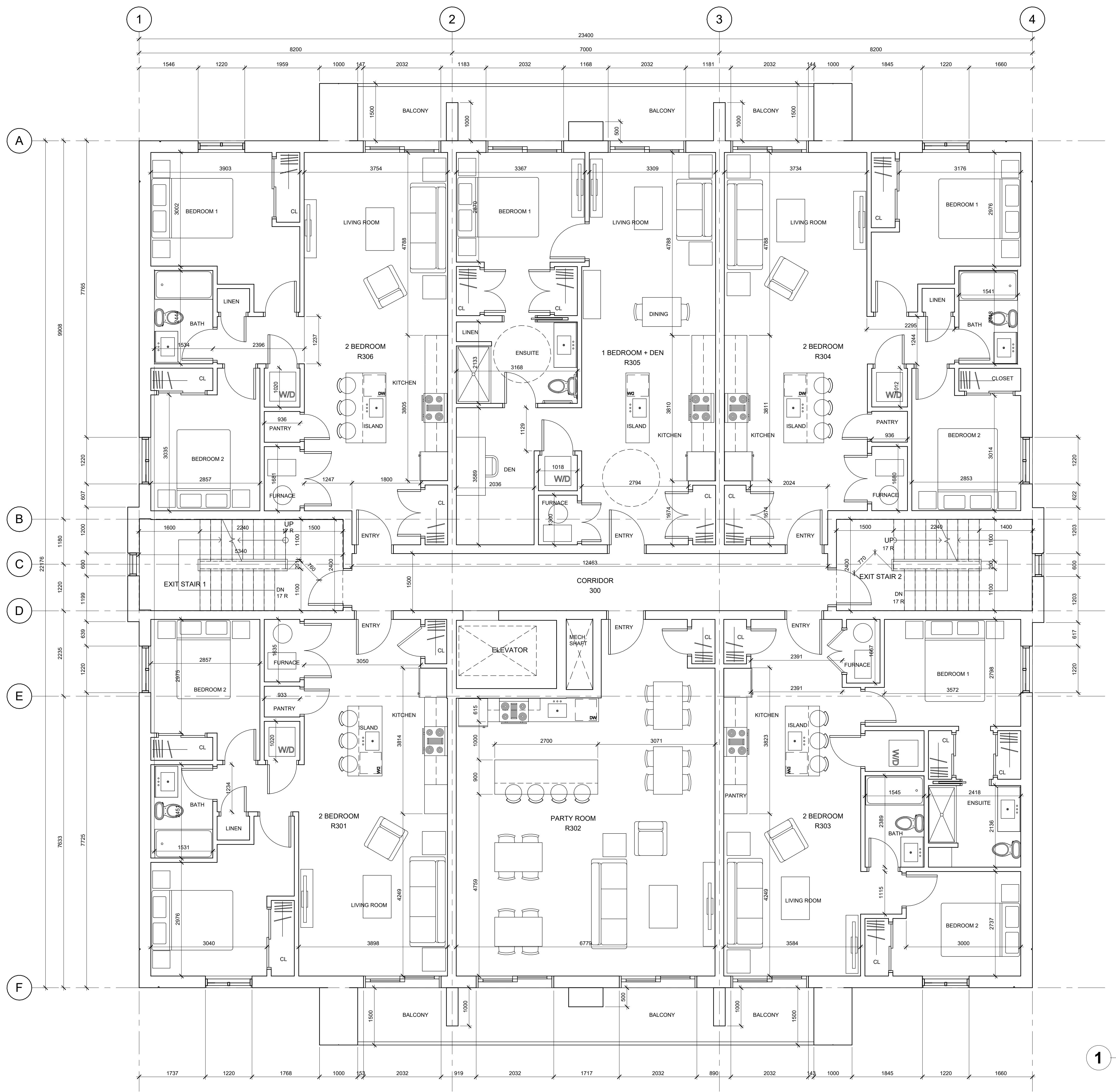
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FOURTH FLOOR
PLAN

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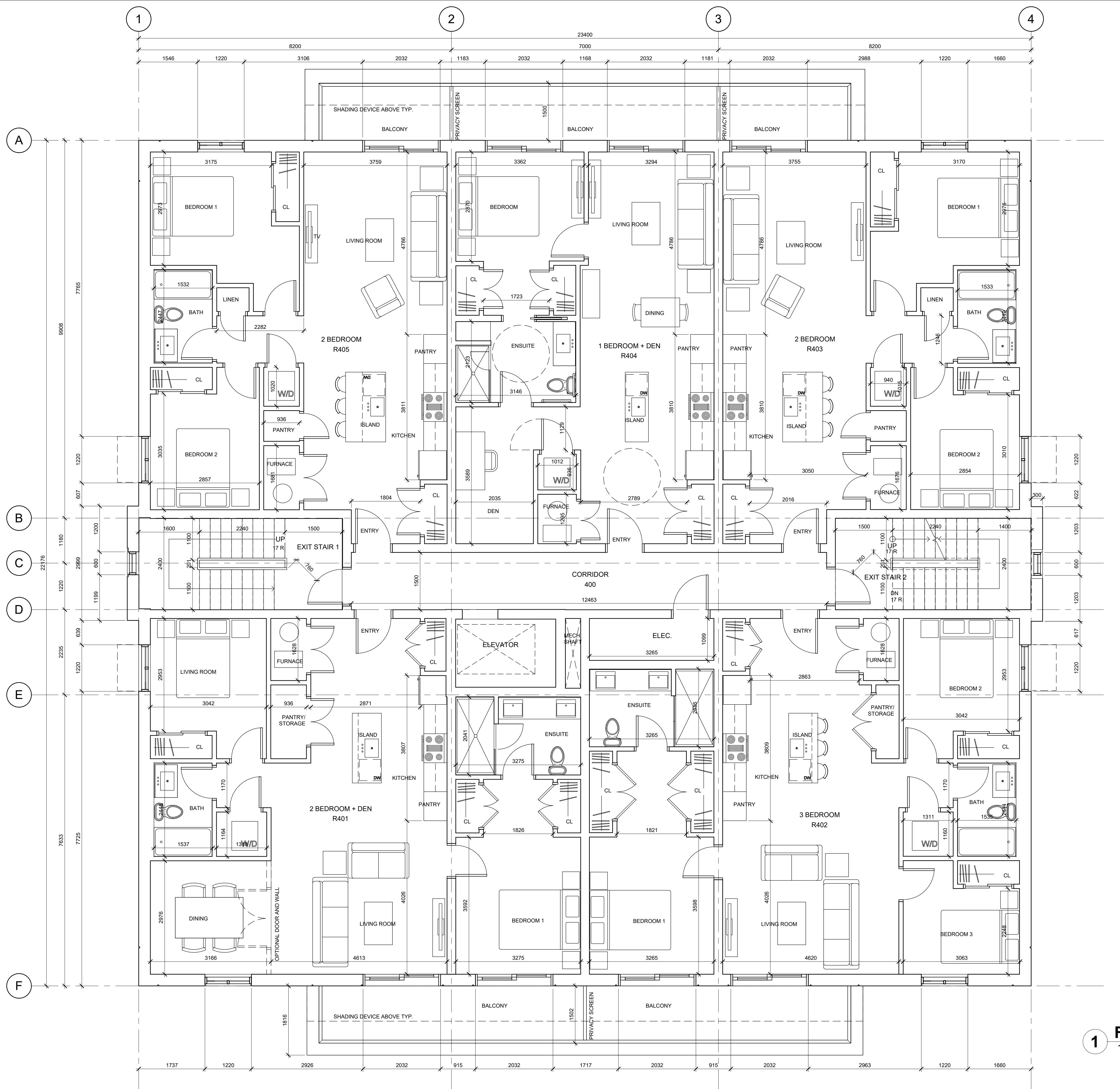
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FIFTH FLOOR PLAN

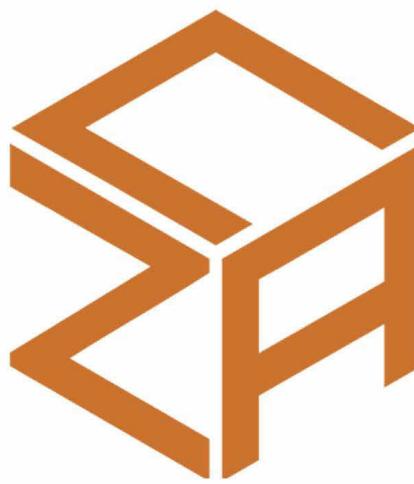
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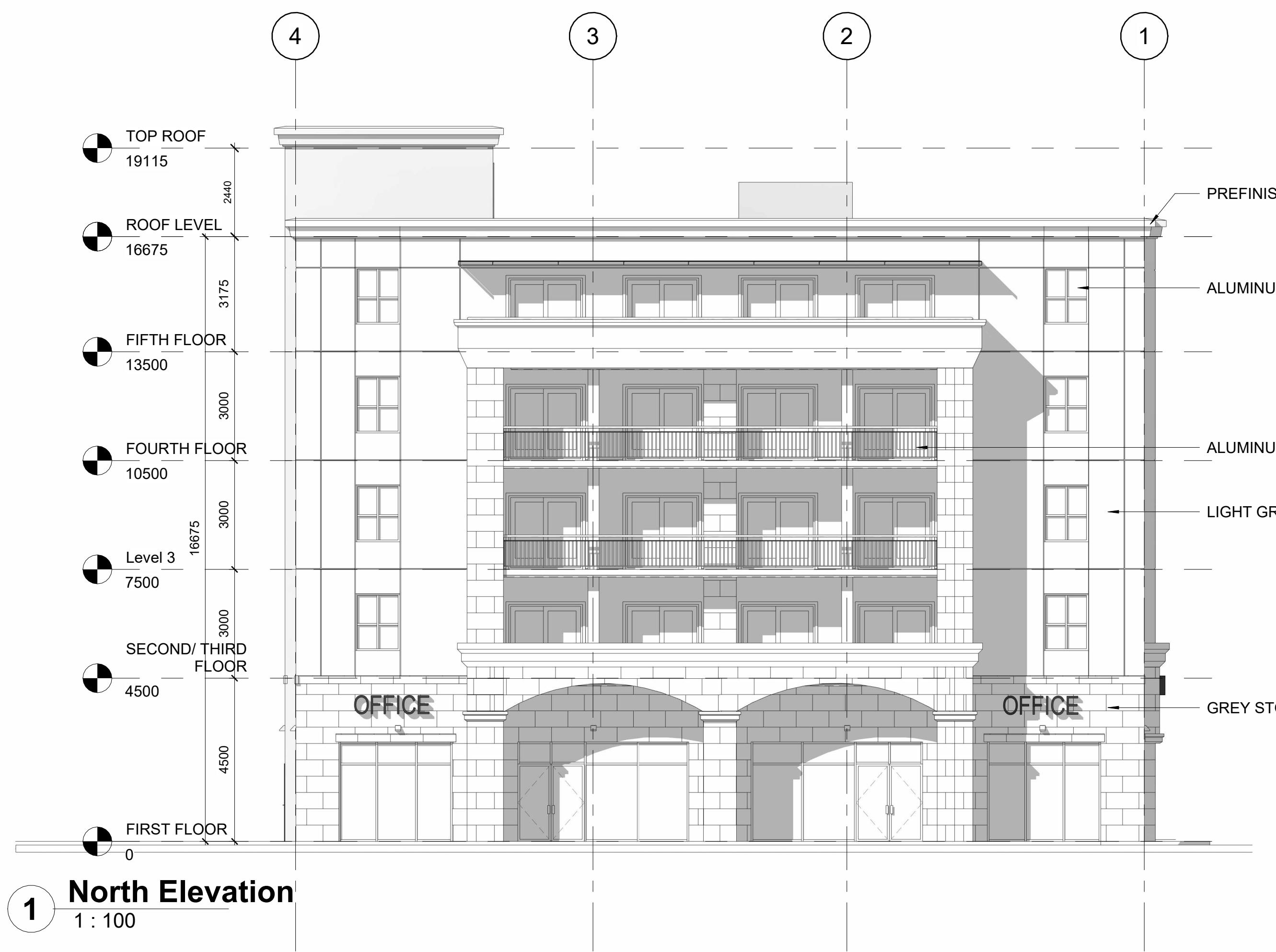
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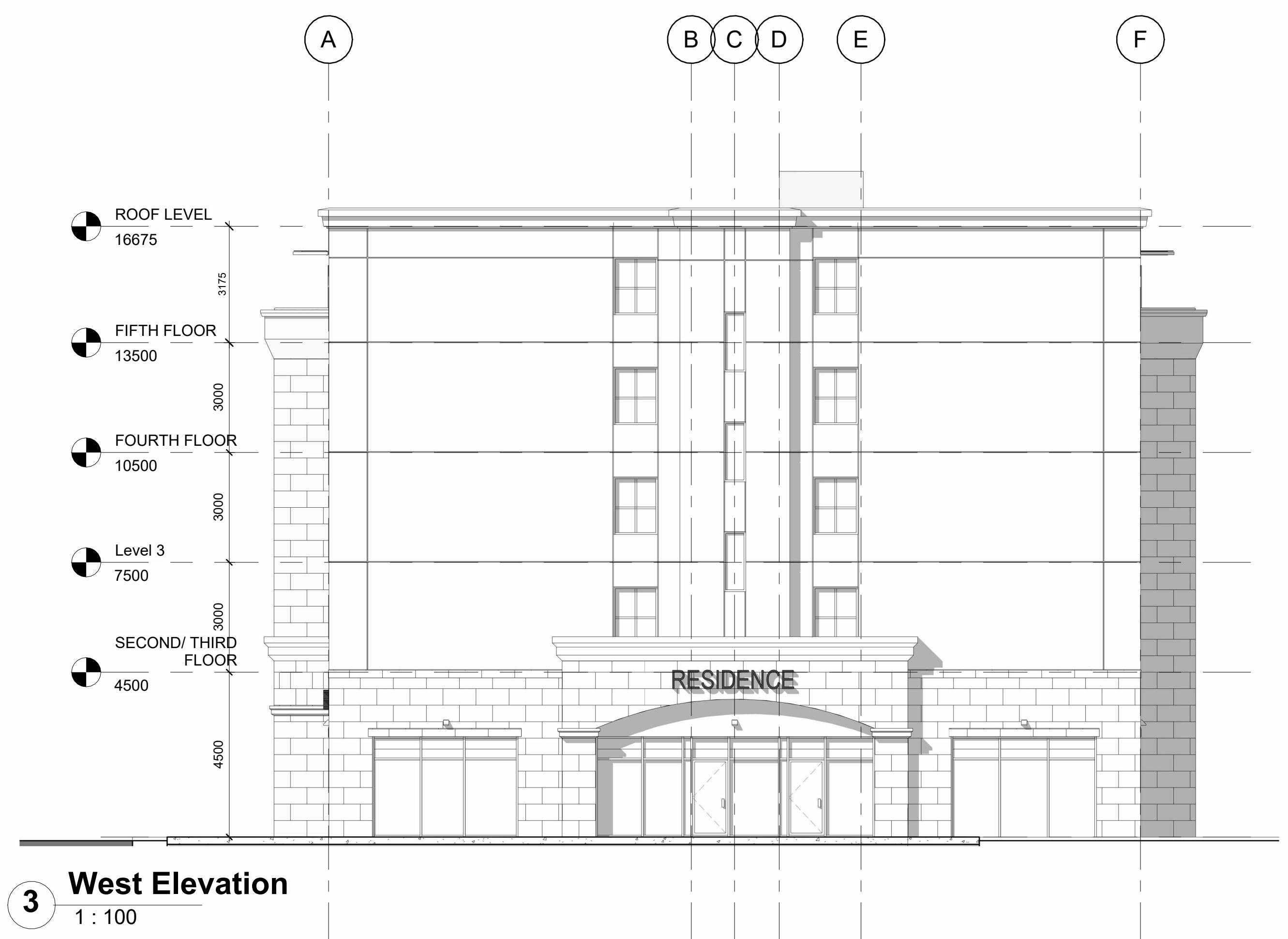
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DELHI, ONTARIO

ELEVATIONS

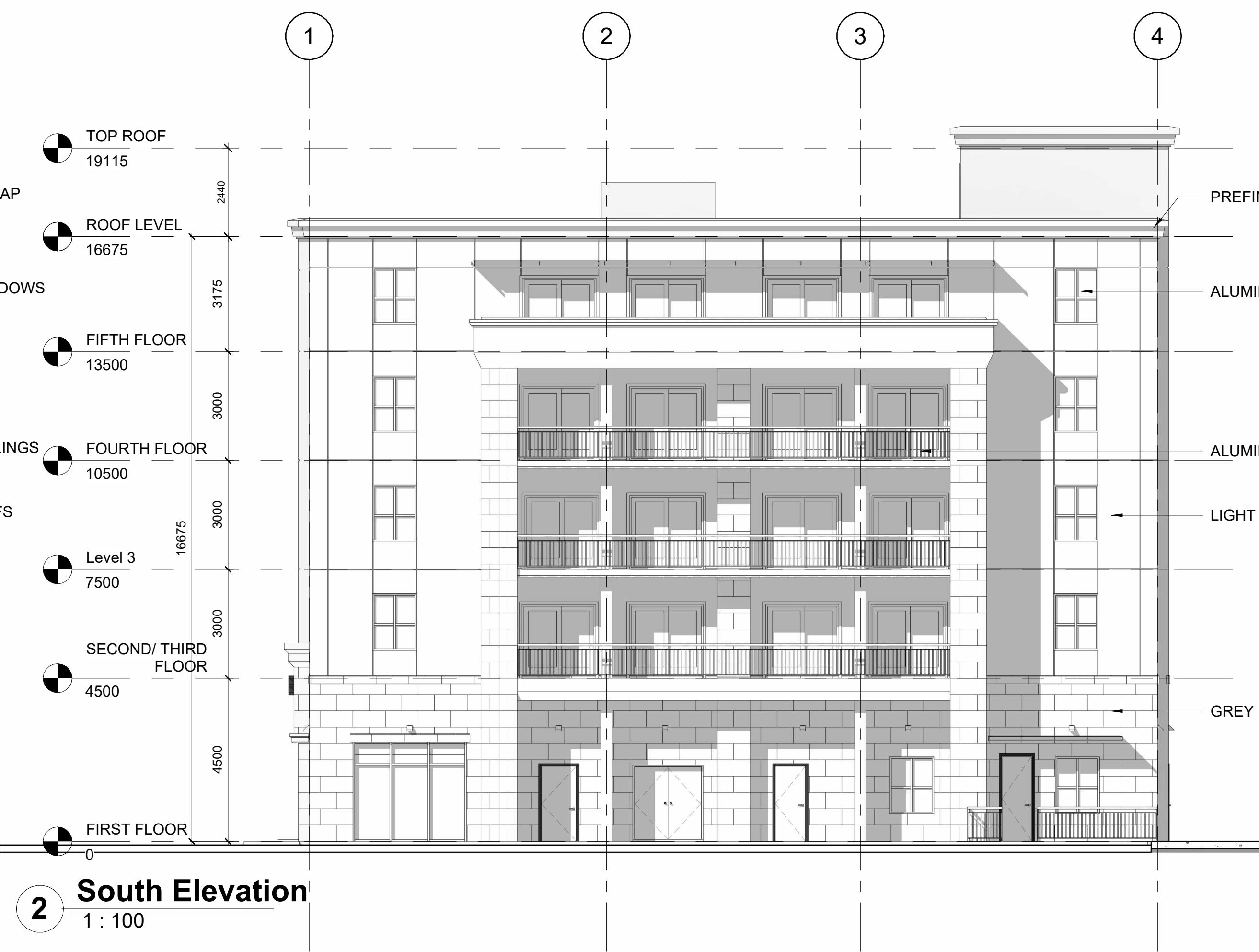
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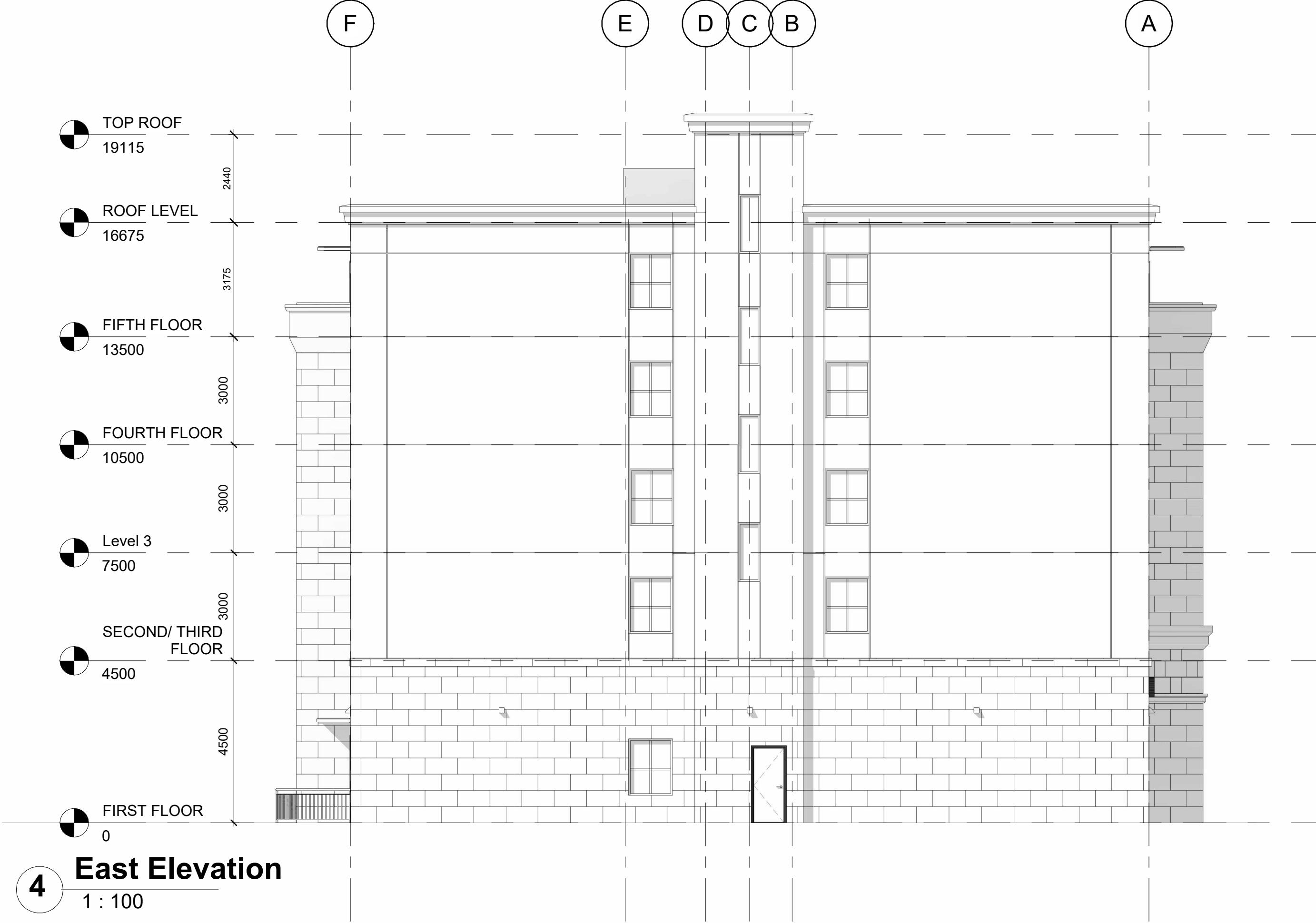
1 North Elevation



3 West Elevation



2 South Elevation

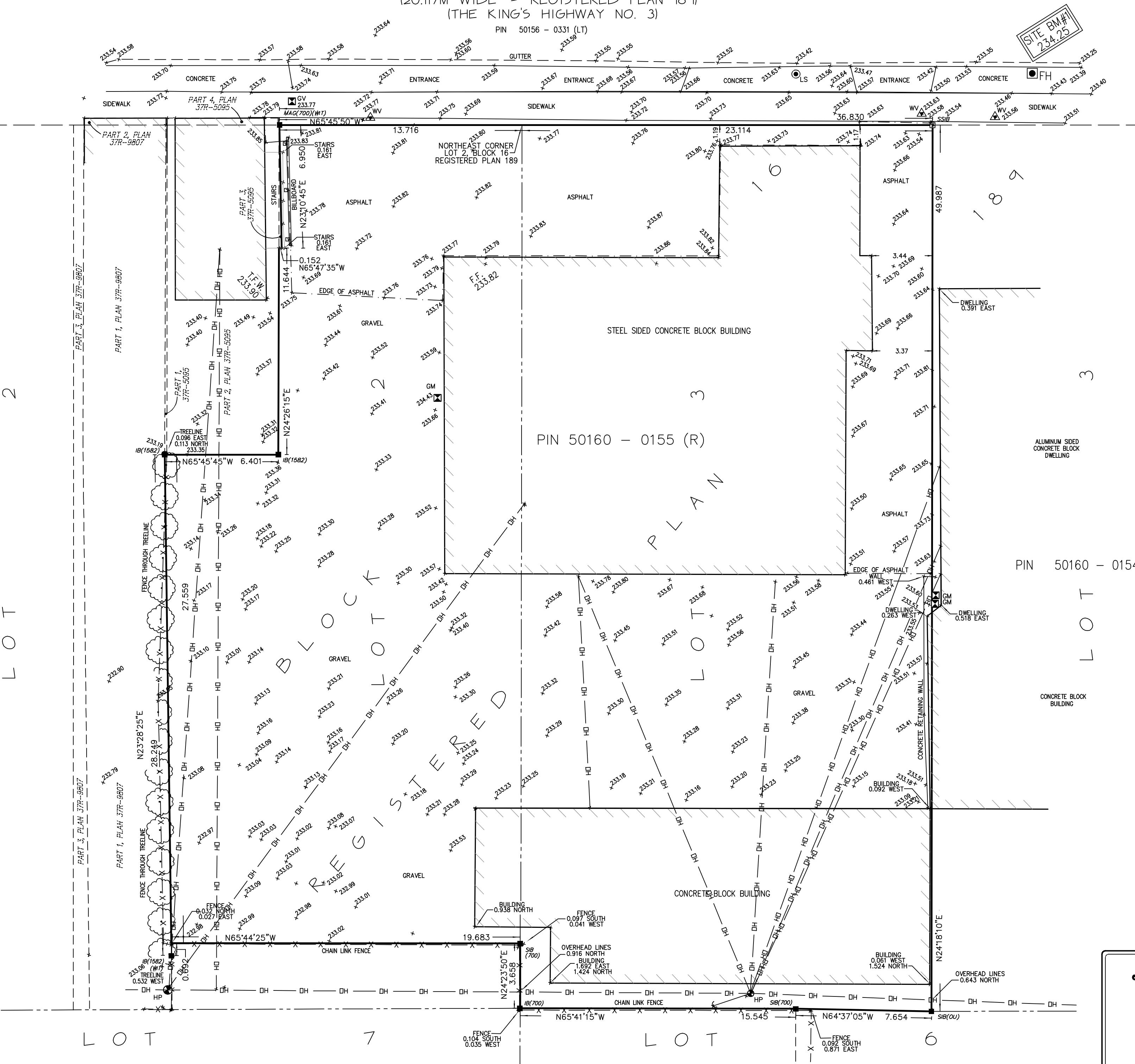


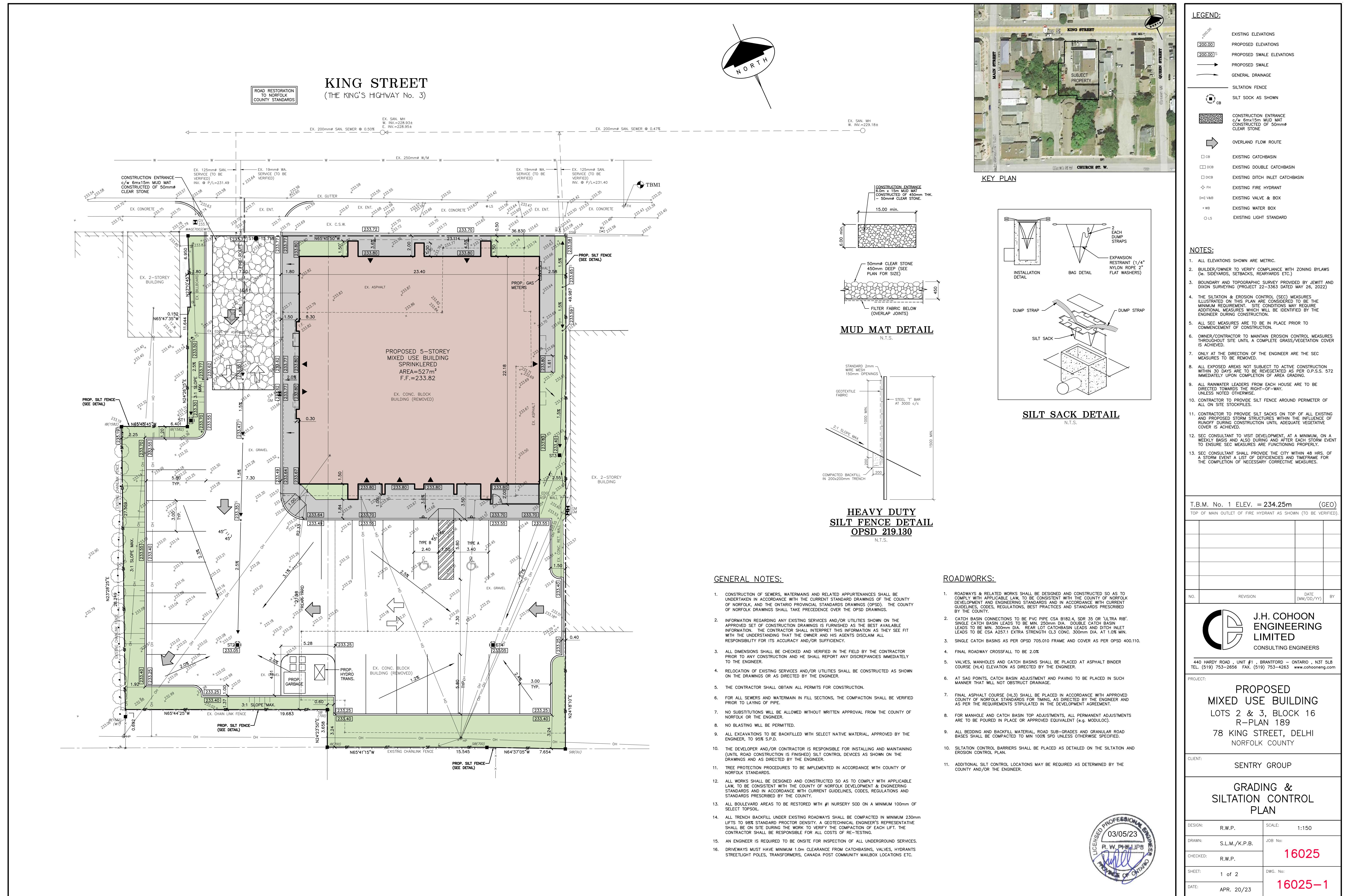
4 East Elevation

KING STREET

(20.117M WIDE - REGISTERED PLAN 189)
(THE KING'S HIGHWAY NO. 3)

PIN 50156 - 0331 (LT)





**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

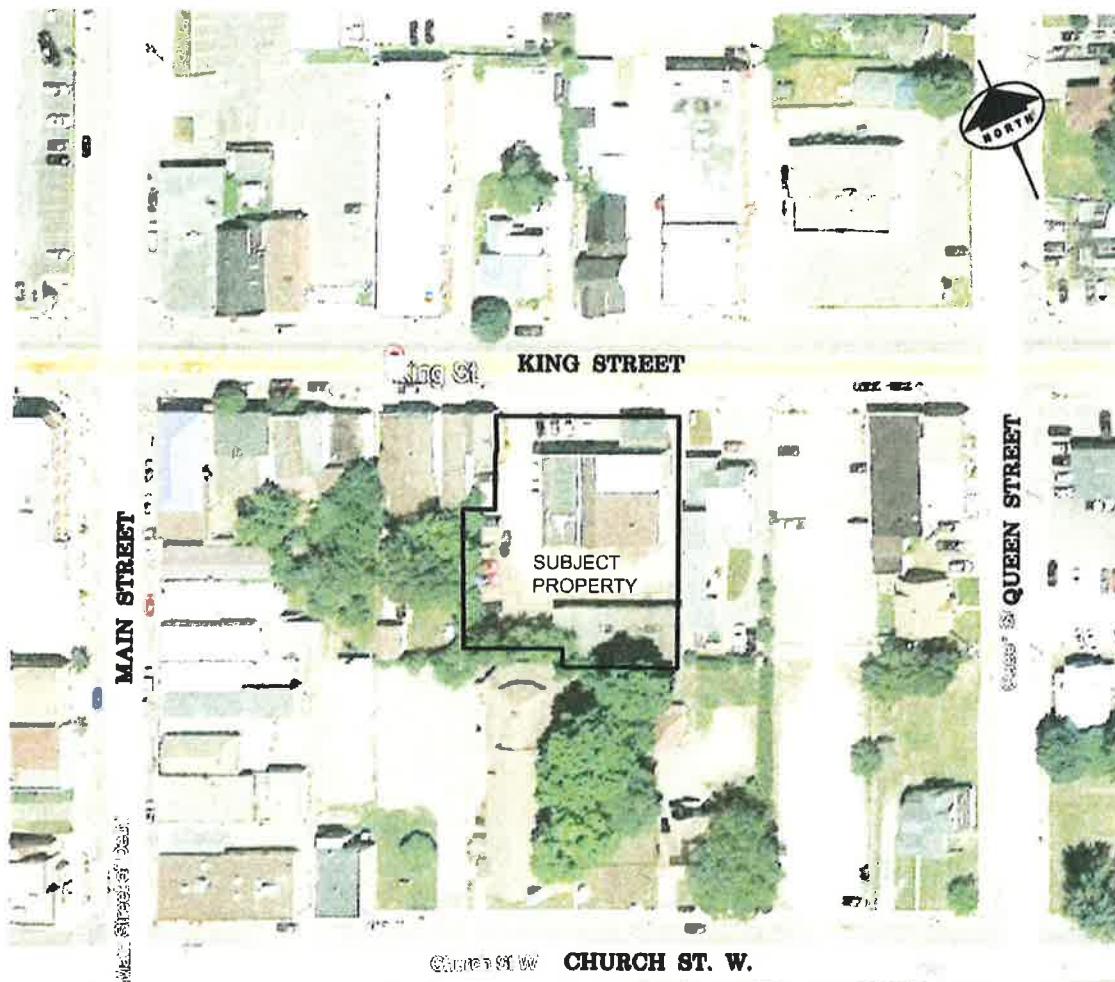
The following Functional Servicing Report was prepared by J.H. Cohoon Engineering Limited for Mr. D. Knill of Sentry Property Group (Brantford, Ontario) in support of a proposed mixed-use commercial \ residential development of the site on the southwest side of King Street in the Town of Delhi, in Norfolk 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

$$\begin{aligned} 2.75 \times 23 \times 450 &= 28,462.5 \text{ liters per day} \\ &= 0.329 \text{ liters per second} \end{aligned}$$

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 Main 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 * 263.5 sq.m. / 10,000 = 2.37 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

$$\begin{aligned} 40 \times 263.5 / 10,000 &= 1.054 \text{ cu.m. per day} \\ &= 1054 \text{ litres per day} \\ &= 0.012 \text{ litres per second.} \end{aligned}$$

Total Average Design Commercial Flow

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

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

Total = 0.341 litres per sec

Infiltration Allowance
 Site Area = 0.195 hectares
 Infiltration Rate = 0.28 liters per second per hectare
 Infiltration Allowance = 0.043 liters per second

Total Average Flow Rate
 = 0.384 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:

AR = Residential Area = 2,371.5 sq.m. (50% residential area on main floor)
 AI = Industrial Area = 0.0
 AC = Commercial Area = 263.5 sq.m.

Mav = $Kav * (1 + (14 / (4 + (P + Pe) ** 0.5)))$

Where

$Kav = (AR + (0.80 * ((AI + AC)) / (AR + AI + AC)))$

In this case, the Modified Harmon Peaking Factor is

$Kav =$
 $(2371.5 + (0.80 * ((0.0 + 263.5))) / (2371.5 + 0.0 + 263.5))$
 $= 0.964$
 $Mav = Kav * (1 + (14 / (4 + (P + Pe) ** 0.5)))$
 $= 0.964 * (1 + (14 / (4 + ((63.25 + 2.37) / 1000) ** 0.5)))$
 $= 4.135 (\text{Max 4})$

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

Average Day Flow Rate (including infiltration) = 0.384 lps
 Peak Flow Rate (including infiltration) = 1.420 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:

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

In this case, ordinary construction is proposed.

Ordinary Construction = 1.0

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

$$\begin{aligned} &= 220 \times 1.0 \times \text{SQRT}(790.5) \\ &= 6,185.5 \text{ litres per min} \\ &\text{Rounded} \\ &= 6,000 \text{ litres per min} \end{aligned}$$

Modifications
Occupancy = Low Hazard Occupancy = -15%
Reduction = 900 litres per min

Net Fire Demand = 5,100 litres per min

Further Modifications Automatic Sprinkler System = 50%
Reduction = 2,550 litres per min

Spatial Exposure (Estimated)

North	Street	+ 0 %
East	3.24m +/-	+ 20 %
West	10.6 +/-	+ 15 %
South	25.6m +/-	+ 10 %
Total		+ 45 %
Increase	=	2,295 litres per min

Total Fire Demand
4,845.0 litres per min
5,000 litres per min (Rounded)
83.3 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 hour 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

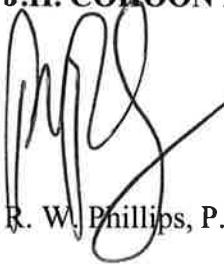
Gas, hydro, Bell, and cable utilities are available to service the proposed development. Coordination of these services will be required with Union Gas, Brantford Power, Bell, and Rogers.

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



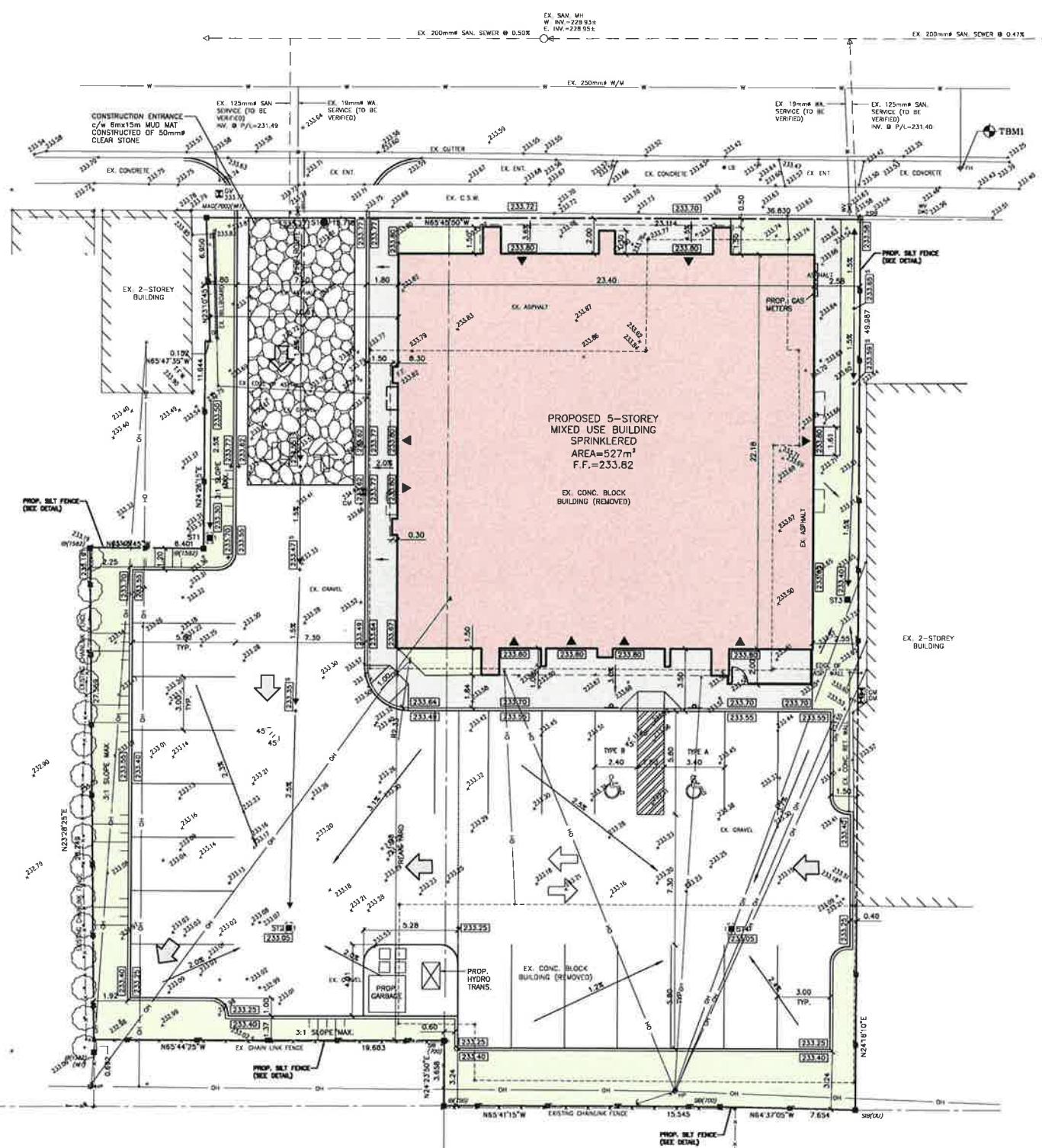
R. W. Phillips, P.Eng.



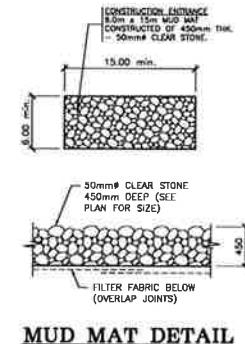
Appendix 'A'
Development Proposal as prepared by
J H Cohoon Engineering Drawing 16025-1

KING STREET

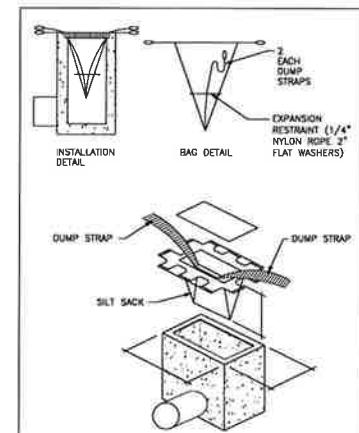
ROAD RESTORATION
TO NORFOLK
COUNTY STANDARDS



KEY PLAN



MUD MAT DETAIL



SILT SACK DETAIL

HEAVY DUTY
SILT FENCE DETAIL
OPSD 219.130

GENERAL NOTES:

1. CONSTRUCTION OF SEWERS, WATERMAINS 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.
2. 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.
3. 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.
4. RELOCATION OF EXISTING SERVICES AND/OR UTILITIES SHALL BE CONSTRUCTED AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
5. THE CONTRACTOR SHALL OBTAIN ALL PERMITS FOR CONSTRUCTION.
6. FOR ALL SEWERS AND WATERMAIN IN TELL SECTIONS, THE COMPACTION SHALL BE VERIFIED PRIOR TO LAYING OF PIPE.
7. NO SUBSTITUTIONS WILL BE ALLOWED WITHOUT WRITTEN APPROVAL FROM THE COUNTY OF NORFOLK OR THE ENGINEER.
8. NO BLASTING WILL BE PERMITTED.
9. ALL EXCAVATIONS TO BE BACKFILLED WITH SELECT NATIVE MATERIAL, APPROVED BY THE ENGINEER, TO SIZE S.P.D.
10. 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.
11. TREE PROTECTION PROCEDURES TO BE IMPLEMENTED IN ACCORDANCE WITH COUNTY OF NORFOLK STANDARDS.
12. 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.
13. ALL BOULEVARD AREAS TO BE RESTORED WITH #1 NURSERY SOIL ON A MINIMUM 100mm OF SELECT TOPSOIL.
14. ALL TRENCH BACKFILL UNDER EXISTING ROADWAYS SHALL BE COMPACTION 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.
15. AN ENGINEER IS REQUIRED TO BE ON SITE FOR INSPECTION OF ALL UNDERGROUND SERVICES.
16. DRIVEWAYS MUST HAVE MINIMUM 1.0m CLEARANCE FROM CATERPILLARS, VALVES, HYDRANTS, STREETCURE POLES, TRANSFORMERS, CANADA POET, COMMUNICAM, MANHOLE LOCATOR, 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 AND 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 B16.4, SDR 35 OR "ULTRA RIB", 12" DIAMETER, 10' LONG. CATCH BASINS TO BE 12" DIAMETER PVC CATCH BASINS. LEADS TO BE 100mm DIA. DRAIN LOT CATCHBASIN LEADS AND DITCH INLET LEADS TO BE CSA A257.1 EXTRA STRENGTH CLD CONC 300mm DIA. AT 1.05 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 (HLD) ELEVATION AS DIRECTED BY THE ENGINEER.
- AT SCA POINTS, CATCH BASIN ADJUSTMENT AND PAVING TO BE PLACED IN SUCH MANNER THAT WILL NOT OBSTRUCT DRAINAGE.
- FINAL ASPHALT COURSE (HLD) 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 CRANLAR ROAD BASES SHALL BE COMPACTED TO MIN 100% SPC UNLESS OTHERWISE SPECIFIED.
- SILATION CONTROL BARRIERS SHALL BE PLACED AS DETAILED ON THE SILATION AND EROSION CONTROL PLAN.
- ADDITIONAL SILT CONTROL LOCATIONS MAY BE REQUIRED AS DETERMINED BY THE PERMITTING AGENCY/PERMIT ISSUER/CONTRACTOR.

LEGEND:

EXISTING ELEVATIONS

200.00 PROPOSED ELEVATIONS

200.00^S PROPOSED SWALE ELEVATIONS

→ PROPOSED SWALE

→ GENERAL DRAINAGE

— SILTATION FENCE

 C8 SILT SOCK AS SHOWN

 CONSTRUCTION ENTRANCE
C/w 8m x 15m MUD MAT
CONSTRUCTED OF 50mm#
CLEAR STONE

→ OVERLAND FLOW ROUTE

C8 EXISTING CATCHBASIN

C9 EXISTING DOUBLE CATCHBASIN

C9 EXISTING DITCH INLET CATCHBASIN

◊ FH EXISTING FIRE HYDRANT

> VAB EXISTING VALVE & BOX

* WB EXISTING WATER BOX

O S EXISTING LIGHT STANDARD

NOTES:

ALL ELEVATIONS SHOWN ARE METRIC.

1. BUILDER/OWNER TO VERIFY COMPLIANCE WITH ZONING BYLAWS (e.g. SIDEYARDS, SETBACKS, REARYARDS ETC.)

2. BOUNDARY AND TOPOGRAPHIC SURVEY PROVIDED BY JEWITT AND DUNN SURVEYING (PROJECT 22-3363 DATED MAY 26, 2022)

3. THE SILTATION & EROSION CONTROL (SEC) MEASURES ILLUSTRATED ON THIS PLAN ARE CONSIDERED TO BE THE MINIMUM REQUIRED. SITE CONDITIONS MAY REQUIRE ADDITIONAL MEASURES WHICH CAN BE IDENTIFIED BY THE ENGINEER DURING CONSTRUCTION.

4. ALL SEC MEASURES ARE TO BE IN PLACE PRIOR TO COMMENCEMENT OF CONSTRUCTION.

5. OWNER/CONTRACTOR TO MAINTAIN EROSION CONTROL MEASURES THROUGHOUT SITE UNTIL A COMPLETE GRASS/VEGETATION COVER IS ACHIEVED.

6. ONLY AT THE DIRECTION OF THE ENGINEER ARE THE SEC MEASURES TO BE REMOVED.

7. ALL EXPOSED GROUND IS 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.

8. ALL RAINWATER LEADERS FROM EACH HOUSE ARE TO BE DIRECTED TOWARDS THE RIGHT-OF-WAY, UNLESS NOTED OTHERWISE.

9. CONTRACTOR TO PROVIDE SILT FLENDS AROUND PERIMETER OF ALL ON SITE STOCKPLACES.

1. CONTRACTOR TO PROMOTE SILT SACKS ON TOP OF ALL EXISTING AND PROPOSED STORM STRUCTURES WITHIN THE INFLUENCE OF RUNOFF DURING CONSTRUCTION UNTIL ADEQUATE VEGETATIVE COVER IS ACHIEVED.

2. 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.

3. SEC CONSULTANT SHALL PROVIDE THE CITY WITH 48 HRS. OF NOTICE FOR ANY REQUIRED MAINTENANCE OR REPAIRS. THE TIMEFRAME FOR THE CONSULTANT TO MAKE NECESSARY CORRECTIONS IS 48 HRS.

T.B.M. No. 1 ELEV. = 234.25m (GEO)

440 HARDY ROAD, UNIT #1, BRANTFORD - ONTARIO, N3T 5LB
TEL. (519) 753-2856 FAX. (519) 753-4263 www.cohooneng.com

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

EST:

GRADING & SILTATION CONTROL PLAN

S. CN	R.W.P.	SCALE 1:150
AWN:	S.L.M./K.P.B.	JOB NO:
ECKED:	R.W.P.	16025
EEET:	1 of 2	DWG. NO
TE:	APR. 20/23	16025-1

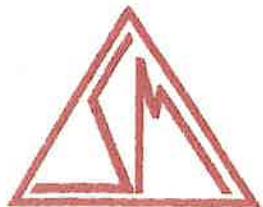
Appendix 'B'
Soil Mat Engineers & Consultants Ltd Report dated June 29, 2022

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 the 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 of 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.

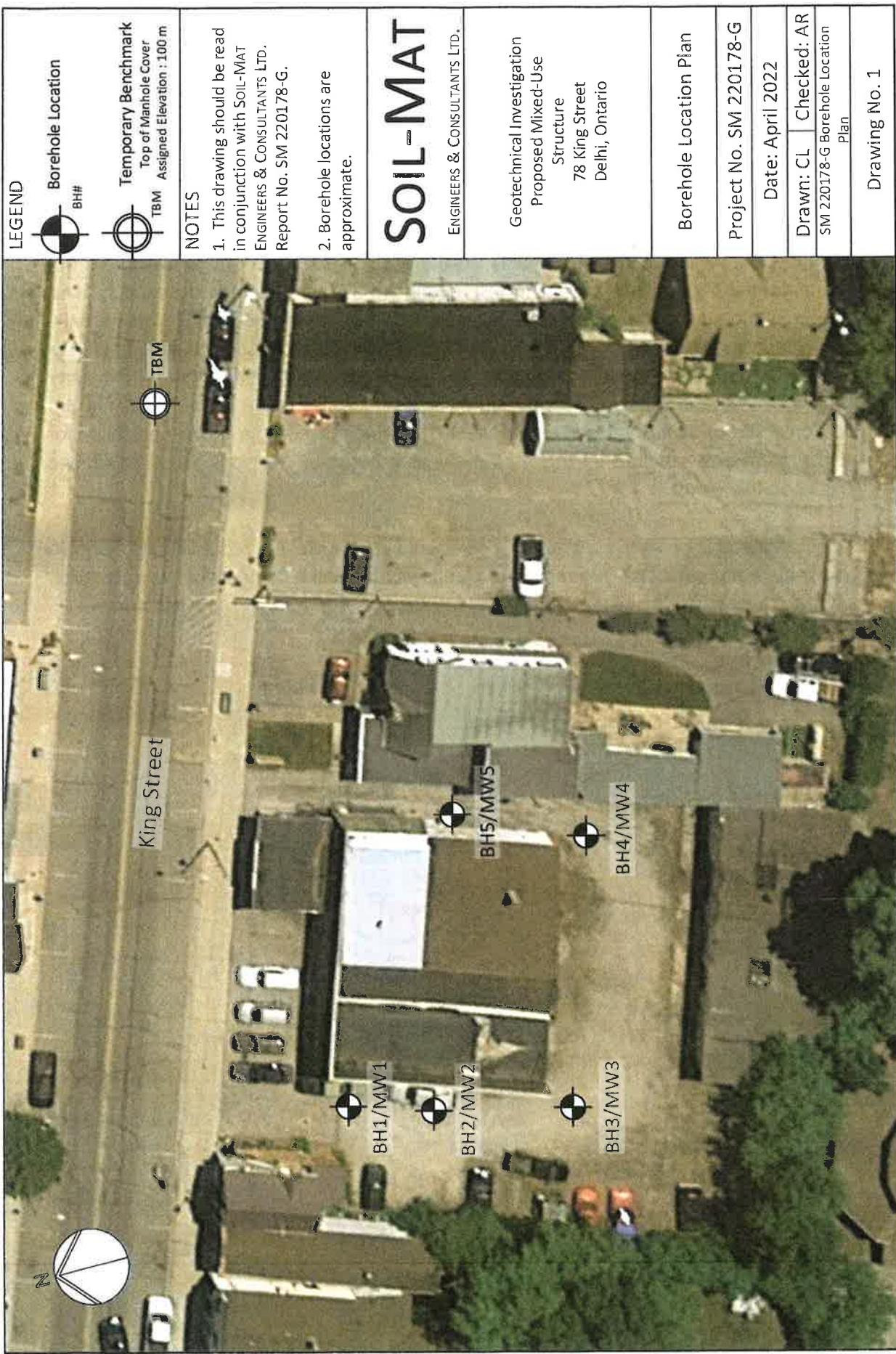

 Adam Roemmele, P. Eng.
 Project Engineer




 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]



Log of Borehole No. 1

Project No: SM 220178-G

Project: Proposed Mixed-Use Structure

Location: 78 King Street, Delhi

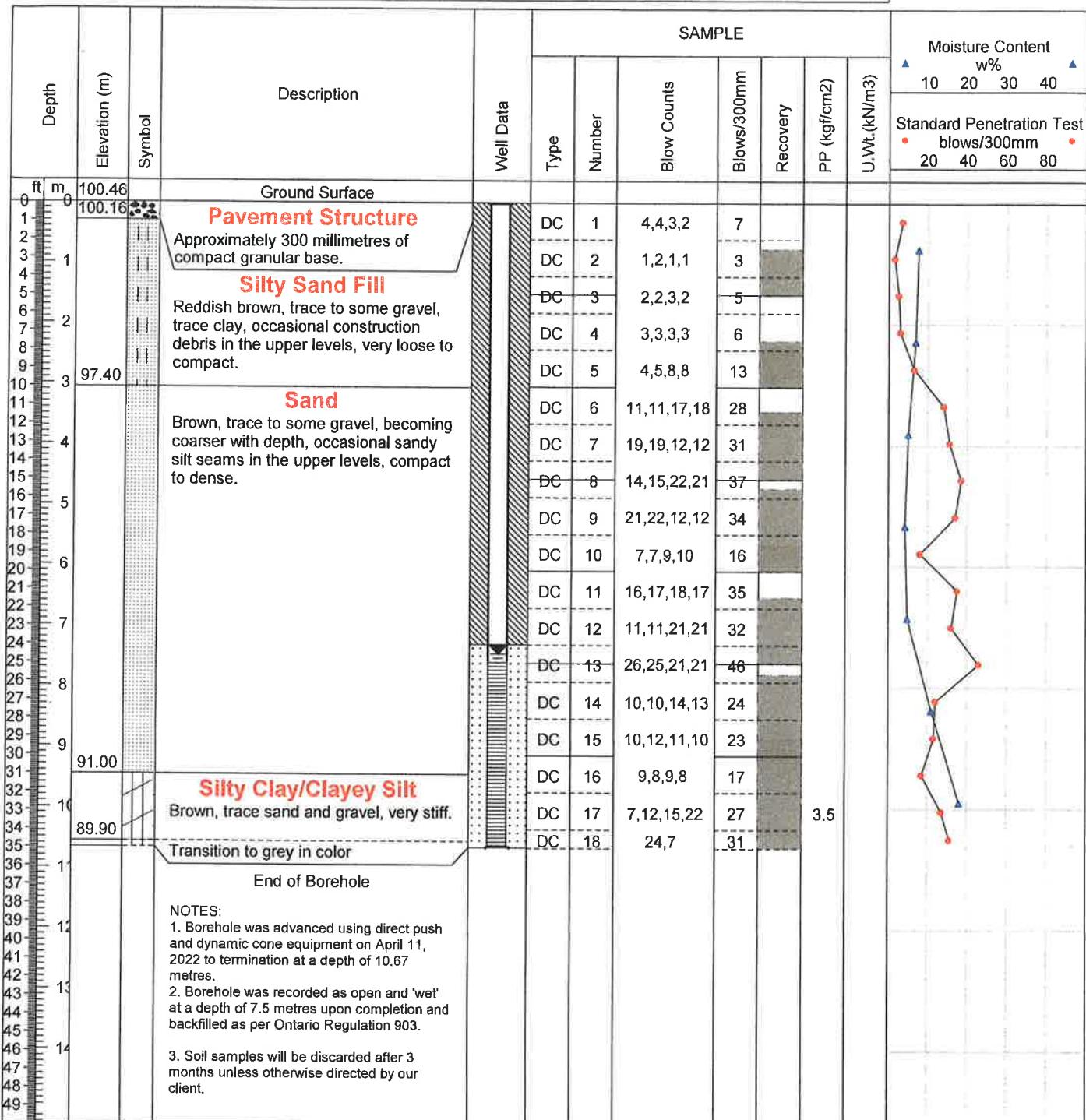
Client: Sentry Property Group

Project Manager: Adam Roemmel, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 541094

E: 4744854



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

Drill Date: April 11, 2022

130 Lancing Drive, Hamilton, ON L8W 3A1

Hole Size: 200 millimetres

T: 905.318.7440 F: 905.318.7455

E: info@soil-mat.ca

Drilling Contractor: Strata Drilling Group

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

E: info@soil-mat.ca

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	Elevation (m)	Symbol	Description	Well Data	SAMPLE					Moisture Content w% 10 20 30 40
					Type	Number	Blow Counts	Blows/300mm	Recovery	
0	100.21		Ground Surface		DC	1	8,6,3,4	9		
1			Pavement Structure		DC	2	1,2,4,2	6		
2			Approximately 250 millimetres of compact granular base.		DC	3	3,2,3,8	5		
3					DC	4	5,6,6,6	12		
4					DC	5	8,6,6,7	12		
5					DC	6	7,8,10,9	18		
6			Silty Sand Fill		DC	7	9,10,14,12	24		
7			Reddish brown, trace gravel and clay, occasional construction debris in the upper levels, loose.		DC	8	14,16,15,16	31		
8					DC	9	16,16,16,16	32		
9					DC	10	18,18,19,16	37		
10					DC	11	16,17,17,16	34		
11					DC	12	15,16,17,19	33		
12					DC	13	24,22,24,23	46		
13					DC	14	17,13,10,6	23		
14					DC	15	6,6,5,7	11		
15					DC	16	7,4,5,6	9		
16					DC	17	8,7,6,6	13		
17					DC	18	7,7	14		
18	89.50		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 12, 2022

130 Lancing Drive, Hamilton, ON L8W 3A1

Hole Size: 200 millimetres

T: 905.318.7440 F: 905.318.7455

Drilling Contractor: Strata Drilling Group

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

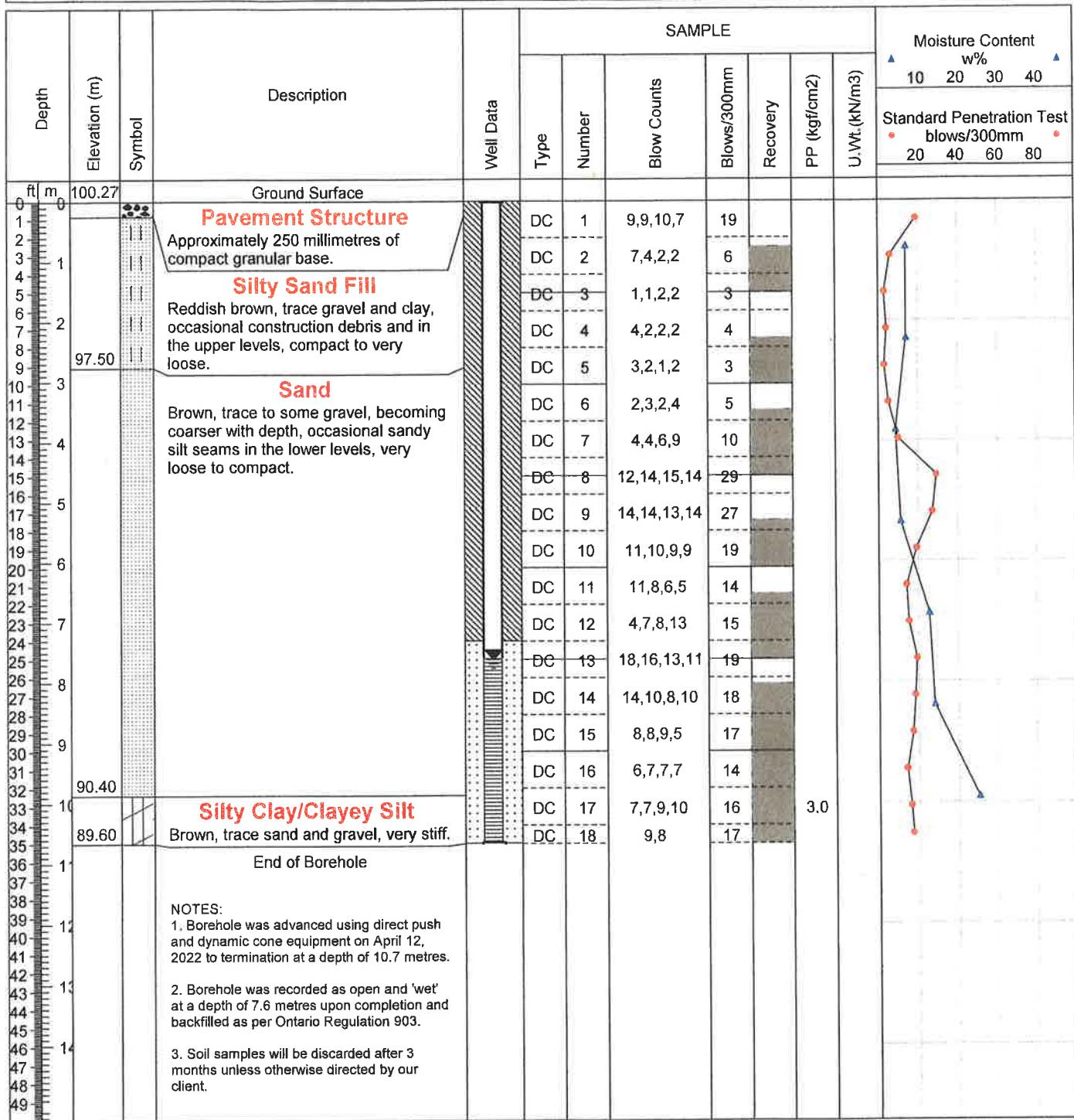
Client: Sentry Property Group

Project Manager: Adam Roemmele, P.Eng.

Borehole Location: See Drawing No. 1

UTM Coordinates - N: 541112

E: 4744827



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 Roemmel, P.Eng.

Borehole Location: See Drawing No.1

UTM Coordinates - N: 541117

E: 4744835



Drill Method: Direct Push/Dynamic Cone

Soil-Mat Engineers & Consultants | td

Drill Date: April 12, 2022

Self-Mat Engineers & Consultants Ltd
130 Lancing Drive, Hamilton, ON L8W 3A1

Hole Size: 200 millimetres

T: 905.318.7440 F: 905.318.7455

Drilling Contractor: State Drilling Group

E: info@soil-mat.ca

Datum: Temporary Benchmark

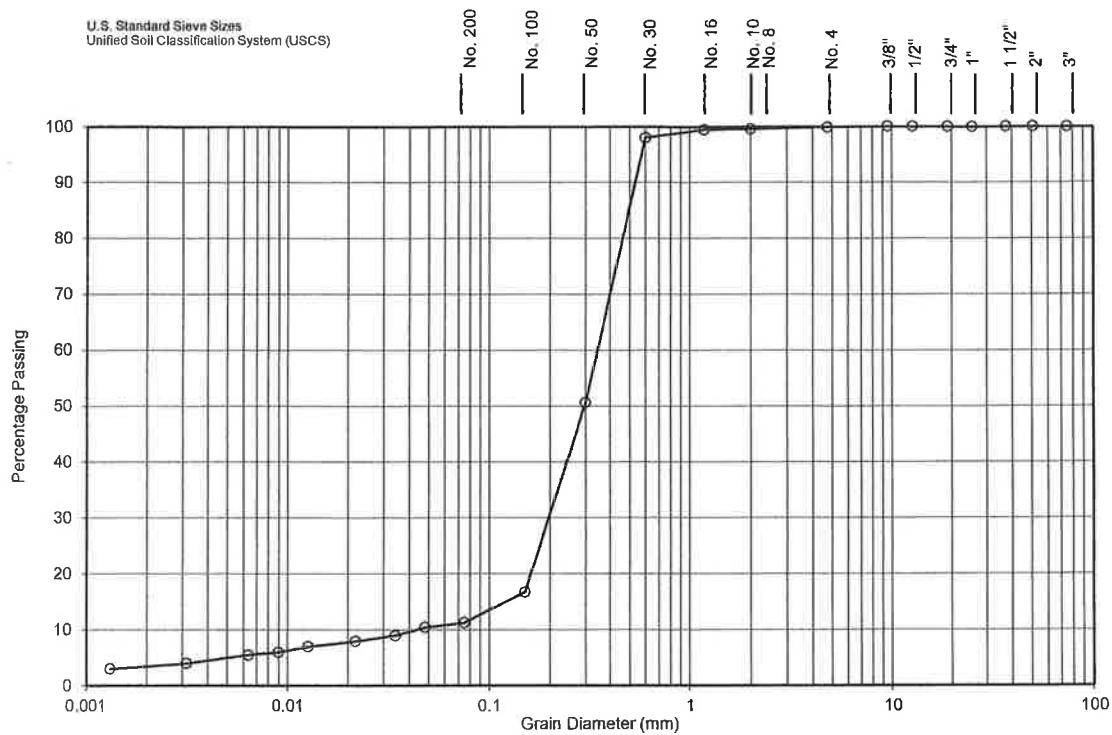
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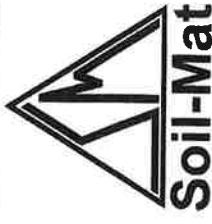
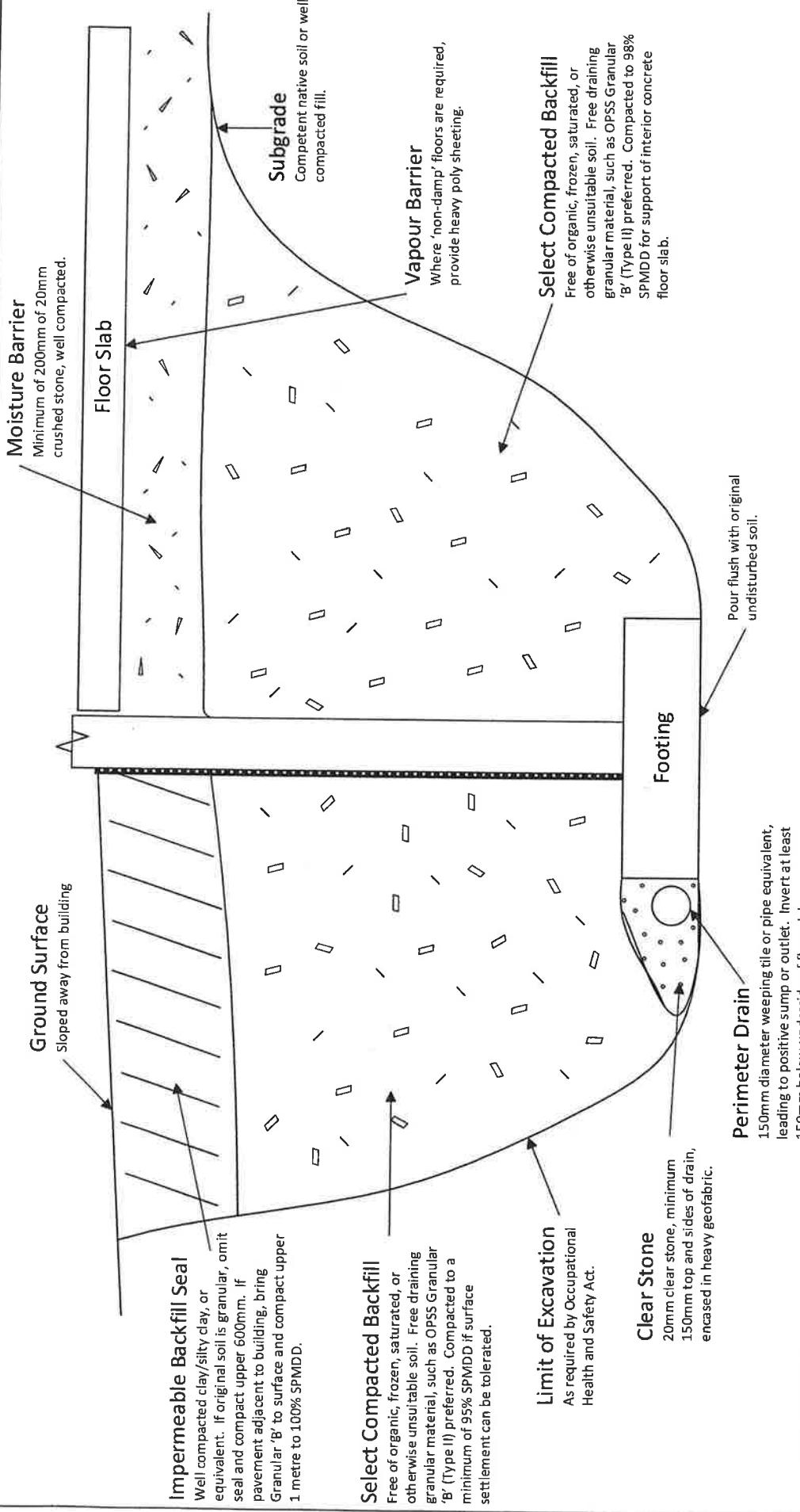
Mechanical & Hydrometer Analyses

U.S. Standard Sieve Sizes
Unified Soil Classification System (USCS)



CLAY	SILT	FINE	MEDIUM	COARSE	FINE	COARSE		
		SAND						GRAVEL

Lab No.:	22-203	Notes: 5 - 10'	
Borehole No.:	1		
Sample No.:	2		
CLAY [%]:	3	Soil Description: Brown Sand w/ traces of Silt and Clay	
SILT [%]:	8	S.W. - Well graded sands to S.M. - Sand-silt mixtures	
SAND [%]:	89		
GRAVEL [%]:	0	Estimated Infiltration Rate [mm/hr]:	70 to 95
D ₁₀ (Effective Diam. in mm):	0.041	Coefficient of Uniformity C _u :	8.5
		Estimated Permeability, k [cm/s]	10 ⁻³
		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.

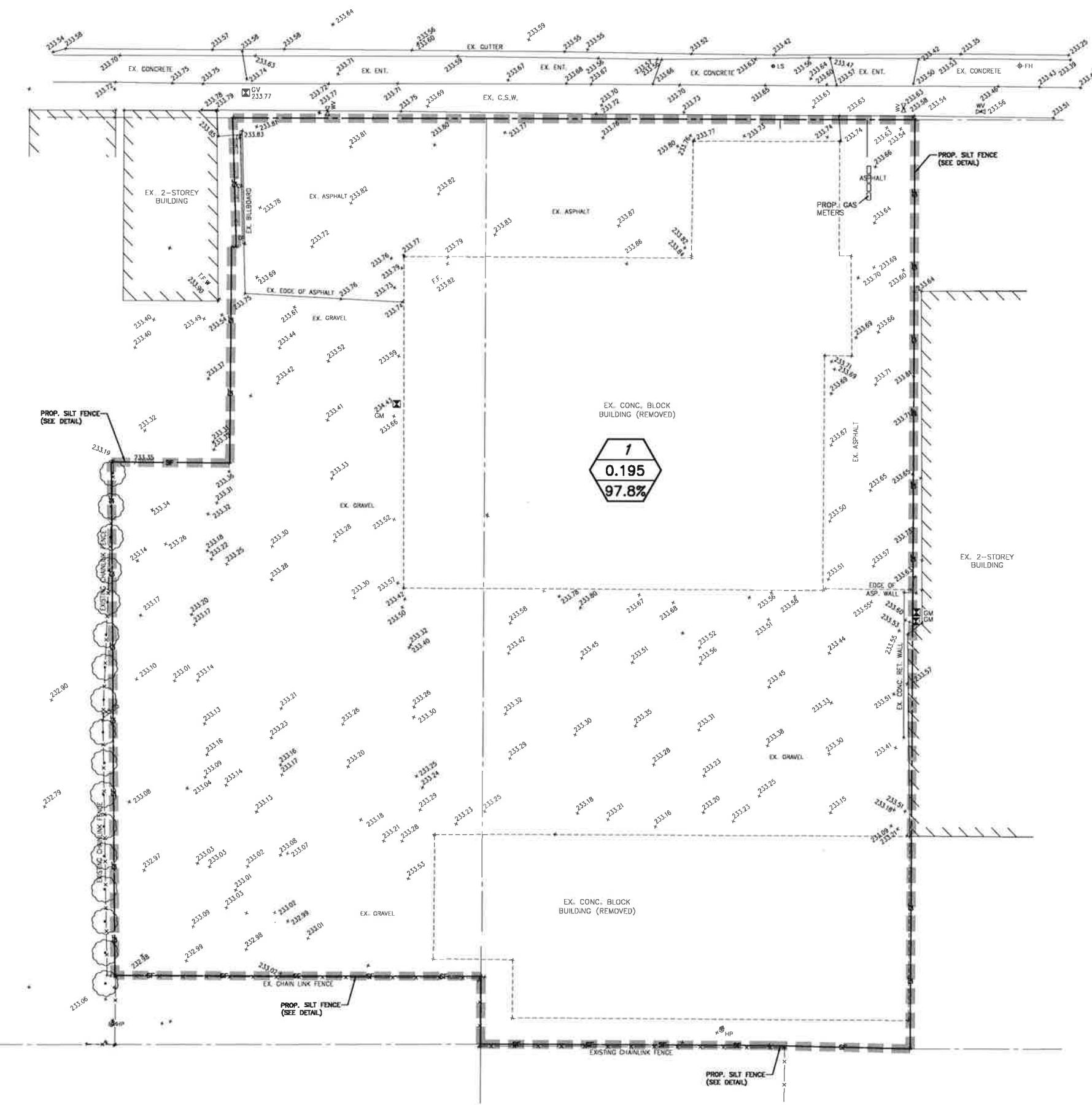
Typical Design Requirements
Slab-on-Grade with Perimeter Drainage

Drawing No. 2

Project No.:	SM 220178-G
Date:	June, 2022

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

 J.H. COHOON ENGINEERING LIMITED
CONSULTING ENGINEERS
BRANTFORD

CLIENT: SENTRY GROUP
SCALE: 1:250

JOB: 16025

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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"
" 0.037 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"
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" Runoff coefficient 0.000 0.939 0.918 "

```

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" Total Catchment area 0.195 hectare"
" Total Impervious area 0.191 hectare"
" Total % impervious 97.800"
" 19 EXIT"
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" 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 "

```

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" 38 START/RE-START TOTALS 101"
" 3 Runoff Totals on EXIT"
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" Total Impervious area 0.191 hectare"
" Total % impervious 97.800"
" 19 EXIT"

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"          0.250  Pervious Manning 'n'"
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"          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 "
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"          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  "

```

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"          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 ----->"          Version 2.25  rev. 473"
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"          MIDUSS created                         ie METRIC"
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"          Job folder:                           Pre50.out"
"          Output filename:                      Bob"
"          Licensee name:                        "
"          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"
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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"
" 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"

```

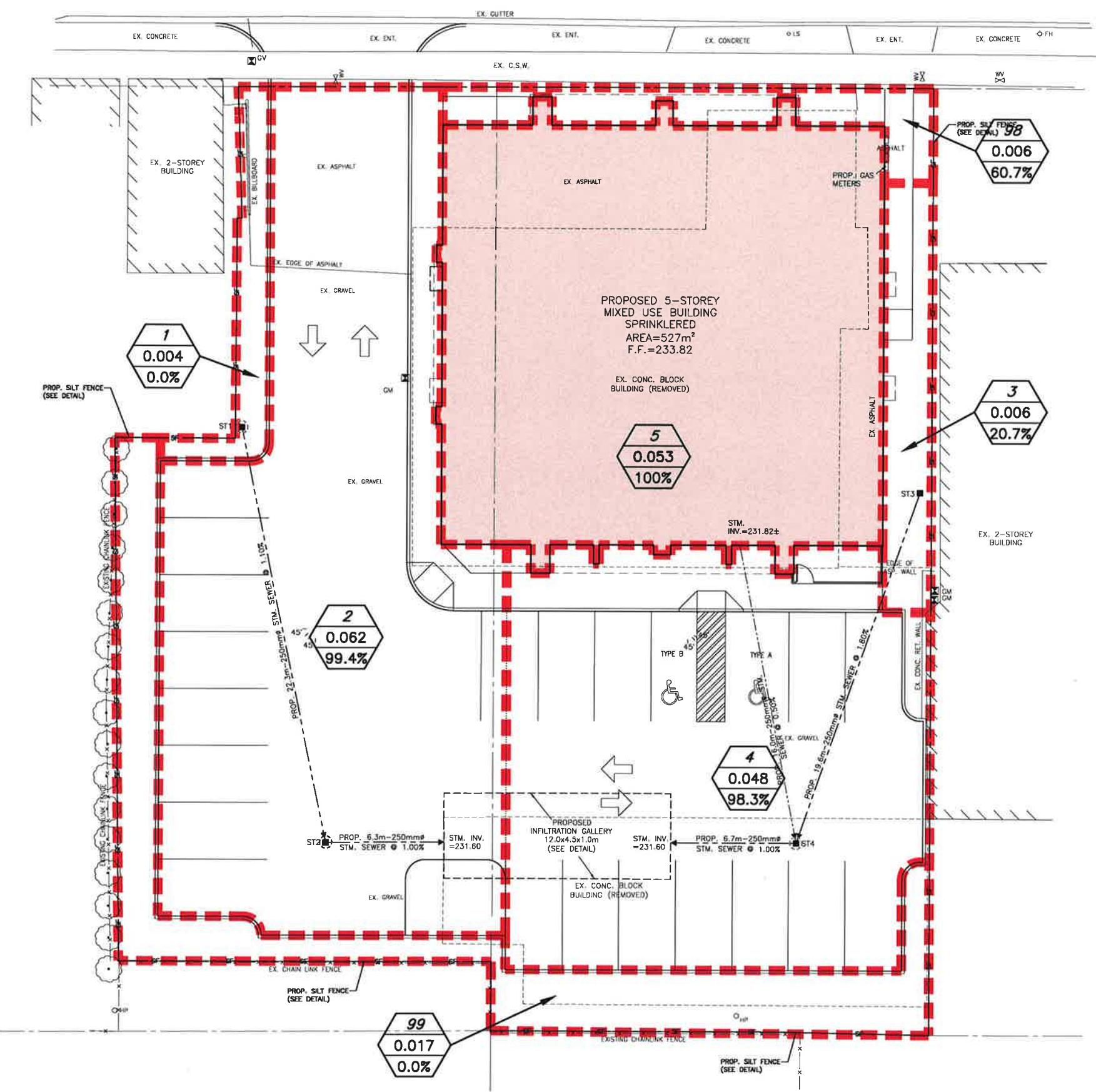
" MIDUSS Output ----->" Version 2.25 rev. 473"
" MIDUSS version
" MIDUSS created February-07-10"
" 10 Units used: ie METRIC"
" Job folder: C:\swm\MIDUSS\16025"
" Output filename: Pre100.out"
" Licensee name: Bob"
" Company "
" Date & Time last used: 31/07/2022 at 9:03:36 AM"
" 31 TIME PARAMETERS"
" 10.000 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 "

```

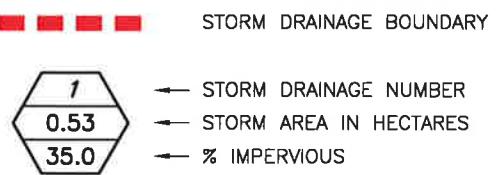
" Maximum flow 0.001 0.083 0.083 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
" 0.083 0.083 0.000 0.000"
" 38 START/RE-START TOTALS 101"
" 3 Runoff Totals on EXIT"
" Total Catchment area 0.195 hectare"
" Total Impervious area 0.191 hectare"
" Total % impervious 97.800"
" 19 EXIT"

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

KING STREET



LEGEND



POST DEVELOPMENT STORM DRAINAGE AREAS

PROPOSED MIXED USE BUILDING
78 KING STREET – NORFOLK COUNTY



CLIENT: SENTRY GROUP
SCALE: 1:250

```

"          MIDUSS Output ----->"  

"          MIDUSS version          Version 2.25  rev. 473"  

"          MIDUSS created          February-07-10"  

"          ie METRIC"  

" 10  Units used:  

"  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"
 " ie METRIC"
 " 10 Units used: C:\swm\MIDUSS\16025"
 " Job folder: Pre5.out"
 " Output filename: Bob"
 " Licensee name: "
 " 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"

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"          MIDUSS Output ----->
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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"
"          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"
"          ie METRIC"
"          10  Units used:                                C:\swm\MIDUSS\16025"
"          Job folder:                                Pre25.out"
"          Output filename:                            Bob"
"          Licensee name:                            "
"          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"
"          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"  

"          ie METRIC"  

" 10  Units used:          C:\swm\MIDUSS\16025"  

"          Job folder:          Pre100.out"  

"          Output filename:      Bob"  

"          Licensee name:        "  

"          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 ----->"          Version 2.25  rev. 473"
"          MIDUSS version          February-07-10"
"          MIDUSS created          ie METRIC"
"          10  Units used:          C:\swm\MIDUSS\16025"
"          Job folder:          Pst2.out"
"          Output filename:          Bob"
"          Licensee name:          "
"          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"

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```

" 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 ----->"          Version 2.25  rev. 473"
"          MIDUSS version          February-07-10"
"          MIDUSS created          ie METRIC"
"          10  Units used:          C:\swm\MIDUSS\16025"
"          Job folder:          Pst5.out"
"          Output filename:          Bob"
"          Licensee name:          "
"          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"

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" 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"

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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"
" 0.012 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"

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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"
" 0.014 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"

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```

" 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"
" EXIT"
" 19

" 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"

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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"
"          0.014      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"
" EXIT"
" 19

```

"          MIDUSS Output ----->"  

"          MIDUSS version          Version 2.25 rev. 473"  

"          MIDUSS created          February-07-10"  

"          ie METRIC"  

" 10  Units used:          C:\swm\MIDUSS\16025"  

"          Job folder:          Pst25.out"  

"          Output filename:      Bob"  

"          Licensee name:        "  

"          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"				

```

" 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 "

```

```

"
" 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"

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```

" 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"

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" 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"

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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"
" 0.019 0.000 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 0.884 "
" 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"

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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"
" 0.021 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 "

```

```

"
" 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"
" EXIT"
" 19

```

"          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"

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" 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"

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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"
"          0.021      0.000      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"

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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"
" 0.023 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"

```

```

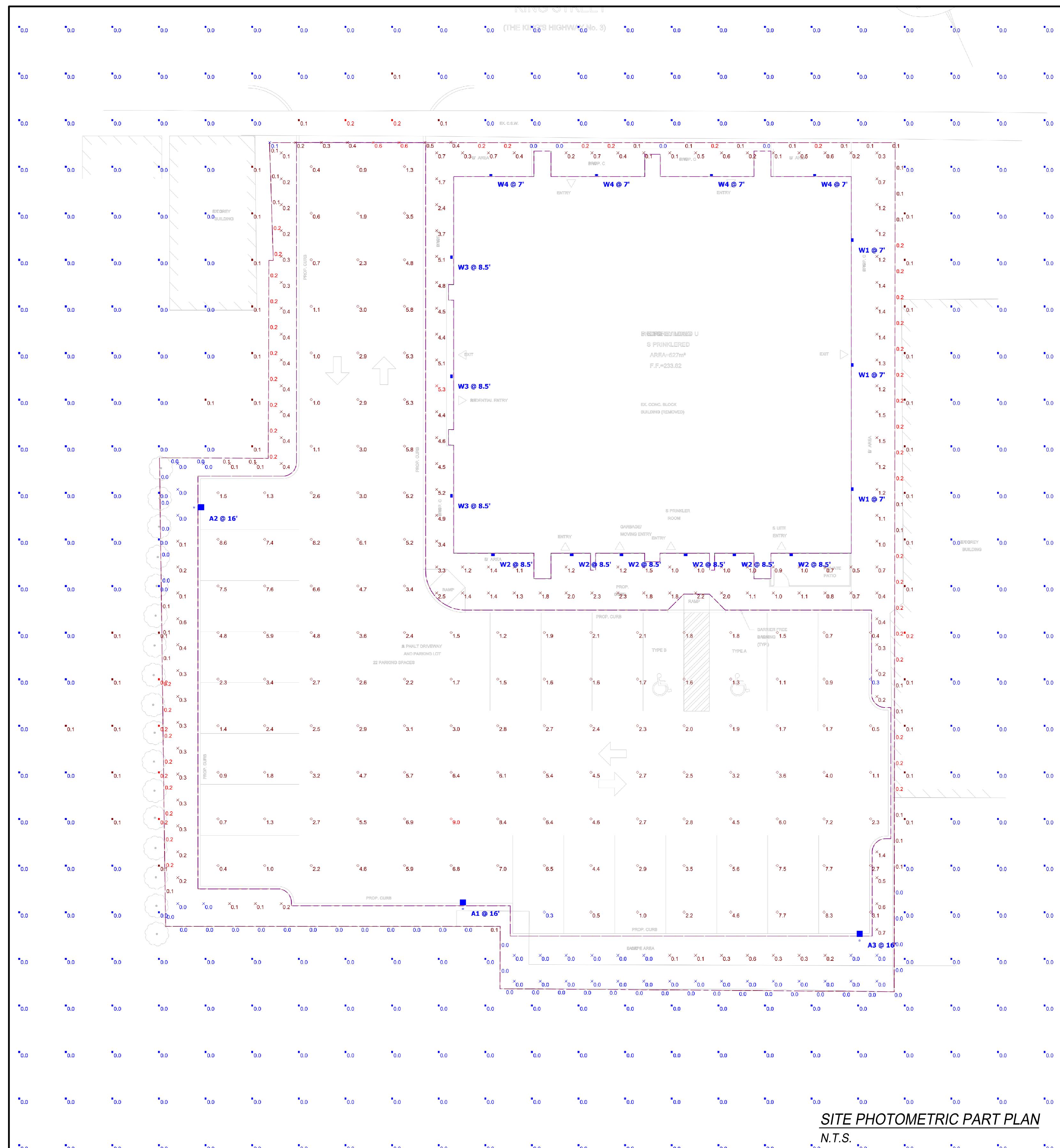
" 53          ROUTE Zero Route"
" 0.00  Zero Route Reach length  (metre)"
"          0.002  0.002  0.002  0.073 c.m/sec"
" 40          HYDROGRAPH Combine 101"
"          6  Combine "
"          101 Node #"
"          "
"          Maximum flow          0.002  c.m/sec"
"          Hydrograph volume      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"
" EXIT"
" 19

Appendix 'E'
Preliminary Storm Sewer Design Calculations



Schedule										
Symbol	Label	Image	QTY	Manufacturer	Catalog	Description	Number Lamps	Lamp Output	LLF	Input Power
	W1		3	Lithonia Lighting	WDGE2 LED P0 40K 80CRI T1S	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 TFTM	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 TFTM	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 BLKE CLR	SLANT-3413-LED402X2 2x TEMPERED GLASS OPENINGS	2	226	0.9	4
□	A1		1	Lithonia Lighting	DSX1 LED P7 40K 70CRI BLC3 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 LCCO 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 RCCO 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

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NORTH

REGISTERED PROFESSIONAL ENGINEER
13/04/23
G. N. CATT
G. N. CATT
PROVINCE OF ONTARIO

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ENGINEER: **GERALD CATT, P.ENG.**
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E-mail: catt@sympatico.ca

E-mail: cut@sympatico.ca

519-717-3361

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	