PRELIMINARY SERVICING REPORT
360 CARROLL STREET EAST

September 21, 2022

Prepared for:
Carrol St East Developments Inc.
140 Ann Street. Unit 202 London,
ON N6A 1R3

Prepared by:
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Project Number: 161414253

The conclusions in the Report titled Preliminary Servicing Report for 360 Carroll Street East are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Carroll St East Developments Inc. (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided to applicable authorities having jurisdiction and others for whom the Client is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.

Prepared by: _____

Signature

Nathan D'hoine, EIT, B.Eng.

Printed Name

Reviewed by: _____

Signature

Dan Vucetic, MESc., P.Eng.

Printed Name

Table of Contents

1 Introduction

1.1 Purpose of The Report

The preliminary servicing analysis has been prepared for Carroll St East Developents Inc. for the proposed development of the 7.675-hectare parcel at municipal number 360 Carroll Street East in Strathroy Ontario, herein referred to as the 'Site'. The subject site is currently un-developed agricultural lands. The proposed subdivision development consists of 116 low-density, single-family lots, a medium density townhome block fronting Carroll Street, and a small park.

Specifically, this report shall consider storm servicing and the provision of stormwater management, sanitary servicing, and capacity of the downstream sewer system and sewage treatment plant, and connection to Strathroy-Caradoc's municipal water supply system. The purpose of this report is to provide inventory of the existing storm, water, and sanitary servicing infrastructure for the feasibility of developing this site as proposed in support of Draft Plan Approval.

1.2 Limitations of the Report

The information presented in this report is based on the review of the following information (information has been attached in the appendices where appropriate):

- As-constructed drawings on file with Strathroy-Caradoc Township for the external services on Carroll Street;
- Ontario Building Code 2020 (OBC);
- Strathroy-Caradoc Servicing Standards and Requirements Manual;
- Preliminary Servicing Drawings from neighboring Southgrove and Fieldcrest Subdivisions;
- Geotechnical Investigation Report, provided by EXP Services Inc. (June 2021);
- Draft Plan of Subdivision, provided by Zelinka Priamo Inc. (April 2022); and,
- Servicing Capacity and Constraints Study, provided by WSP on behalf of Strathroy-Caradoc (July 2022). Found here: Servicing Capacity and Constraint Study | Growing Together Strathroy-Caradoc (growingtogethersc.ca)

1.3 Location

The site is located in the municipality of Strathroy-Caradoc, in Middlesex County. The site is bounded by Carroll Street to the north, agricultural fields to the west, and east, and a newly developed residential subdivision to the south. The site is currently undeveloped and operating as a plant nursery.

2 Sanitary Servicing

2.1 Existing External Services

Sanitary treatment for the subject site is anticipated to be provided by the Strathroy Wastewater Treatment Facility (SWWTF). There is currently no sanitary sewer fronting the subject site on Carroll Street. The nearest existing sanitary infrastructure is a 250mm diameter sewer on Queen Street, approximately 430m north-west of the subject site. According to available as-built records, the Queen Street sewer drains north-east towards Metcalfe Street East, where it flows by gravity towards the Albert Street Pumping Station (ASPS). Additionally, there is a 375mm diameter sanitary sewer from the Southgrove Meadows Subdivision to the Queen and Carroll Street intersection installed in 2020. A map of the existing sanitary network for Strathroy (2014) is attached in the Appendix.

There are three subdivisions that are being planned immediately adjacent to the subject site, as follows:

- Southgrove Meadows Subdivision designed by SBM Consultants, to the south;
- Fieldcrest Phase 2 Subdivision designed by MTE Consultants, to the north (across Carroll Street); and,
- Saxton Road Subdivision (conceptual plan) by LDS Consultants, to the west.

There is no known plan for development of current agricultural lands to the east of the site.

2.2 Proposed Sanitary Routing

All neighboring subdivisions identified in the above section are assumed to utilize sanitary sewers for municipal servicing with the same ultimate sanitary downstream outlet on Queen Street. Given the available information at the time of writing this report, Stantec investigated the feasibility of routing the sanitary sewer through each subdivision however with consideration of timing and minimizing disturbance of Carroll Street the options for sanitary routing and outlet are shown in Appendix A, sanitary drainage routing Figure 2 and detailed below:

Preferred Route – Tie into Proposed Local Sanitary Network to the North (Fieldcrest Phase 2 Subdivision):

- In discussions with Fieldcrest Subdivision developer, a cost-sharing agreement has been proposed to deepen and upsize the top-end of the Willis Avenue sanitary sewer to account for the subject lands proposed sanitary flow. Lowering the proposed sanitary sewer at Willis Avenue within Fieldcrest subdivision eliminates PDC conflict with the storm sewer and allows necessary grade reduction for sufficient clearance for the storm sewer to pass under Carroll Street. Fieldcrest Subdivision would provide a sanitary outlet at south side of Carroll Street, at an anticipated invert of 230.60m at the site property line. This would require some insulation for frost but would not ultimately affect the ability to service the remainder of the subject site by gravity.

- This route will ultimately discharge to the 450mm diameter Queen Street trunk sewer system. **Section 2.4** will demonstrate downstream capacity of this system to convey estimated sewage peak flows from the site.

Alternative 1 – New Sanitary Trunk Sewer Extension on Carroll Street:

- Install new 250mm diameter sanitary sewer down Carroll Street to Queen Street and tie into existing MH572 via the 250mm diameter stub (see Southgrove As-Built Servicing Drawings, Sheet #14, **Appendix B**). This option requires the installation of approximately 430m of sanitary sewer from the subject site to Queen Street within the Carroll Street right-of-way. Based on local topography and proposed site grading, there is sufficient grade to provide 0.40% average pipe slope to the downstream existing invert elevation of 228.696m.
- Based on the External Sanitary Drainage Area Plan provided by SBM Consultants (2016), there is unallocated capacity remaining following the buildout of subdivisions to the west and south (see Southgrove As-Built Servicing Drawings, Sheet #8 and 9, **Appendix B**).
- However, according to the servicing study conducted by WSP (2022), there is currently no plan to extend wastewater infrastructure further down Carroll Street to the east from Queen Street.

The following constraints were used to evaluate the potential options:

1. The minimum slope for a sanitary sewer (>13 units) is 0.35%, per Strathroy Design Standards 2.2 b). The current site concept has more than 13 units (assuming 200mm diameter minimum).
2. Minimum required cover from pipe crown is 2.75m (assuming basement drainage IS required) as per Strathroy Design Standards 2.2 c).

Capacity constraints of all the above options are similar because they are ultimately draining into the Queen Street sanitary sewer. Downstream capacity will be covered in further detail in **Section 2.4** below.

2.3 Preliminary Sewage Flow Calculation

To evaluate the suitability of the downstream sanitary infrastructure, preliminary sewage peak flow rates have been calculated. Sewage flows are based on the following, per Strathroy-Caradoc Servicing Standards:

a) Low Density (Zone R1) = 30units/hectare @ 2.4 people/unit
Medium Density (Zone R2) = 75 units/hectare @ 2.4 people/unit

Given this, we can infer a rough estimate of the site population based on the current draft plan concept, See **Table 1** below**.**

Table 1 – Population Calculation (Current Draft Plan)

Residential Type	Area (ha)	# Lots	Density (Units/ha)	Pop. per Unit	Population
Low Density (SF Lots)	-	116	30	2.4	279
Medium Density (Townhomes)	0.98	-	75	2.4	177
				Total =	**456**

Therefore, given the calculation in **Table 2**, the total proposed site population is 456 people. From this, we can calculate a peak sewage flow, as follows.

Table 2 – Preliminary Peak Sewage Flow Calculation

Population	Area (ha)	Peaking* Factor	Sewage** (L/s)	Infiltration† (L/s)	Total (L/s)
456	7.675	4.39	6.94	0.61	7.55

**Based on Harmon Peaking Factor as per Strathroy Standards 2.3 f)*
***Per capita sewage flow = 300L/day, as per Strathroy Standards 2.3 c)*
† Infiltration rate = 0.08L/s/ha, as per Strathroy Standards 2.3 g)

Therefore, the total expected peak sewage flow from the site is 7.55L/s.

2.4 Downstream Sanitary Sewer Capacity Review

Downstream sanitary capacity was reviewed based on the Servicing Study conducted by WSP (July 2022). According to the report, the developments south of Carroll Street East (presumably including the subject site) have been included in the future build-out modelling. The referenced sewer segment is the 450mm diameter Queen Street truck sewer that connects to Front Street East, polygon ID 58 (see Figure A-3, Table B-2, and B-3 from WSP Report, **Appendix B**). The following table summarizes the remaining capacity for existing (2021) and future (2046) build-out scenarios.

Table 3 – Downstream Sanitary Capacity, Existing vs. Future (Queen Street Trunk Sewer, ID 58) *

Condition	Area (ha)	Peak Flow (L/s)	Pipe Size (mm)	Estimated Full Capacity	Remaining Capacity
Existing	96.96	84.61	450	121.0	30%
Future	96.96	92.64	450	121.0	23%

** Adapted from WSP Servicing Report (July 2022) Table B-3 and B-4.*

Based on **Table 3** above, there is unallocated capacity remaining for the future build-out scenario, which is assumed to include the subject site.

The Strathroy WWTF is currently operating at 53% rated capacity and will be able to accommodate peak sanitary flows out to the 2046 forecast date. Planned capital works for the inlet screen will ensure the WWTF will function as intended (WSP, 2022). Therefore, the subject site has been accounted for and downstream infrastructure will be able to accommodate additional peak sewage flows generated by the subject site.

3 Stormwater Management

3.1 Existing Storm Services

There is currently no storm services fronting the subject site on Carroll Street. However, there is a storm manhole in the Queen and Carroll Street intersection with a 600mm diameter stub facing east down Carroll Street. There is also an existing Stormwater Management Facility (SWMF) north of Carroll Street, located in the Fieldcrest Subdivision

There is no documented natural watercourse that flows through the site.

3.2 Stormwater Management Strategy

The overall stormwater strategy will be discussed here for informational purposes. The full preliminary Stormwater Management (SWM) Report by Stantec Consulting is provided in **Appendix C**.

Stormwater runoff from the site will be managed by on-site water quantity and quality controls. Water quantity control will be achieved by the following, in order of largest contribution:

- Park block being utilized as a dry pond SWMF with LID infiltration and underground storage, with overflow to the Fieldcrest Subdivision north of Carrol Street via Willis Avenue storm sewer at a maximum flow rate of up to 170 L/s for all storm events;
- Underground storage facility under the medium density block parking lot; and,
- Infiltration through the installation of pervious 3rd pipe systems, pervious catchbasins, and swales;

The stormwater management strategy shall adhere to the municipality's guidelines for LID (Low-Impact Development) measures, and current (2021) municipal design standards to ensure system resiliency against changing climate conditions.

4 Municipal Water Servicing

4.1 Existing Water Services

Based on the available as-built records, there is a 400mm diameter trunk watermain present fronting the subject site, on the north side of Carroll Street (see Carroll Street Plan and Profile Record Drawings, **Appendix B**).

Strathroy-Caradoc Engineering to provide pressures and flows under design conditions. Alternatively, a hydrant flow test may need to be conducted to establish a hydraulic grade line (HGL) for the site. In the absence of more detailed information, we will assume the WSP report can be used to accurately determine a HGL for the site.

The Carroll Street subdivision is said to be fed from Junction J1132 with the following parameters:

- Elevation = 232.17m,
- Head Pressure = 269.91m (370 kPa).

Table 4 – Preliminary Water Pressure Calculation (Assumed HGL=270.0m)

Topography	Elevation (m, AMSL) †	Head Pressure (m)	Pressure (kPa)	Maximum Allowable Operation Pressure (kPa)*	Minimum Allowable Operation Pressure (kPa)*	Allowable Range? (Y/N)
Low Point	232.0	38.0	372.8	480	275	Y
High Point	236.0	34.0	333.5			Y

** As per Strathroy Design Standards 4.3.2 a) i).*
† Elevations obtained from Topographic Survey conducted by Stantec Consulting, May 2022.

From **Table 4** (above) water pressures are within allowable range for servicing. No pressure alteration (boosted pressure system, pressure reducing valves) is anticipated to be required for ground-level units. Note that standard operating pressure is 350-480kPa and the high-point elevation has a pressure just outside this threshold. This analysis is preliminary and further details will be given after a water model has been developed for the site during detailed design stage.

4.2 Proposed Water Servicing

Water for site servicing is anticipated to come from the existing 400mm diameter watermain on Carroll Street. A water service connection (>150mm diameter) will need to extend across Carroll Street to service

the site. The watermain will be sized appropriately to address domestic demands and ensure adequate fire flow for the entire site.

Looping will be included in the ultimate design to ensure supply redundancy and prevent excessive residence times. Looping is anticipated to be available in the future with neighboring Saxton Subdivision at Street B and C (per the current Draft Plan, **Appendix A**).

A preliminary analysis was conducted based on the findings of the WSP Report to evaluate whether the allocated water demand was sufficient compared to the proposed demand. Results are summarized below:

Table 5 – Allocated vs Proposed Water Demands (Adapted from WSP, 2022)

State	LD Units	HD Units	Population	Average Day* (L/s)	Max Day ** (L/s)	Peak Hour † (L/s)
Allocated	185	33	495	1.43	5.02	11.18
Proposed	116	74	456	1.32	4.62	10.30
Δ	69	-41	39	0.11	0.40	0.88

** Average Day demand = 250L/Day/Capita, per Strathroy Design Standards.*
*** Max Day Peaking Factor = 3.5, per Strathroy Design Standards.*
† May Hour Peaking Factor = 7.8, per Strathroy Design Standards.

Therefore, based on the above **Table 5**, it is anticipated the existing 400mm diameter watermain on Carroll Street will be able to service the subject site as proposed, with an additional 0.88L/s of peak hour reserve capacity compared to allocated.

5 Conclusion

This report was prepared with the objective of determining if the proposed development of the site is feasible from a servicing perspective and to support Draft Plan Approval. The following summarizes the report findings:

- Sanitary flow from the proposed development is proposed to be directed north towards Willis Avenue, which is part of the proposed Fieldcrest Subdivision. Coordination with Fieldcrest Subdivision Phase 2 is underway which will allow for alteration to pipe size and grade to facilitate Carroll Street crossing and servicing of the subject lands. It is understood that the site has been allocated for in WSP's report and poses no issues to the downstream sanitary infrastructure.
- Stormwater flow from the proposed development should also be directed north towards Willis Avenue. 170.0L/s flow rate has been imposed on this outlet for major storms, therefore any additional flow volume must be retained and mitigated on-site via SWM controls. stormwater will ultimately discharge to the downstream Fieldcrest Subdivision SWMF; however, quantity control adhering to MECP's Enhanced Quality Target will be required before outletting off-site. The storm outlet at Fieldcrest Subdivision is being coordinated with MTE, Municipality, and County to facilitate Carroll Street crossing.
- Municipal water service is available to this site via a 400mm diameter watermain on the north side of Carroll Street. It is anticipated that pressure is sufficient to provide adequate servicing. Looping is anticipated with neighboring future subdivision to allow for design redundancy, ensuring adequate pressure, and reducing retention times.

We trust this meets with your requirements, should you have any question, or require further information, please contact the undersigned.

Sincerely,

Stantec Consulting Ltd.

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Attachment: Appendix A, Appendix B, Appendix C

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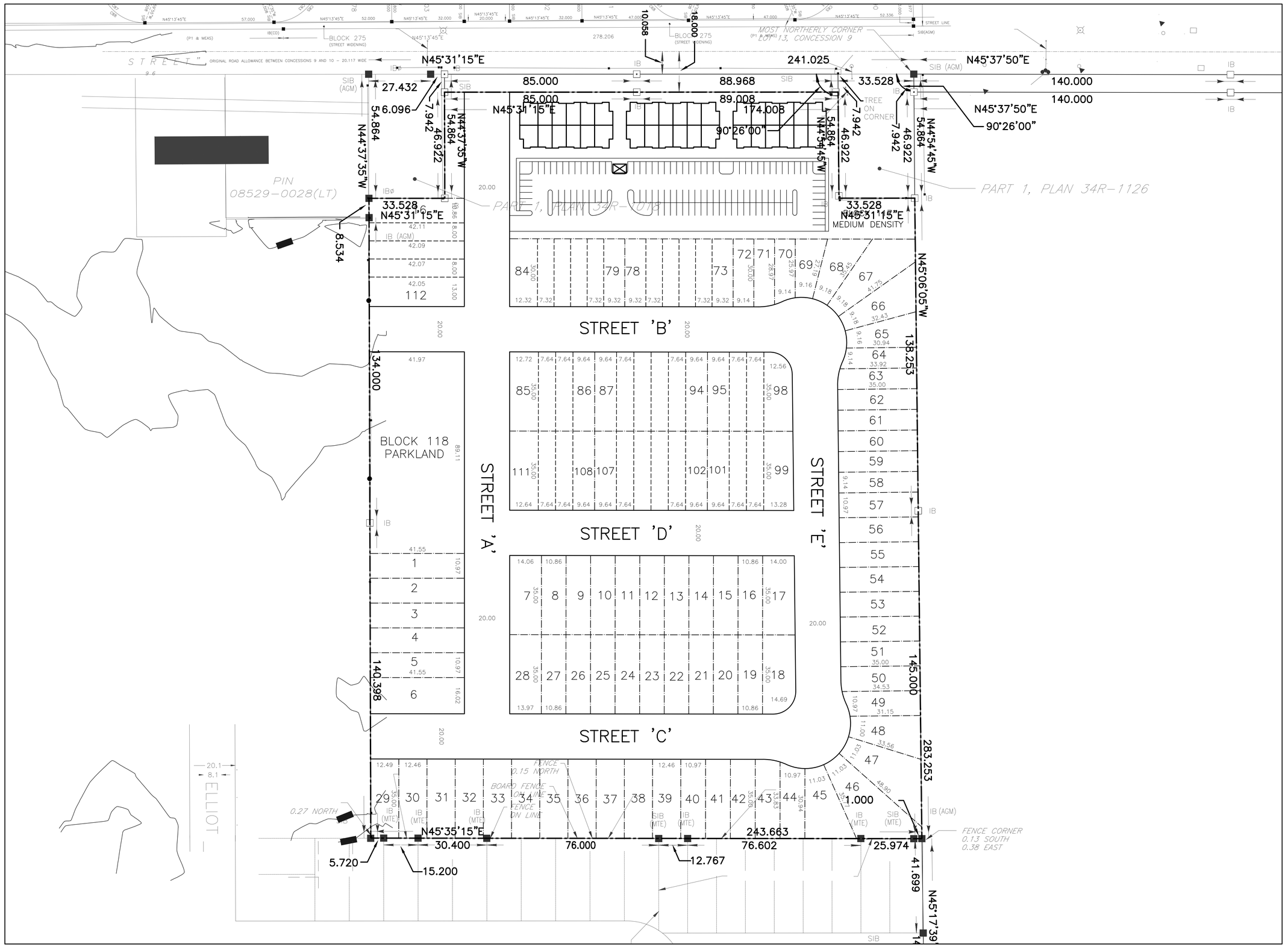
Appendix A

Supporting Drawings and Servicing Drawings



KEY PLAN

Subject Lands

DRAFT PLAN OF SUBDIVISION

OF PART OF

Lots 13 & 14, Concession 9

(Part 2, Plan 33R-21220)

(GEOGRAPHIC TOWNSHIP OF CARADOC)

MUNICIPALITY OF STRATHROY–CARADOC
COUNTY OF MIDDLESEX

INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT

A) As shown	G) As shown
B) As shown	H) Municipal water supply available
C) As shown	I) Sandy, Silty Clay
D) As listed below	J) As shown
E) As shown	K) All municipal services to be available
F) As shown	L) As shown

PROPOSED LAND USES AND AREAS

RESIDENTIAL, SINGLE DETACHED (LOTS 1-72)	--- ha
RESIDENTIAL, STREET TOWNHOUSE (BLOCKS 73-116)	--- ha
MEDIUM DENSITY (BLOCK 117)	--- ha
PARKLAND (BLOCK 118)	--- ha
PROPOSED ROADS	--- ha
TOTAL	7.675 ha

OWNER'S CERTIFICATE

HEREBY CONSENTS TO THE FILING OF THIS PLAN IN DRAFT FORM

---, Owner — DATED

SURVEYOR'S CERTIFICATE

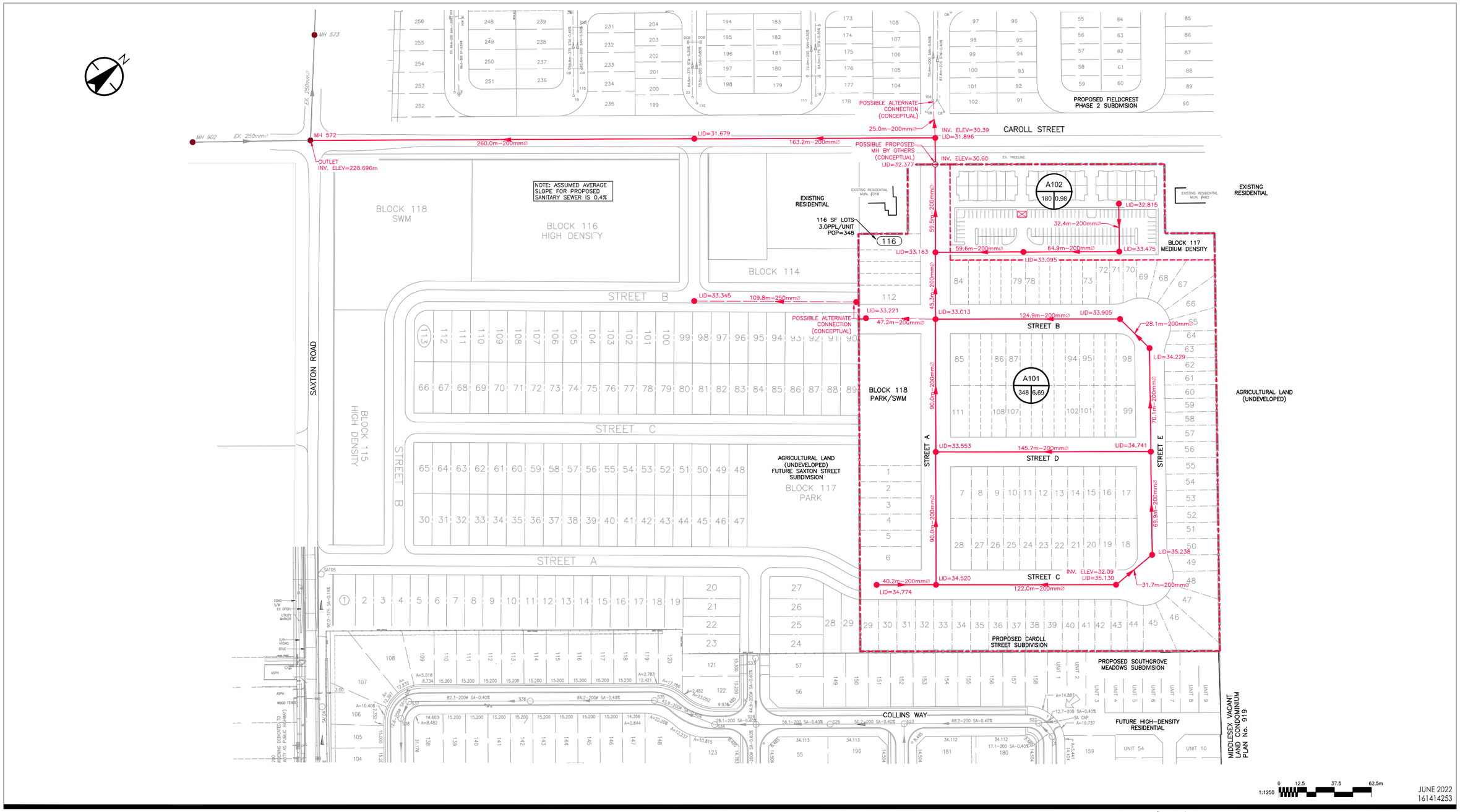
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY SHOWN ON THIS PLAN.

---, ONTARIO LAND SURVEYOR for --- — DATED

NO.	REVISION	DATE	INITIAL

ZELINKA PRIAMO LTD
A Professional Planning Practice
318 Wellington Road, London, Ontario N6C 4P4
Tel: (519) 474-7137 Fax: (519) 474-2284 e-mail: zp@zpplan.com

DRAWN BY	PROJECT NO.
CTK	LIT/STY/21-01
DATE	SCALE
APRIL 2022	1:750



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Client/Project

CAROL STREET SUBDIVISION
STRATHROY, ON

Figure No.
2

Title
SANITARY ROUTING FIGURE

Legend

SUBDIVISION BOUNDARY
DRAINAGE AREA BOUNDARY
PROPOSED SANITARY SEWER
EXISTING SANITARY SEWER

POPULATION — A101 — AREA ID
100 | 0.37
AREA (IN HECTARES)

NOTE: ASSUMED AVERAGE SLOPE FOR PROPOSED SANITARY SEWER IS 0.4%

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Stantec

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Markham ON
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TOPOGRAPHIC SKETCH of

360 CARROLL STREET EAST

CITY OF STRATHROY-CARADOC

REGIONAL MUNICIPALITY OF MIDDLESEX COUNTY

Scale 1:750

20 0 20 40 METRES

Stantec Geomatics Ltd.
ONTARIO LAND SURVEYORS

CAUTION

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

UTILITIES SHOWN ARE FOR DISCUSSION PURPOSES ONLY AND PRIOR TO CONSTRUCTION SHOULD BE CONFIRMED BY A CONTRACTOR.

METRIC CONVERSION

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

VERTICAL DATUM NOTE

ELEVATIONS ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD-1928:1978).

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR (UTM, ZONE 17, CM81°00'W)
DATUM: NAD 83 (CSRS)(2010.0)

THIS PLAN MAY BE CONVERTED TO GROUND BY DIVIDING BY A COMBINED SCALE FACTOR OF 0.99960.

TOPOGRAPHIC LEGEND

MW	DENOTES	MONITORING WELL
SN	DENOTES	SIGN
TB BELL	DENOTES	TERMINAL BOX - BELL
UP	DENOTES	UTILITY POLE

DRAWN: ADJ CHECKED: * DATE: MAY 11 2022 PROJECT No.: 161414253

Legend

Types of Manhole

- CB
- STRM_MH

- Storm Sewer
- Road
- Watercourse
- railway
- Boundary
- Catchment Boundary

0.25 — DRAINAGE AREA (ha)
0.45 — RUNOFF COEFFICIENT

N

0 25 50 100 150 200 Meters

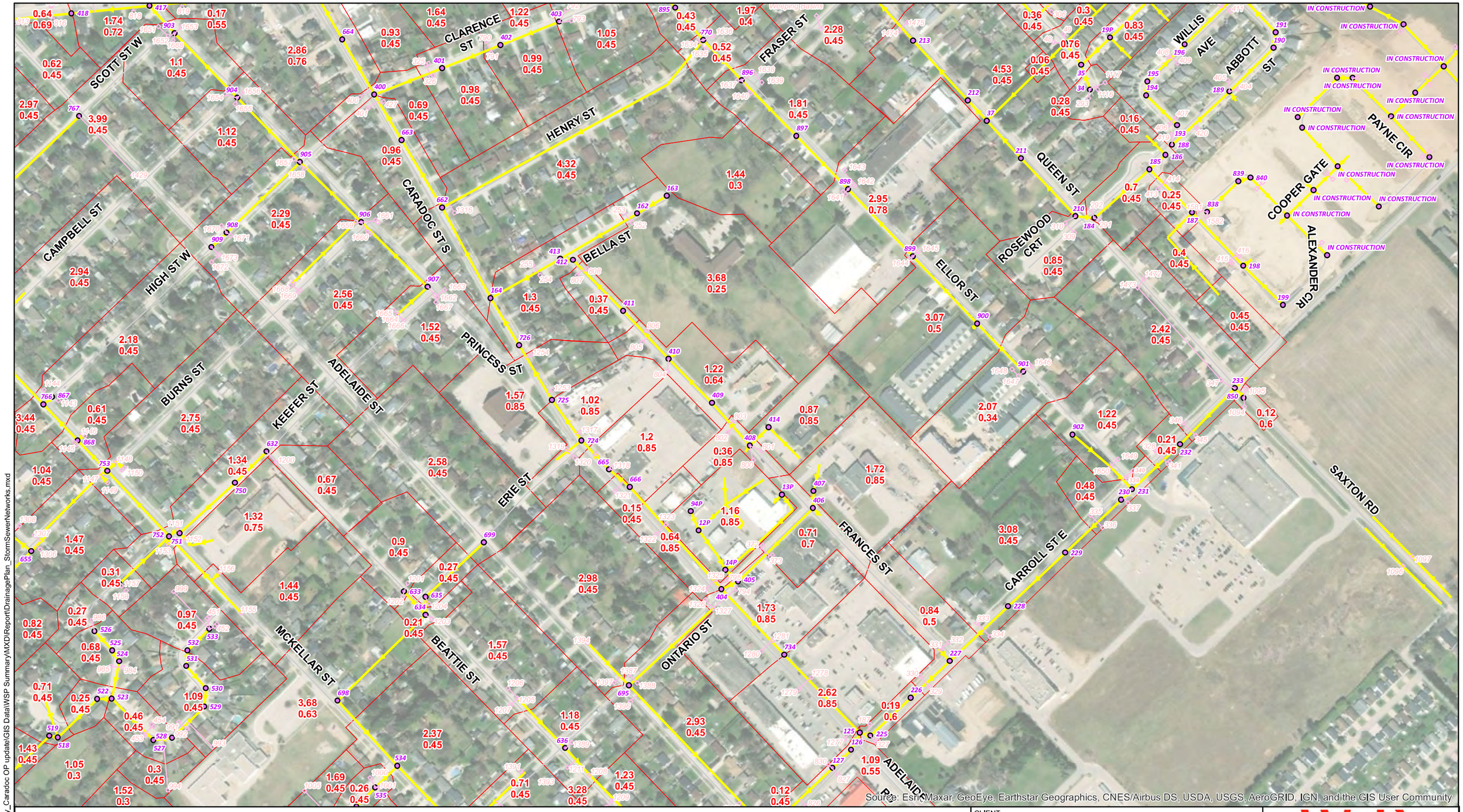
CLIENT
MUNICIPALITY OF STRATHROY-CARADOC

TITLE
SERVICING CAPACITY AND CONSTRAINTS STUDY – STORMWATER

STORM SEWER PLAN

Checked J.Z.	Drawn J.C
Date June 2022	Proj. No. 20M-01349-00
Scale 1:4,000	Figure No. **STM-12**

Document Path: F:\EIWSP_Strathroy_Caradoc OP update\GIS Data\WSP Summary\MXD\Report\DrainagePlan_StormSewerNetworks.mxd



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Legend

Types of Manhole

- CB
- STRM_MH

- Storm Sewer
- Road
- Watercourse
- railway
- Boundary
- Catchment Boundary

0.25 — DRAINAGE AREA (ha)
0.45 — RUNOFF COEFFICIENT

N

0 25 50 100 150 200 Meters

CLIENT
MUNICIPALITY OF STRATHROY-CARADOC

TITLE
SERVICING CAPACITY AND CONSTRAINTS STUDY – STORMWATER

STORM SEWER PLAN

Checked: J.Z.	Drawn: J.C
Date: June 2022	Proj. No.: 20M-01349-00
Scale: 1:4,000	Figure No.: **STM-14**

Arnella St PS
Mill Pond PS
Albert St PS
McNab St PS
High St PS
Bella St PS
Park St PS
Victoria St
Metcalfe St E
Carroll St E
Source: Esri, DigitalBorder, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Sanitary Manhole
- Sewage Pumping Station
- Sanitary Forcemain
- Sanitary Gravity Sewer
- Analyzed Sewer Segment
- Sanitary Subcatchment

Strathroy-Caradoc Official Plan

Figure A-3
Strathroy Sewer Network - Existing Conditions
Page 4 of 5

0 0.25 0.5 Kilometers

20M-01349-00 | January 2022

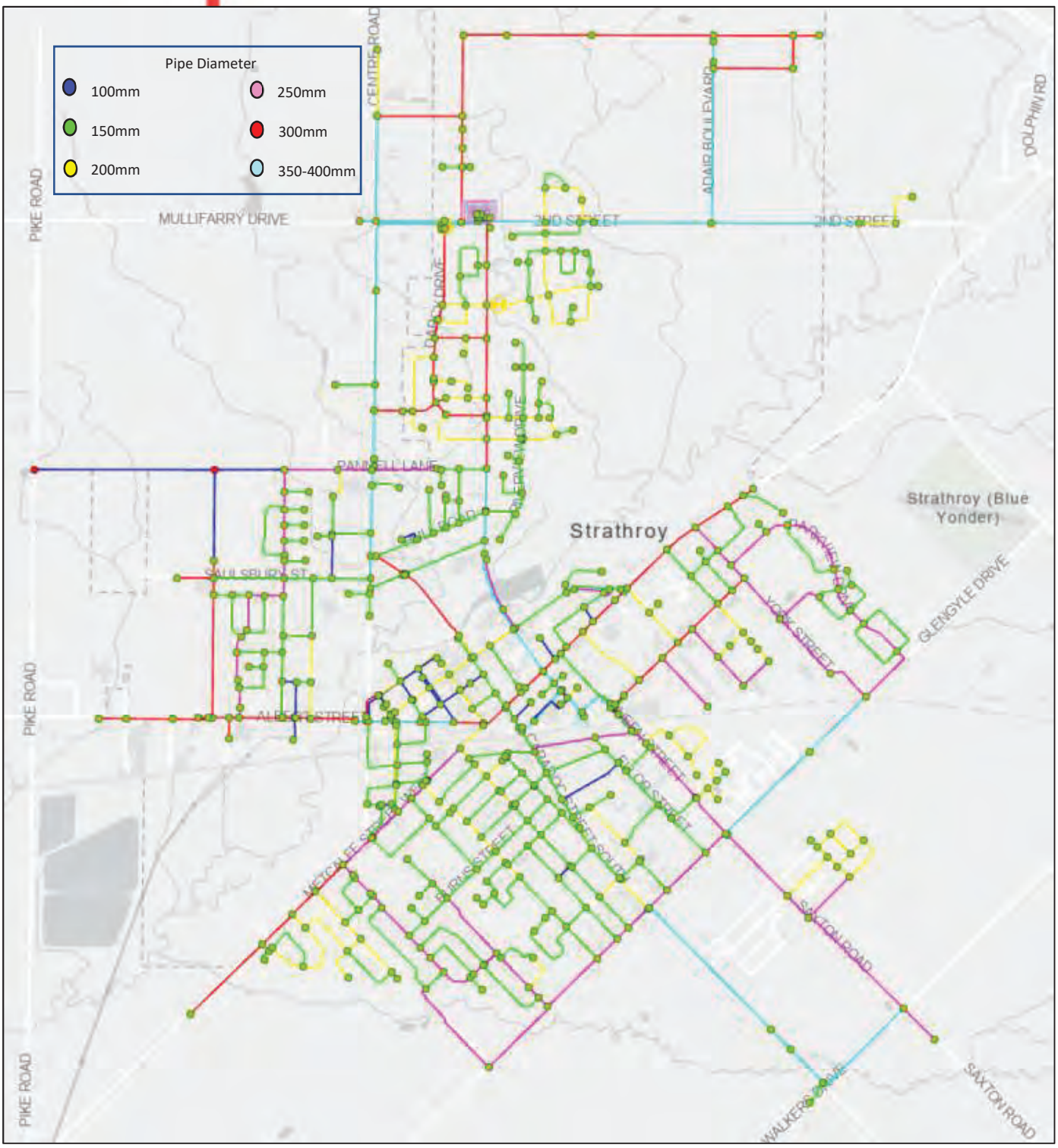

Figure A3 – Existing Watermain System Layout with Pipe Diameters

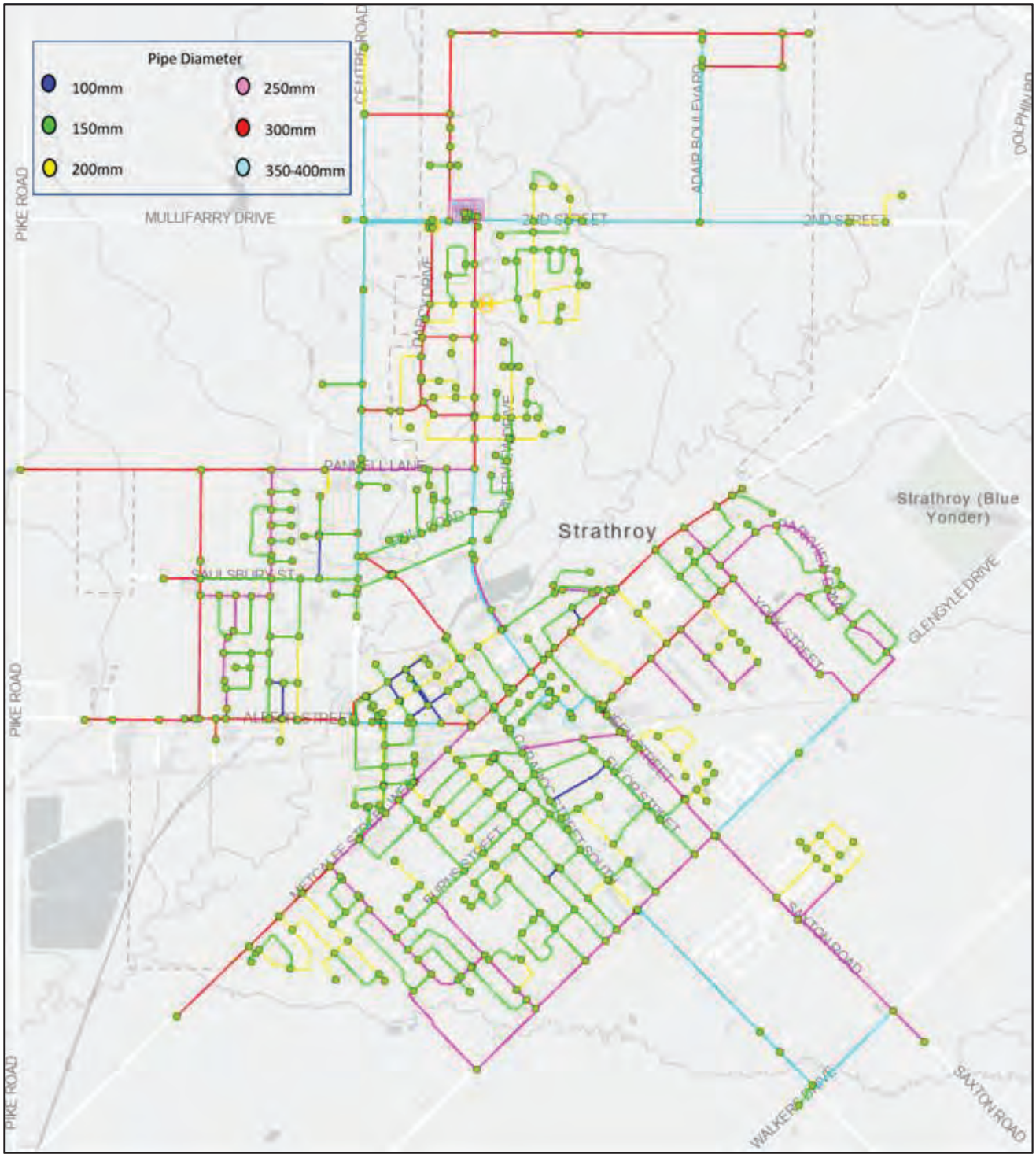

Figure A4 – Proposed Watermain System Layout with Pipe Diameters

APPENDIX A

WATER DEMANDS

Strathroy 2036 Projections

Demands

Population (Low Density Residential)	2.40	ppu
Population (Medium Density Residential)	2.40	ppu
Population (High Density Residential)	1.60	ppu
Commercial	50	pha
Average Day Residential Demand	250	L/cap/day
Average Day Commercial Demand	260	L/cap/day

Peaking Factors

Maximum Hour	7.80
Maximum Day	3.50

Demand Rate Calculation

Development	Node	Low Density Residential (No. of Units)	Medium Density Residential (No. of Units)	High Density Residential (No. of Units)	COMMERCIAL (No. of ha)	POPULATION	AVERAGE DAY (L/S)	MAX DAY (L/S)	PEAK HOUR (L/S)
Area A1 - Saulsbury (3 years, 25 years)	J396	0		75		120	0.35	1.21	2.71
Area A2 - Ellor St (3 years)	J912	38		0		0	0.26	0.92	2.05
Area A3 - South Carroll Street W	J698	495		87		1328	3.84	13.45	29.97
Area A4 - Queen Street	J844	31		6		84	0.24	0.85	1.90
Area A5 - Carroll St E	J1132	185		33		495	1.43	5.02	11.18
Area A6 - Burns/Oak (3 years)	J666	90		0		215	0.62	2.18	4.86
Area A7 - Park/Ridge St	J640	22		0		53	0.15	0.53	1.19
Area A8 - Cuddy (25 years)	Already Incorporated	0		0		0	0.00	0.00	0.00
Area A9 - North Meadows	J118	1181		208		3168	9.17	32.08	71.50
Area A10 - South Grove Meadows	J964	40		0		96	0.28	0.97	2.17
Area A11 - Glengyle Dr	J1008	38		7		101	0.29	1.02	2.28
Area A12 - Head Street	J196	58		0		140	0.41	1.42	3.17
Total		**2178**	**0**	**415**	**0.00**	**5800**	**17.05**	**59.66**	**132.97**

Appendix B

As-Built Drawings

MTE FILE No: -1-GENERAL

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SWM POND

BLOCK 279

BLOCK 278

BLOCK 269

BLOCK 273

BLOCK 274

WILLIS AVENUE

ABBOTT STREET

EXISTING RESIDENTIAL

ALEXANDER CIRCLE

NEW LOT

COOPER GATE

PAYNE CIRCLE

DAVIS TERRANCE

NEWTON AVENUE

FUTURE RESIDENTIAL

CARROLL STREET

38.7m–855x1345 HE STM–0.32%
45.5m–750 STM–0.15%
19.2m–200 SAN–0.35%
24.1m–600 STM–0.25%
ST CAP 1
SAN CAP 1
EX. 7.4–750 ST–0.12%
66.1m–750 STM–0.12%
40.5m–300 SAN–0.20%
EX. PLUG
HEADWALL 2 PER OPSD 804.03 WITH GRATING PER OPSD 804.05 AND FLAP GATE BACKFLOW PREVENTER
71.3m–300 SAN–0.20%
73.8m–855x1345 HE STM–0.25%
39.0m–855x1345 HE STM–0.25%
18.5m–200 SAN–0.35%
16.0m–675 STM–0.25%
42.8m–300 SAN–0.20%
ST CAP 2
SAN CAP 2
49.8m–855x1345 HE STM–0.22%
40.1m–200 SAN–0.35%
63.0m–200 SAN–0.35%
66.5m–855x1345 HE STM–0.22%
39.7m–300 STM–0.45%
EX. 76.0–300 SAN–0.20%
EX. 82.8–450 ST–0.23%
EX. 63.9–300 SAN–0.20%
EX. 26.0–375 ST–0.30%
EX. 90.0–300 ST–0.40%
EX. 12.0–375 ST–0.30%
EX. 9.8–250 SAN–0.25%
EX. SAN CAP 2
EX. 16.8–300 SAN–0.20%
43.0m–250 SAN–0.25%
42.3m–200 SAN–0.35%
14.2m–375 STM–0.40%
16.7m–200 SAN–0.50%
EX. SAN CAP 3
53.0m–200 SAN–0.50%
50.0m–300 STM–0.43%
EX. 18.7m–200 SAN–0.50%
63.5m–300 STM–0.45%
66.7m–200 SAN–0.50%
15.3m–200 SAN–0.50%
17.8m–375 STM–0.35%
42.0m–675 STM–0.25%
38.6m–675 STM–0.25%
38.7m–900 STM–0.18%
44.4m–900 STM–0.18%
83.5m–900 STM–0.10%
14.8–375 ST–0.30%
60.7–375 ST–0.30%
EX. 62.5–200 SAN–0.50%
12.3–200 SAN–0.40%
EX. 49.0–375 ST–0.30%
EX. 56.8–200 SAN–0.40%
EX. 53.6–300 SAN–0.20%
57.9–600 ST–0.16%
EX. 71.1–300 SAN–0.30%
EX. 128
EX. 131
EX. 45
EX. 39
EX. 34
EX. 46
EX. 20.1–200 SAN–0.45%
EX. 20.2–450 SAN–0.23%
EX. 48.6–200 SAN–1.23%
86.0–300 ST–0.54%
59.0–300 ST–0.54%
EX. STMH 13
77.5m–450 STM–0.25%
65.9–375 ST–0.30%
EX. SAN CAP 1
EX. STMH 136
EX. RYCBMH–101
RYCBMH–100
EX. CAP

LEGEND

- 129 DENOTES LOT NUMBERS
- PHASE LIMIT
- SANITARY MANHOLE
- STORM MANHOLE OR MANHOLE TEE
- SANITARY SEWER
- STORM SEWER
- CB CATCH BASIN
- CICB CURB INLET CATCH BASIN
- DCB DOUBLE CATCHBASIN
- 9 PLAN & PROFILE DRAWING NUMBER
- HOUSE SETBACK LIMITS / EASEMENTS
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER

BENCHMARK:

ELEVATIONS ARE GEODETIC DERIVED FROM THE MINISTRY OF TRANSPORT VERTICAL BENCHMARK No. 0011979U254 HAVING AN ELEVATION OF 225.562 METRES

SITE BENCHMARKS:

CUT CROSS ON CONCRETE SIDEWALK LOCATED ON THE FURTHEST WEST EDGE OF SUBJECT PARCEL, RUNNING PARALLEL TO QUEEN STREET. HAVING A ELEVATION OF 230.335. (CONTRACTOR TO FIELD VERIFY)

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS		No.	REVISIONS	DATE	CONSULTANT
DESIGN	KAM				
DRAWN BY	IRA				
CHECKED	KAM				
APPROVED	KAM				
DATE	APR. 2022				

CONSULTANT OR DIVISION

MTE

Engineers, Scientists, Surveyors

ENGINEER'S STAMP

STRATHROY-CARADOC

SCALE

SCALE – 1 : 750

7.5m 0 15m

FIELDCREST SUBDIVISION – PHASE 2
FIELDCREST LTD.

GENERAL SERVICING PLAN

PROJECT No. 44465-104

SHEET No. 1

PLAN FILE No.

-2-STORM

MTE FILE No:

P:\P\44465\104\PHASE 2\44465-104_PRELIM_12.DWG

WILLIS AVENUE
ABBOTT STREET
EXISTING RESIDENTIAL
BLOCK 269
BLOCK 279
BLOCK 278
FUTURE DEVELOPMENT
SWM POND
Blk 277
HEADWALL 2 PER OPSD 804.03 WITH GRATING PER OPSD 804.05 AND FLAP GATE BACKFLOW PREVENTER
38.7m-855x1345 HE STM-0.32%
45.5m-750 STM-0.15%
24.1m-600 STM-0.25%
ST CAP 1
EX. 7.4-750 ST-0.12%
EX ST CAP 4
56.1m-750 STM-0.12%
73.6m-855x1345 HE STM-0.25%
39.0m-855x1345 HE STM-0.25%
16.0m-675 STM-0.25%
ST CAP 2
WILLIS AVENUE 49.9m-855x1345 HE STM-0.23%
KEY
3 — AREA NUMBER
0.77 42 — RUN-OFF CO-EFFICIENT
AREA (IN ha)
CATCHMENT AREA
LEGEND
46 DENOTES LOT NUMBERS
PHASE LIMIT
110 STORM MANHOLE
STORM SEWER
EXISTING/FUTURE STORM SEWER
OVERLAND FLOW ROUTES
1 0.38 0.50
2 0.23 0.50
3 0.42 0.50
4 0.50 0.50
5 0.63 0.50
6 2.08 0.65
7 3.26 0.50
8 0.05 0.50
9 0.05 0.50
10 0.59 0.50
11 0.40 0.50
12 0.25 0.50
14 0.14 0.50
15 0.63 0.50
16 0.59 0.50
17 0.05 0.50
18 0.05 0.50
19 0.67 0.50
20 0.49 0.50
21 0.25 0.50
22 0.32 0.50
23 0.05 0.50
24 0.93 0.50
FUTURE PHASE FUTURE RESIDENTIAL BLOCK 274
Blk 278
NEWTON AVENUE
FUTURE STM
DAVIS TERRANCE
COOPER GATE
BLOCK 273
PAYNE CIRCLE
ALEXANDER CIRCLE
CARROLL STREET
4.0m WIDE MUNICIPAL EASEMENT
NEW LOT
EX. STMH 13
EX. RYCB-101
RYCBMH-101
RYCBMH-100
14.8-375 ST-0.30%
60.7-375 ST-0.30%
49.0-375 ST-0.30%
30.0-375 ST-0.30%
EX. 82.8-450 ST-0.23%
EX. 20.0-375 ST-0.30%
EX. 90.0-300 ST-0.40%
EX. 12.0-375 ST-0.30%
57.9-600 ST-0.16%
18.3-600 ST-0.16%
37.7-375 ST-0.30%
50.0m-300 STM-0.43%
14.2m-375 STM-0.40%
63.5m-300 STM-0.45%
17.8m-375 STM-0.35%
86.8-300 ST-0.54%
59.0-300 ST-0.54%
46.2-375 ST-0.30%
65.1m-450 STM-0.40%
61.5m-375 STM-0.35%
62.4m-450 STM-0.30%
42.0m-675 STM-0.25%
38.6m-675 STM-0.25%
83.5m-900 STM-0.10%
38.7m-900 STM-0.18%
44.4m-900 STM-0.18%
39.7m-300 STM-0.45%
59.8m-375 STM-0.40%
64.5m-375 STM-0.35%
64.0m-375 STM-0.35%
67.4m-375 STM-0.40%
66.5m-855x1345 HE STM-0.22%
77.5m-450 STM-0.25%

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS		No.	REVISIONS	DATE	CONSULTANT
DESIGN	KAM				
DRAWN BY	IRA				
CHECKED	KAM				
APPROVED	KAM				
DATE	APR. 2022				

CONSULTANT OR DIVISION

MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

STRATHROY-CARADOC

SCALE

SCALE - 1 : 750
7.5m 0 15m

FIELDCREST SUBDIVISION – PHASE 2
FIELDCREST LTD.

STORM AREA PLAN

PROJECT No. 44465-104
SHEET No. 2
PLAN FILE No.

MTE FILE No: -3-SANITARY

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BLOCK 279

BLOCK 278

FUTURE DEVELOPMENT

KEY
3 — AREA NUMBER
0.77 | 42 — AREA (IN ha) / POPULATION
CATCHMENT AREA

LEGEND
46 DENOTES LOT NUMBERS
PHASE LIMIT
110 SANITARY MANHOLE
SANITARY SEWER
EXISTING/FUTURE SANITARY SEWER

WILLIS AVENUE
ABBOTT STREET
QUEEN STREET
ALEXANDER CIRCLE
PAYNE CIRCLE
COOPER GATE
DAVIS TERRANCE
NEWTON AVENUE
CARROLL STREET
EXISTING RESIDENTIAL
NEW LOT
4.0m WIDE MUNICIPAL EASEMENT
BLOCK 269
BLOCK 273
FUTURE RESIDENTIAL
BLOCK 274
Blk 277
Blk 278

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	KAM
DRAWN BY	IRA
CHECKED	KAM
APPROVED	KAM
DATE	APR. 2022

No.	REVISIONS	DATE	CONSULTANT

CONSULTANT OR DIVISION
MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

STRATHROY-CARADOC

SCALE
SCALE - 1 : 750
7.5m 0 15m

FIELDCREST SUBDIVISION – PHASE 2
FIELDCREST LTD.

SANITARY AREA PLAN

PROJECT No. 44465-104
SHEET No. 3
PLAN FILE No.

MTE FILE No: -4A-STORM DE

P:\P\44465\104\PHASE 2\44465-104_PRELIM_12.DWG

STORM SEWER DESIGN SHEET

(TOWNSHIP OF STRATHROY-CARADOC)

DATE : APR 2022
DESIGNED BY : IRA
CHECKED BY : IRA

RUNOFF COEFFICIENT 'C'

PARKS & PLAYGROUNDS		0.20
RESIDENTIAL	SINGLE & DUPLEX	0.35
	ROWHOUSING	0.65
	APARTMENTS	0.65 - 0.70
COMMERCIAL & INDUST.		0.70 - 0.90
DENSELY BUILT, PAVED		0.90

FLOW Q = 2.78 CIA
WHERE Q = PEAK FLOW IN LITRES PER SECOND (l/s)
A = AREA IN HECTARES (ha)
C = RUNOFF COEFFICIENT
i = RAINFALL INTENSITY IN MILLIMETRES PER HOUR (mm/hr.)

I = A/(T+B)^C
WHERE: A= 1137.257
B= 7.184
C= 0.83

Return Period _____5_____ **Years**

LOCATION				AREA (A)			TOTAL A x C						RAINFALL INTENSITY			Q	SEWER DESIGN							PROFILE				
AREA	STREET	FROM	TO	AREA DIM.	DELTA	TOTAL		DELTA	SECTION	LATERAL	SEWER	TOTAL	TIME ENTRY min.		INTENSITY		DIA.	SLOPE		VEL.	CAP.	LENGTH	T of Q	FALL IN		DROP IN	INVERT ELEV.	
No.		M.H.	M.H.	Sq. m	AREA ha	AREA ha	'C'	A x C	A x C	A x C	A x C	2.78 AxC	SECT.	ACCUM.	I'mm/hr.	l/s	mm	%	n	m/s	l/s	m	Min.	SECTION	HEADLOSS	MANHOLE	U.S.	D.S.
22	ALEXANDER CIRCLE	15	16		0.32	0.32	0.5	0.160	0.000		0.160	0.445		10.00	107.33	48	300	0.40	0.013	0.90	63	50.0	0.93	0.215			232.232	232.017
21	ALEXANDER CIRCLE	16	17		0.40	0.72	0.5	0.200	0.160		0.360	1.001	0.93	10.93	102.73	103	375	0.40	0.013	1.00	111	14.2	0.24	0.057		0.075	231.942	231.885
20	ALEXANDER CIRCLE	17	18		0.49	1.21	0.5	0.245	0.360		0.605	1.682	0.24	11.17	100.58	169	450	0.40	0.013	1.14	181	65.1	0.95	0.261		0.075	231.810	231.549
														12.12														
24	ALEXANDER CIRCLE (EXISTING)	EX13	18		0.93	0.93	0.5	0.465			0.465	1.293	0.00	11.43	99.31	128	450	0.25	0.013	0.90	143	77.5	1.44	0.194			231.697	231.503
														12.87														
19	ALEXANDER CIRCLE	19	18		0.67	0.67	0.5	0.335	0.000		0.335	0.931		10.00	107.33	100	375	0.40	0.013	1.00	111	59.8	1.00	0.239			231.863	231.624
														11.00														
18	COOPER GATE	18	20		0.05	2.86	0.5	0.025	0.465	0.940	1.430	3.975		12.08	97.61	388	675	0.25	0.013	1.17	420	42.0	0.60	0.105		0.222	231.327	231.222
17	COOPER GATE	20	21		0.05	2.91	0.5	0.025	1.430		1.455	4.045	0.60	12.68	95.16	385	675	0.25	0.013	1.17	420	38.6	0.55	0.095		0.030	231.192	231.097
15	PAYNE CIRCLE	22	21		0.63	0.63	0.5	0.315	0.000		0.315	0.876		10.00	107.33	94	375	0.35	0.013	0.94	104	61.5	1.09	0.215			231.610	231.395
16	PAYNE CIRCLE	23	21		0.59	0.59	0.5	0.295	0.000		0.295	0.820		10.00	107.33	88	375	0.35	0.013	0.94	104	64.5	1.14	0.226			231.621	231.395
14	COOPER GATE	21	11		0.14	4.27	0.5	0.070	1.455	0.610	2.135	5.935	0.55	13.23	93.03	552	900	0.10	0.013	0.90	572	83.5	1.55	0.083			230.843	230.760
13	PAYNE CIRCLE	12	13		0.37	0.37	0.5	0.185	0.000		0.185	0.514		10.00	107.33	55	300	0.45	0.013	0.92	65	63.5	1.15	0.285			231.863	231.578
12	PAYNE CIRCLE	13	14		0.25	0.62	0.5	0.125	0.185		0.310	0.862	1.15	11.15	101.71	88	375	0.35	0.013	0.94	104	17.8	0.32	0.062		0.075	231.503	231.441
11	PAYNE CIRCLE	14	11		0.40	1.02	0.5	0.200	0.310		0.510	1.418	0.32	11.47	99.31	141	450	0.30	0.013	0.98	156	62.4	1.06	0.187		0.075	231.366	231.179
10	PAYNE CIRCLE	10	11		0.59	0.59	0.5	0.295	0.000		0.295	0.820		10.00	107.33	88	375	0.35	0.013	0.94	104	64.0	1.13	0.224			231.477	231.253
9	DAVIS TERRANCE	11	8		0.05	5.93	0.5	0.025	2.135	0.805	2.965	8.243	1.55	14.78	87.54	722	900	0.18	0.013	1.21	768	38.7	0.53	0.070		0.029	230.731	230.661
8	DAVIS TERRANCE	8	2		0.05	5.98	0.5	0.025	2.965		2.990	8.312	0.53	15.31	86.83	713	900	0.18	0.013	1.21	768	44.4	0.61	0.080		0.050	230.611	230.531
23	DAVIS TERRANCE	24	2		0.05	0.05	0.5	0.025			0.025	0.070		10.00	107.33	8	300	0.45	0.013	0.92	65	39.7	0.72	0.179			231.234	231.055
5	WILLIS AVENUE	1	2		0.63	0.63	0.5	0.315			0.315	0.876		10.00	107.33	94	375	0.40	0.013	1.00	111	67.4	1.12	0.270			231.046	230.776
4	WILLIS AVENUE	2	3		0.50	7.16	0.5	0.250	2.990	0.340	3.580	9.952	0.61	15.92	83.94	835	1050	0.22	0.013	1.48	1281	66.5	0.75	0.146		0.059	230.472	230.326
3	WILLIS AVENUE	3	4		0.42	7.58	0.5	0.210	3.580		3.790	10.536	0.75	16.67	81.75	861	1050	0.22	0.013	1.49	1290	49.0	0.56			0.030	230.290	230.165
7	NEWTON AVENUE (FUTURE)	EX.CAP	4		3.26	3.26	0.5	1.630			1.630	4.531		15.00	86.83	393	675	0.25	0.013	1.17	420	16.0	0.23	0.040			230.340	230.300
2	WILLIS AVENUE	4	5		0.23	11.07	0.5	0.115	3.790	1.630	5.535	15.387	0.56	17.23	80.19	1234	1050	0.25	0.013	1.58	1365	39.0	0.41	0.098		0.030	230.083	229.985
1	WILLIS AVENUE	5	6		0.42	11.49	0.5	0.210	5.535		5.745	15.971	0.41	17.64	79.09	1263	1050	0.25	0.013	1.57	1363	73.8	0.78	0.184		0.030	229.954	229.770
6	NEWTON AVENUE (FUTURE)	EX.CAP	6		2.08	2.08	0.5	1.040			1.040	2.891		13.50	92.02	266	600	0.25	0.013	1.09	307	24.1	0.37	0.060			230.070	230.010
	WILLIS AVENUE	6	POND		0.00	13.57	0.5	0.000	5.745	1.040	6.785	18.862	0.78	18.42	77.08	1454	1050	0.32	0.013	1.78	1545	38.7	0.36	0.124		0.030	229.740	229.616

EXISTING SERVICES	DRAWING & SOURCE	DATE	CONSTRUCTED SERVICES	CONFIRMATION

DETAILS	
DESIGN	KAM
DRAWN BY	IRA
CHECKED	KAM
APPROVED	KAM
DATE	APR. 2022

NO.	REVISIONS	DATE	CONSULTANT

CONSULTANT OR DIVISION
MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

STRATHROY-CARADOC

SCALE

FIELDCREST SUBDIVISION – PHASE 2
FIELDCREST LTD.

STORM DESIGN SHEET

PROJECT No. 44465-104
SHEET No. 4A
PLAN FILE No.

MTE FILE No: -4B-SANITARY

P:\P\44465\104\PHASE 2\44465-104_PRELIM_12.DWG

SANITARY SEWER DESIGN SHEET

(TOWNSHIP OF STRATHROY-CARADOC)

DATE : April 2019
DESIGNED BY : DS
CHECKED BY : DS

RESIDENTIAL POPULATION DENSITIES

THE FOLLOWING POPULATION ALLOWANCES WILL APPLY WHEN DESIGNING SANITARY SEWERS:

(A) HECTARE BASIS

LOW DENSITY (SINGLE FAMILY/SEMI-DETACHED)	= 3 PEOPLE/UNIT
MEDIUM DENSITY (TOWNHOUSES)	= 75 UNITS/HA @ 2.4 PEOPLE/UNIT
HIGH DENSITY (APARTMENTS)	= 150-300 UNITS/HA @ 1.6 PEOPLE/UNIT
COMMERCIAL / INSTITUTIONAL / CHURCH	= 50 PEOPLE/HA PER GROSS AREA = 70 PEOPLE/HA PER NET AREA
INDUSTRIAL	= 11 PEOPLE/HA PER NET AREA
MINIMUM FLOW FOR COMMERCIAL/IDUSTRIAL	22500 L/DAY/GROSS HA
ELEMENTARY SCHOOL	= 600 PEOPLE (AS PER CITY OF LONDON DESIGN GUIDELINES)
SECONDARY SCHOOL	= 1500 PEOPLE (AS PER CITY OF LONDON DESIGN GUIDELINES)

(B) LOT BASIS

SINGLE FAMILY	= 3 PEOPLE
DUPLEX / SEMI	= 6 PEOPLE

DESIGN CRITERIA

SEWAGE = 300 L/DAY/CAP = 0.00347 l/s/person
INFILTRATION = 6740 L/HA/DAY = infilt. of 0.078 l/s/ha
PEAKING FACTOR = HARMON FORMULA $M = (1 + \frac{14}{4 + P^{0.5}}) \times 1.1$

LOCATION				AREA (HECTARES)			POPULATION					SEWAGE FLOW				SEWER DESIGN					PROFILE					
AREA	STREET	FROM	TO	NET OR	DELTA	TOTAL	PER	PER	No. OF	DELTA	TOTAL	M	SEWAGE	INFILT.	TOTAL	DIA.	SLOPE		VELOCITY	CAP.	LENGTH	FALL IN		DROP IN	INVERT ELEV.	
No.		M.H.	M.H.	GROSS	AREA ha	AREA ha	ha	LOT	LOTS	POP.	POP.	Min.2.0	l/s	l/s	l/s	mm	%	n	m / s	l / s	M	SEWER	HEADLOSS	MANHOLE	U.S.	D.S.
	CONNECTION 1 AT WILLIS AVENUE																									
1	WILLIS AVENUE	106	105		0.73	0.73		3	12	36.00	36	4.77	0.60	0.06	**0.66**	200	0.50	0.013	0.74	23.19	70.40	0.352			230.608	230.256
2	WILLIS AVENUE	105	104		0.50	1.23		3	9	27.00	63	4.72	1.03	0.10	**1.13**	200	0.35	0.013	0.62	19.38	63.00	0.220		0.050	230.206	229.986
3	WILLIS AVENUE	104	103		0.73	1.96		3	12	36.00	99	4.66	1.60	0.15	**1.75**	200	0.35	0.013	0.62	19.40	46.10	0.161	0.050	0.050	229.936	229.775
8	EASEMENT	SUN. STUB	103		3.14	3.14		3	60	180.00	180	4.58	2.86	0.24	**3.10**	200	0.35	0.013	0.62	19.40	18.50	0.065			229.840	229.775
4	WILLIS AVENUE	103	102		0.28	5.38		3	5	15.00	294	4.49	4.58	0.42	**5.00**	300	0.20	0.013	0.61	43.25	42.80	0.086	0.080	0.100	229.675	229.589
5	WILLIS AVENUE	102	101		0.37	5.75		3	5	15.00	309	4.48	4.80	0.45	**5.25**	300	0.20	0.013	0.61	43.25	71.30	0.143	0.050	0.050	229.539	229.396
7	EASEMENT	SUN. STUB	101		2.69	2.69				300.00	300	4.49	4.68	0.21	**4.89**	200	0.35	0.013	0.62	19.40	19.20	0.067			229.513	229.446
6	WILLIS AVENUE	101	EX.CAP		0.28	8.72		3	5	15.00	624	4.31	9.34	0.68	**10.02**	300	0.20	0.013	0.61	43.25	40.50	0.081	0.050	0.100	229.346	229.265
	CONNECTION 2 AT ABBOTT STREET																									
9	PAYNE CIRCLE	111	112		0.72	0.72		3	11	33.00	33	4.79	0.55	0.06	**0.61**	200	0.50	0.013	0.74	23.19	72.00	0.360			230.671	230.311
10	PAYNE CIRCLE	112	113		0.40	1.12		3	8	24.00	57	4.73	0.94	0.09	**1.03**	200	0.50	0.013	0.74	23.19	58.10	0.291		0.050	230.261	229.970
11	PAYNE CIRCLE	113	114		0.25	1.37		3	4	12.00	69	4.71	1.13	0.11	**1.24**	200	0.50	0.013	0.74	23.15	15.30	0.076	0.050	0.050	229.920	229.844
14	PAYNE CIRCLE	114	108		0.47	1.84		3	16	48.00	117	4.64	1.89	0.14	**2.03**	200	0.50	0.013	0.74	23.19	66.70	0.334	0.050	0.050	229.794	229.460
12	PAYNE CIRCLE	110	109		0.73	0.73		3	11	33.00	33	4.79	0.55	0.06	**0.61**	200	0.80	0.013	0.93	29.34	73.00	0.584			230.774	230.190
13	PAYNE CIRCLE	109	108		0.50	1.23		3	10	30.00	63	4.72	1.03	0.10	**1.13**	200	0.80	0.013	0.93	29.34	67.40	0.539		0.191	229.999	229.460
	EASEMENT	108	107		0.00	3.07		3	0	0.00	180	4.58	2.86	0.24	**3.10**	200	0.35	0.013	0.62	19.40	42.30	0.148	0.050	0.474	228.986	228.838
	EASEMENT	107	EX.CAP		0.00	0.00		3	0	0.00	180	4.58	2.86	0.00	**2.86**	250	0.25	0.013	0.61	29.73	43.00	0.108	0.030	0.050	228.788	228.680
	CONNECTION 3 AT ALEXANDER CIRCLE																									
15	ALEXANDER CIRCLE	115	116		0.72	0.72		3	11	33.00	33	4.79	0.55	0.06	**0.61**	200	0.50	0.013	0.74	23.19	62.60	0.313			230.359	230.046
16	ALEXANDER CIRCLE	116	117		0.54	1.26		3	8	24.00	57	4.73	0.94	0.10	**1.04**	200	0.50	0.013	0.74	23.19	60.50	0.303		0.050	229.996	229.693
17	ALEXANDER CIRCLE	117	118		0.25	1.51		3	4	12.00	69	4.71	1.13	0.12	**1.25**	200	0.50	0.013	0.74	23.19	16.70	0.084	0.050	0.050	229.643	229.559
18	ALEXANDER CIRCLE	118	EX.CAP		0.32	1.83		3	16	48.00	117	4.64	1.89	0.14	**2.03**	200	0.50	0.013	0.74	23.19	53.00	0.265	0.050	0.050	229.509	229.244

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION	DETAILS	No.	REVISIONS	DATE	CONSULTANT
					DESIGN KAM				
					DRAWN BY IRA				
					CHECKED KAM				
					APPROVED KAM				
					DATE APR. 2022				

CONSULTANT OR DIVISION

MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

STRATHROY-CARADOC

SCALE

FIELDCREST SUBDIVISION – PHASE 2
FIELDCREST LTD.

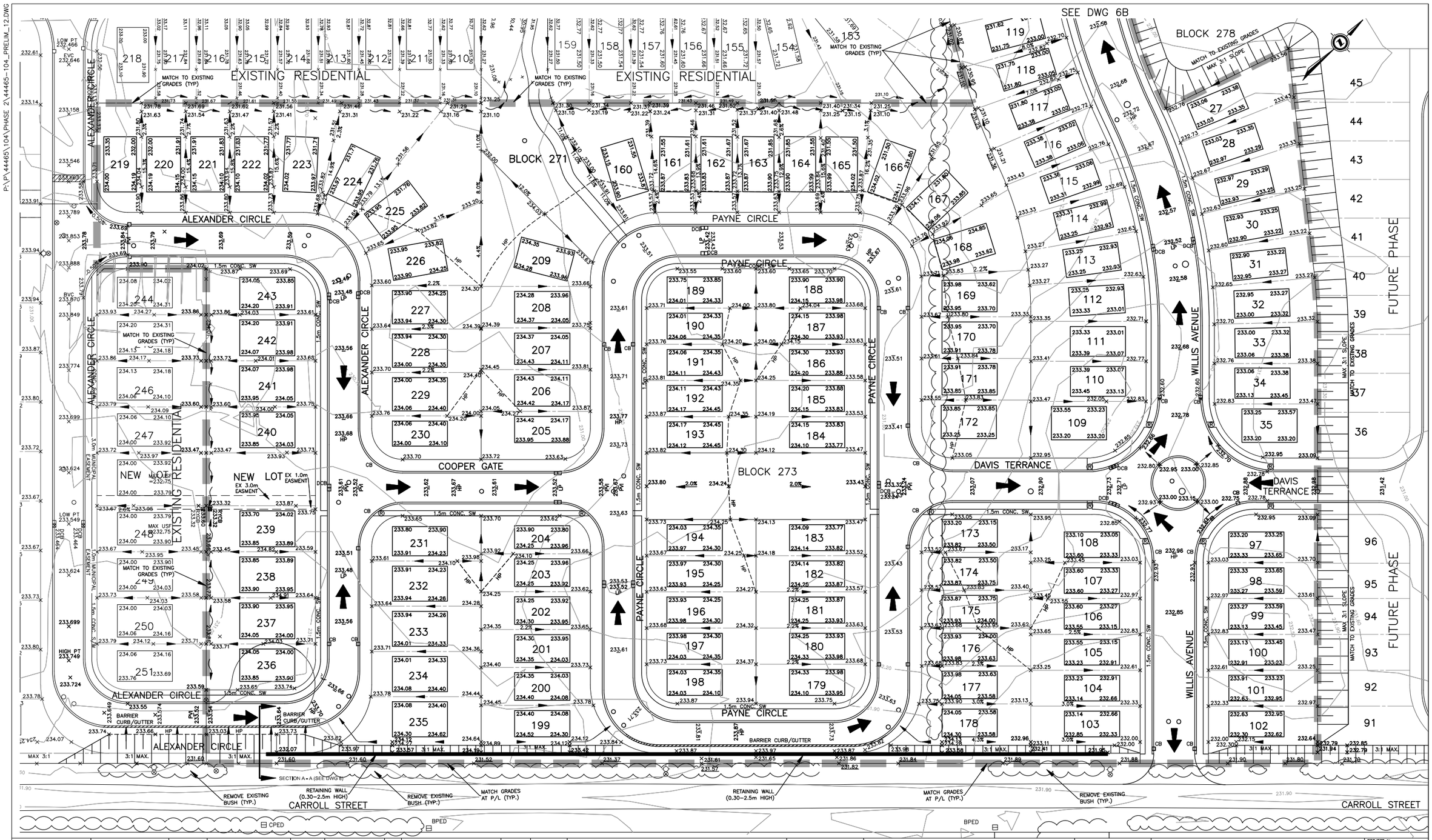
SANITARY DESIGN SHEET

PROJECT No. 44465-104
SHEET No. 4B
PLAN FILE No.

-6A- GRADING

MTE FILE No:

P:\P\44465\104\PHASE 2\44465-104_PRELIM_12.DWG



EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION	DETAILS	No.	REVISIONS	DATE	CONSULTANT
					DESIGN KAM				
					DRAWN BY IRA				
					CHECKED KAM				
					APPROVED KAM				
					DATE APR. 2022				

CONSULTANT OR DIVISION

MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

STRATHROY-CARADOC

SCALE

SCALE - 1 : 500
5m 0 10m

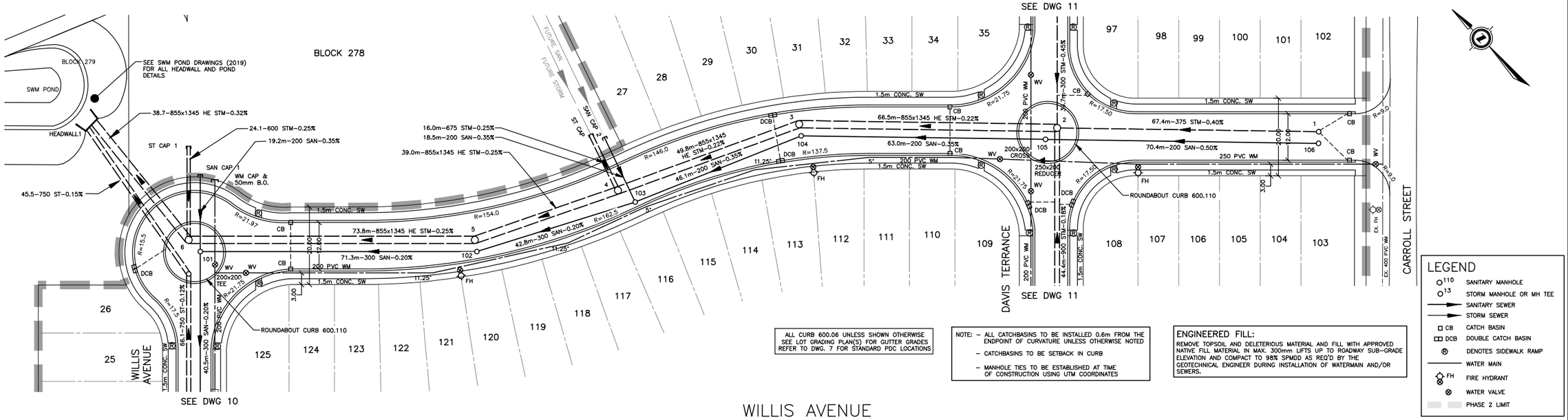
FIELDCREST SUBDIVISION - PHASE 2
FIELDCREST LTD.

GRADING PLAN

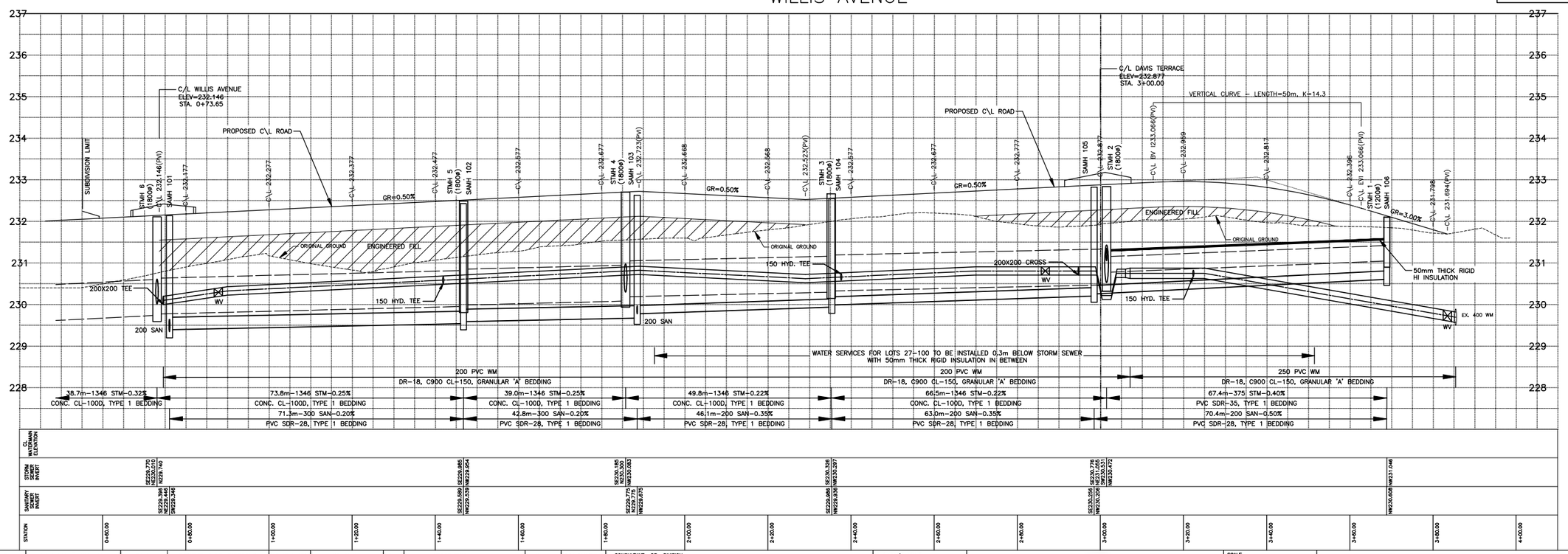
PROJECT No. 44465-104

SHEET No. 6A

PLAN FILE No.



WILLIS AVENUE



EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	KAM
DRAWN BY	IRA
CHECKED	KAM
APPROVED	KAM
DATE	APR. 2022

No.	REVISIONS	DATE	CONSULTANT

CONSULTANT OR DIVISION
MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

STRATHROY-CARADOC

SCALE
SCALE – 1 : 500
5m 0 10m

FIELDCREST SUBDIVISION – PHASE 2
FIELDCREST LTD.

WILLIS AVENUE

PROJECT No. 44465-104
SHEET No. 9
PLAN FILE No.

This record document has been prepared in part based upon information furnished by others. Strik, Baldinelli, Moniz Ltd. (SBM) cannot assure the accuracy of others' information and thus is not responsible for the accuracy of this record document or for an error or omission that may have been incorporated into it as a result. Those relying on this record document are advised to obtain independent verification of its accuracy before applying it for any purpose.

RECORD DRAWING

AS CONSTRUCTED SERVICES	COMPLETION		No.	REVISIONS	D/M/Y	BY
		DESIGN EMB/KAM	12	MINOR REVISIONS FOR PHASE 3A/3B	09/01/18	EMB
		DRAWN EMB	13	PHASE 3 ISSUED FOR CONST COSTING	17/01/18	EMB
		CHECKED KAM	14	REVISED TO REMOVE GATEWAYS	29/03/18	EMB
		APPROVED –	15	REVISED FOR WEST LEG HARDY DRIVE	11/05/18	EMB
		DATE SEPTEMBER 2013	16	REVISED FOR AS BUILT CURBS, PH3A	03/07/18	EMB
			17	REVISE FOR GRADING AT LOT 9/10 PH2	31/07/18	EMB
		CAD KAM-12-060	18	ISSUED FOR SITE INSTRUCTION #3	21/11/18	KAM
			19	STORM OVERFLOW FOR CLIENT REVIEW	18/10/19	BH
			20	PHASE 1 & 2 AS-BUILT	17/01/20	JSF

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LICENSED PROFESSIONAL ENGINEER — B. R. HYLAND 100223591 — Jan 17, 2020 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — K. A. MONIZ 100124684 — Jan. 16/20 — PROVINCE OF ONTARIO

CLIENT SOUTHGROVE MEADOWS INC.
131 HARRIS ROAD
DELAWARE, ONTARIO, N0L 1E0
P: 519 868-2440 E: emilpattyn@gmail.com

SCALE — SCALE – 1 : 1000 (10.0 0 20.0m)

TITLE: SOUTHGROVE MEADOWS SUBDIVISION
STRATHROY, ON

PHASING PLAN

PROJECT No. KAM-12-060
SHEET No. 1C
PLAN FILE No. –

K:\2012 Projects\KAM-12-060 South Grove Meadows - South Grove Meadows Subdivision\KAM CAD Files\KAM-12-060 Southgrove Meadows 2020-01-16.dwg

AS CONSTRUCTED SERVICES	COMPLETION		No.	REVISIONS	D/M/Y	BY
		DESIGN EMB/KAM	12	MINOR REVISIONS FOR PHASE 3A/3B	09/01/18	EMB
		DRAWN EMB	13	PHASE 3 ISSUED FOR CONST COSTING	17/01/18	EMB
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		DATE SEPTEMBER 2013	16	REVISED FOR AS BUILT CURBS, PH3A	03/07/18	EMB
			17	REVISE FOR GRADING AT LOT 9/10 PH2	31/07/18	EMB
		CAD KAM–12–060	18	ISSUED FOR SITE INSTRUCTION #3	21/11/18	KAM
			19	STORM OVERFLOW FOR CLIENT REVIEW	18/10/19	BH
			20	PHASE 1 & 2 AS–BUILT	17/01/20	JSF

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LICENSED PROFESSIONAL ENGINEER B. R. HYLAND 100223591 Jan 17, 2020 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER K. A. MONIZ 100124884 Jan. 16/20 PROVINCE OF ONTARIO

CLIENT
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P: 519 868-2440 E: emilpattyn@gmail.com

SCALE
HORIZONTAL – 1 : 500
5.0 0 10.0m
VERTICAL – 1 : 50
0.50 0 1.0m

TITLE
SOUTHGROVE MEADOWS SUBDIVISION
STRATHROY, ON

PLAN/PROFILE SAXTON ROAD

FROM CARROLL ST EAST TO 360m SOUTH OF CARROLL ST EAST

PROJECT No. KAM–12–060
SHEET No. 14
PLAN FILE No. –

K:\2012 Projects\KAM-12-060 South Grove Meadows - South Grove Meadows Subdivision\KAM CAD Files\KAM-12-060 Southgrove Meadows 2020-01-16.dwg

SEE SHEET No. 24

SEE SHEET No. 16

SEE SHEET No. 14

ELWOOD ST

COLLINS WAY

SAXTON ROAD

CONSTRUCTION NORTH

TRUE NORTH

THE CONTRACTOR SHALL SUPPORT ALL UTILITY CROSSINGS DURING INSTALLATION OF THE NEW SANITARY SEWER.

RESTORATION WITHIN LIMITS OF CONSTRUCTION SHALL BE AS PER NOTE 13 ON SHEET No. 1A.

EXISTING MAILBOXES TO BE TEMPORARILY RELOCATED AND REINSTALLED AFTER CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE WITH CANADA POST FOR LOCATIONS/HEIGHTS/OFFSETS, ETC.

PROP HYD

END OF CONC C&G

NEW EDGE OF ASPHALT CUT BACK DWY'S

SOUTH LIMITS OF SUBDIVISION

END OF CONC S/W

1.5 CONC S/W

MATCH EX ASPHALT / FUTURE CONC C&G (BY OTHERS)

SAWCUT EX ASPHALT

RELOCATE ALL MAIL BOXES, ETC

MATCH EXISTING ASPHALT & END OF NEW C&G

DRIVEWAY SLOPE 1% ±

DRIVEWAY SLOPE 1.6% ±

SITE BENCHMARK #1 TOP SPINDLE FIRE HYDRANT ELEV 235.32

SITE BENCHMARK #2 TOP SPINDLE FIRE HYDRANT ELEV 234.88

DRIVEWAY SLOPE 5.8% ±

DRIVEWAY SLOPE 7.6% ±

DRIVEWAY SLOPE 3.8% ± / 7.3% ±

PROVIDE DROPPED CURB AT EXISTING ENTRANCES–TYPICAL.

NEW 250x250x200 TEE

DRIVEWAY SLOPE 5.1% ±

INSTALL NEW 250 WV & BOX AS PART OF PHASE 3 WORKS

DRIVEWAY SLOPE 7.9% ±

DRIVEWAY SLOPE 3.8% ±

DRIVEWAY SLOPE 6.1% ±

NEW 250x250x250 TEE

SANITARY PDC – 100ø @ 2.0% MINIMUM, TYPICAL FOR ALL. REFER TO SERVICE SPECIFICATIONS ON SHEET 1B.

BLOCK 201 (ROAD WIDENING DEDICATED TO MUNICIPALITY AS PUBLIC HIGHWAY)

NOTE: FOR PROPOSED 1.5m CONCRETE SIDEWALK AT STANDARD 1.0m OFFSET FROM PROPERTY LINES, HYDRO POLES WILL BE REQUIRED TO BE RELOCATED.

* ACTUAL HYDRO POLE DIAMETER 305mm (12") AND WILL BE 870 CLEAR TO BACK OF CURB

NOTE: AS OF JANUARY 17, 2020, THE PROPOSED SURFACE ROAD IMPORVEMENTS HAVE NOT BEEN IMPLEMENTED. THIS RECORD DRAWING IS ONLY FOR SANITARY SEWER.

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RECORD DRAWING

CREST CURVE DATA
DESIGN SPEED = 60 km/hr
K = 15
ΔG = 1.73
L = 1.73 x 15 = 25.95m
USE L = 45.0m
d = 1.73 x 45 / 800 = 0.097
VPI CREST ELEV=233.599–0.097=233.502
BVC ELEV=233.294/BVC STA=0+347.5
VPI ELEV=233.502/VPI STA=0+370
EVC ELEV=233.044/EVC STA=0+392.5

SAG CURVE DATA
DESIGN SPEED = 60 km/hr
K = 18
ΔG = 1.73
L = 1.73x 18 = 31.14m
USE L = 45.0m
d = 1.73 x 45 / 800 = 0.097
VPI SAG ELEV=232.942+0.097=233.039
BVC ELEV=233.106/BVC STA=0+437.5
VPI ELEV=233.039/VPI STA=0+460
EVC ELEV=233.167/EVC STA=0+482.5

CREST CURVE DATA
DESIGN SPEED = 60 km/hr
K = 15
ΔG = 1.5
L = 1.5 x 15 = 22.5m
USE L = 30.0m
d = 1.5 x 30 / 800 = 0.056
VPI CREST ELEV=233.213–0.056=233.157
BVC ELEV=233.083/BVC STA=0+472.1
VPI ELEV=233.157/VPI STA=0+487.1
EVC ELEV=233.138/EVC STA=0+502.1

SAG CURVE DATA
DESIGN SPEED = 50 km/hr
K = 18
ΔG = 2.27
L = 2.27 x 18 = 40.86m
USE L = 45.0m
d = 2.27 x 45 / 800 = 0.128
VPI SAG ELEV=232.976+0.128=233.104
BVC ELEV=233.088/BVC STA=0+511.98
VPI ELEV=233.104/VPI STA=0+534.5
EVC ELEV=233.375/EVC STA=0+556.98

CREST CURVE DATA
DESIGN SPEED = 50 km/hr
K = 15
ΔG = 2.27
L = 2.27 x 15 = 34.05m
USE L = 45.0m
d = 2.27 x 45 / 800 = 0.128
VPI CREST ELEV=234.840–0.128=234.712
BVC ELEV=234.441/BVC STA=0+617
VPI ELEV=234.712/VPI STA=0+639.5
EVC ELEV=234.727/EVC STA=0+662

PROP 250 WV (@ P/L) /w VALVE BOX TO GRADE

PROP 250 WM CONNECTION (250x250x250 TEE)

PROP 250 WV & BOX

PROP 200 WV (@ P/L) /w VALVE BOX TO GRADE

PROP 200 WM CONNECTION (250x250x200 TEE)

PROP 200 SA

PROP 250 WV

CONTRACTOR TO COORDINATE WITH MUNICIPALITY'S WATER DIVISION REGARDING TIMING OF CONNECTION AND EXISTING WATERMAIN SHUTDOWN

INFILTRATION TRENCH SEE DETAIL 'B' ON SHEET No. 6
NOTE: CLEAN OUT CAPS BEHIND CURB LINE SHALL BE CAST IRON MEETING H20 LOADING STANDARDS, MODEL VB–S006L, PROVIDED BY EMCO WATERWORKS.

INTERPOLATED STABILIZED GROUNDWATER ELEVATION

EX ℄ PROFILE OF SAXTON ROAD

EX PROFILE OVER PROPOSED SA SEWER

EX 250 DI WM

SILTY SAND: brown, distant silt layering, compact, moist.

BECOMING COMPACT, TRACE CLAY, DILATANT SILT LAYERING BELOW 1.5m DEPTH

BECOMING VERY DENSE AT 4.0m DEPTH

SILTY SAND: brown, weathered, loose, moist.

ASPHALT / GRANULAR / TOPSOIL

END OF BH #3 6.6m BGS

END OF BH #4 6.6m BGS

90.0–375 SA–0.11%
SDR35–BEDDING AS PER SCSD–11

84.2–375 SA–0.15%
SDR35–BEDDING AS PER SCSD–11

84.2–375 SA–0.11%
SDR35–BEDDING AS PER SCSD–11

34.0–200 SA–0.74%
SDR35–BEDDING AS PER SCSD–11

C/L WATERMAIN ELEVATION: 231.505 | 233.152

STORM SEWER INVERT

SANITARY SEWER INVERT: 229.475N 229.360S | 229.680N 229.566E 229.635S | 229.760N 229.760S | 229.885N 230.074E 230.140S | 230.391N

STATION: 0+375 | 0+390 | 0+405 | 0+420 | 0+435 | 0+450 | 0+465 | 0+480 | 0+495 | 0+510 | 0+525 | 0+540 | 0+555 | 0+570 | 0+585 | 0+600 | 0+615 | 0+630

AS CONSTRUCTED SERVICES	COMPLETION

DESIGN EMB/KAM
DRAWN EMB
CHECKED KAM
APPROVED –
DATE SEPTEMBER 2013
CAD KAM–12–060

No.	REVISIONS	D/M/Y	BY
12	MINOR REVISIONS FOR PHASE 3A/3B	09/01/18	EMB
13	PHASE 3 ISSUED FOR CONST COSTING	17/01/18	EMB
14	REVISED TO REMOVE GATEWAYS	29/03/18	EMB
15	REVISED FOR WEST LEG HARDY DRIVE	11/05/18	EMB
16	REVISED FOR AS BUILT CURBS, PH3A	03/07/18	EMB
17	REVISE FOR GRADING AT LOT 9/10 PH2	31/07/18	EMB
18	ISSUED FOR SITE INSTRUCTION #3	21/11/18	KAM
19	STORM OVERFLOW FOR CLIENT REVIEW	18/10/19	BH
20	PHASE 1 & 2 AS–BUILT	17/01/20	JSF

CONSULTANT

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LICENSED PROFESSIONAL ENGINEER B. R. HYLAND 100223591 Jan 17, 2020 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER K. A. MONIZ 100124884 Jan. 16/20 PROVINCE OF ONTARIO

CLIENT
SOUTHGROVE MEADOWS INC.
131 HARRIS ROAD
DELAWARE, ONTARIO, N0L 1E0
P: 519 868-2440 E: emilpattyn@gmail.com

SCALE
HORIZONTAL – 1 : 500
5.0 0 10.0m
VERTICAL – 1 : 50
0.5 0 1.0m

TITLE
SOUTHGROVE MEADOWS SUBDIVISION
STRATHROY, ON

PLAN/PROFILE SAXTON ROAD
FROM 360m SOUTH OF CARROLL ST EAST
TO 690m SOUTH OF CARROLL ST EAST

PROJECT No. KAM–12–060
SHEET No. 15
PLAN FILE No. –

K:\2012 Projects\KAM-12-060 South Grove Meadows - South Grove Meadows Subdivision\KAM CAD Files\KAM-12-060 Southgrove Meadows 2020-01-16.dwg

SEE SHEET No. 15

SAXTON ROAD

ELLIOT STREET

SEE SHEET No. 20

100ø SANITARY PDC @ 2% MIN. SEE SHEET No. 18 FOR SERVICE MATERIALS & NOTES

COORDINATE ALL TRANSFORMER LOCATIONS WITH HYDRO ONE

LIMIT OF S/W FOR PHASE 1, PROVIDE DEAD END BARRICADE (OPSD 912.532) WITH DEAD END SIGN.

LIMIT OF ASPHALT FOR PHASE 1 PROVIDE DEAD END BARRICADE (OPSD 912.532) WITH DEAD END SIGN.

LIMIT OF S/W FOR PHASE 1. WHEN SIDEWALK EXTENDED, PLACE DEAD END BARRICADE (OPSD 912.532) WITH DEAD END SIGN AT LIMITS OF PHASE 2.

TRUE NORTH

CONSTRUCTION NORTH

1.5m CONC S/W

U/G HYDRO

250 WV

250 SVWM, C900, CL150, DR18

250 PVC WM, C900, CL150, DR18

250x250x250 TEE

250x200x250 TEE

250x150x250 TEE

HYD c/w 150 LEAD & WV TYPICAL AS SHOWN

25 WS S/w CURB STOP AT THE C/L OF THE LOT, AT 0.3m FROM P/L IN THE ROW. SEE SHEET No. 1 FOR SERVICE MATERIALS & NOTES

LIGHT STANDARD (BY OTHERS) COORDINATE INSTALLATION WITH TRANSFORMER AND FIRE HYDRANT INSTALLATIONS.

CLEAN OUT (CO)

BLOCK 202 (34) (ROAD WIDENING DEDICATED TO MUNICIPALITY AS PUBLIC HIGHWAY)

EX HYD

CB63 T/G 233.80

CB64 T/G 233.14

COLLINS WAY

RECORD DRAWING

CREST CURVE DATA
DESIGN SPEED = 50 km/hr
K = 15
ΔG = 1.70
L = 1.70 x 15 = 25.5m
USE L = 50.0m
d = 1.70 x 50 / 800 = 0.106
VPI CREST ELEV=235.496-0.106=235.390
BVC ELEV=235.371/BVC STA=1+112.51
VPI ELEV=235.390/VPI STA=1+137.51
EVC ELEV=235.196/EVC STA=1+162.51

SAG CURVE DATA
DESIGN SPEED = 50 km/hr
K = 18
ΔG = 1.70
L = 1.70 x 18 = 30.6m
USE L = 50.0m
d = 1.70 x 50 / 800 = 0.106
VPI CREST ELEV=233.992+0.106=234.098
BVC ELEV=234.371/BVC STA=1+230
VPI ELEV=234.387/VPI STA=1+230.22
EVC ELEV=234.117/EVC STA=1+280.22

PROP. ℄ PROFILE OF COLLINS WAY

EX ℄ PROFILE OF COLLINS WAY

150 LATERAL AND STEM TO GRADE FOR HYDRANT

ROUGH GRADE TO MATCH EXISTING GROUND (PH 1)

LIMITS OF ASPHALT, CONC ⓒ&G AND S/W FOR PHASE 1
LIMITS OF SILT FENCING FOR PHASE 1

INFILTRATION TRENCH SEE DETAIL 'D' ON SHEET No. 6
NOTE: CLEAN OUT CAPS BEHIND CURB LINE SHALL BE CAST IRON MEETING H20 LOADING STANDARDS, MODEL VB-SC06L, PROVIDED BY EMCO WATERWORKS.

INFILTRATION TRENCH SEE DETAIL 'C' ON SHEET No. 6
NOTE: CLEAN OUT CAPS BEHIND CURB LINE SHALL BE CAST IRON MEETING H20 LOADING STANDARDS, MODEL VB-SC06L, PROVIDED BY EMCO WATERWORKS.

SAFETY PLATFORM 250 WV OPSD 404.020 ELEV. 232.475

SAFETY PLATFORM OPSD 404.020 ELEV. 232.776

INTERPOLATED STABILIZED GROUNDWATER ELEVATION

ENGINEERED FILL AS PER GEOTECHNICAL REPORT

200 SA TO BE INSTALLED 3.0m PAST PHASE 1 LIMIT ASPHALT

FOR CONTINUATION OF SERVICES, CORE INTO EXISTING SANITARY MANHOLE

CAP WM FOR LIMITS OF PHASE 1 USF 32.41
CAP TO BE REMOVED FOR PHASE 2 WORK
STA. 1+315; ℄/L 232.358; INV. 232.233

12.80–250 WM @ 2% PVC C900 CL150 DR18 BEDDING AS PER W–20

116.2–250 WM @ 0.53% PVC C900 CL150 DR18 BEDDING AS PER W–20

115.0–250 WM @ 1.32% PVC C900 CL150 DR18 BEDDING AS PER W–20

63.9–250 WM @ 0.11% PVC C900 CL150 DR18 BEDDING AS PER W–20

6.3–200 WM @ 0.75% PVC C900 CL150 DR18 BEDDING AS PER W–20

192.0–250 WM @ 0.53% PVC C900 CL150 DR18 BEDDING AS PER W–20

4.5–200 WM @ 0.50% CLEAN OUT CAPS BEHIND CURB LINE SHALL BE CAST IRON MEETING H20 LOADING STANDARDS, MODEL VB-SC06L, PROVIDED BY EMCO WATERWORKS.

72.4–200 SA–0.37% SDR35–BEDDING AS PER SCSD–11

82.0–200 SA–0.38% SDR35–BEDDING AS PER SCSD–11

65.0–200 SA–0.42% SDR35–BEDDING AS PER SCSD–11

74.0–200 SA–0.35% SDR35–BEDDING AS PER SCSD–11

62.9–200 SA–0.41% SDR35–BEDDING AS PER SCSD–11

62.9–200 SA–0 SDR35–BEDDING

C/L WATERMAIN ELEVATION	233.150 / 233.150 / 232.928 / 233.794 / 232.275 / 232.346 / 232.356 / 232.358
STORM SEWER INVERT	
SANITARY SEWER INVERT	229.985N 230.145S 230.030E / 230.300W 230.330E / 230.640W 230.670E / 230.940W 230.970E / 231.230W 231.430N 231.260E / 231.517W 231.542E
STATION	1+000 1+015 1+030 1+045 1+060 1+075 1+090 1+105 1+120 1+135 1+150 1+165 1+180 1+195 1+210 1+225 1+240 1+255 1+270 1+285 1+300 1+315 1+330 1+345 1+360 1+375 1+390

237

AS CONSTRUCTED SERVICES	COMPLETION			No.	REVISIONS	D/M/Y	BY
		DESIGN	EMB/KAM	12	MINOR REVISIONS FOR PHASE 3A/3B	09/01/18	EMB
		DRAWN	EMB	13	PHASE 3 ISSUED FOR CONST COSTING	17/01/18	EMB
		CHECKED	KAM	14	REVISED TO REMOVE GATEWAYS	29/03/18	EMB
		APPROVED	–	15	REVISED FOR WEST LEG HARDY DRIVE	11/05/18	EMB
		DATE	SEPTEMBER 2013	16	REVISED FOR AS BUILT CURBS, PH3A	03/07/18	EMB
				17	REVISE FOR GRADING AT LOT 9/10 PH2	31/07/18	EMB
		CAD	KAM–12–060	18	ISSUED FOR SITE INSTRUCTION #3	21/11/18	KAM
				19	STORM OVERFLOW FOR CLIENT REVIEW	18/10/19	BH
				20	PHASE 1 & 2 AS–BUILT	17/01/20	JSF

CONSULTANT

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LICENSED PROFESSIONAL ENGINEER B. R. HYLAND 100223591 Jan 17, 2020 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER K. A. MONIZ 100124684 Jan. 16/20 PROVINCE OF ONTARIO

CLIENT
SOUTHGROVE MEADOWS INC.
131 HARRIS ROAD
DELAWARE, ONTARIO, N0L 1E0
P: 519 868-2440 E: emilpattyn@gmail.com

SCALE
HORIZONTAL – 1 : 500
5.0 0 10.0m
VERTICAL – 1 : 50
0.5 0 1.0m

TITLE
SOUTHGROVE MEADOWS SUBDIVISION
STRATHROY, ON
PLAN/PROFILE COLLINS WAY
FROM SAXTON ROAD EAST 375m

PROJECT No. KAM–12–060
SHEET No. 16
PLAN FILE No. –

This record document has been prepared in part based upon information furnished by others. Strik, Baldinelli, Moniz Ltd. (SBM) cannot assure the accuracy of others' information and thus is not responsible for the accuracy of this record document or for an error or omission that may have been incorporated into it as a result. Those relying on this record document are advised to obtain independent verification of its accuracy before applying it for any purpose.

RECORD DRAWING

AS CONSTRUCTED SERVICES	COMPLETION		No.	REVISIONS	D/M/Y	BY
		DESIGN EMB/KAM	12	MINOR REVISIONS FOR PHASE 3A/3B	09/01/18	EMB
		DRAWN EMB	13	PHASE 3 ISSUED FOR CONST COSTING	17/01/18	EMB
		CHECKED KAM	14	REVISED TO REMOVE GATEWAYS	29/03/18	EMB
		APPROVED –	15	REVISED FOR WEST LEG HARDY DRIVE	11/05/18	EMB
		DATE SEPTEMBER 2013	16	REVISED FOR AS BUILT CURBS, PH3A	03/07/18	EMB
			17	REVISE FOR GRADING AT LOT 9/10 PH2	31/07/18	EMB
		CAD KAM–12–060	18	ISSUED FOR SITE INSTRUCTION #3	21/11/18	KAM
			19	STORM OVERFLOW FOR CLIENT REVIEW	18/10/19	BH
			20	PHASE 1 & 2 AS–BUILT	17/01/20	JSF

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LICENSED PROFESSIONAL ENGINEER B. R. HYLAND 100223591 Jan 17, 2020 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER K. A. MONIZ 100124664 Jan. 16/20 PROVINCE OF ONTARIO

CLIENT
SOUTHGROVE MEADOWS INC.
131 HARRIS ROAD
DELAWARE, ONTARIO, N0L 1E0
P: 519 868-2440 E: emilpattyn@gmail.com

SCALE
HORIZONTAL – 1 : 500 (5.0 0 10.0m)
VERTICAL – 1 : 50 (0.5 0 1.0m)

TITLE
SOUTHGROVE MEADOWS SUBDIVISION
STRATHROY, ON

PLAN/PROFILE COLLINS WAY
FROM 375m NORTH OF SAXTON RD TO 495m NORTH OF SAXTON RD TO COLLINS WAY

PLAN/PROFILE COLLINS WAY
FROM COLLINS WAY NORTH 225m TO COLLINS WAY

PROJECT No. KAM–12–060
SHEET No. 17
PLAN FILE No. –

EXT = EXTERNAL AREA
SUB = SUBDIVISION

SA4 — AREA IDENTIFIER
0.10 — AREA IN HECTARES
30 — TOTAL POPULATION

SANITARY CATCHMENT AREA MARKER

AS CONSTRUCTED SERVICES	COMPLETION

DESIGN EMB/KAM
DRAWN EMB
CHECKED KAM
APPROVED –
DATE SEPTEMBER 2013
CAD KAM–12–060

No.	REVISIONS	D/M/Y	BY
1	ISSUED FOR CLIENT REVIEW	15/08/14	KAM
2	ISSUED TO MUNICIPALITY FOR REVIEW	25/09/14	KAM
3	ISSUED FOR MOECC ECA	07/07/15	KAM
4	REVISED FOR MUNICIPALITY COMMENTS	14/07/15	KAM
5	ISSUED FOR HYDRO ONE DESIGN	06/08/15	KAM
6	ISSUED FOR CONSTRUCTION–SAXTON RD	01/12/15	KAM
7	REVISED FOR INFILTRATION UPDATES	21/01/16	KAM
8	MINOR SOUTH P/L GRADING	06/06/16	KAM

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ENGINEER'S STAMP

ENGINEER'S STAMP

CLIENT
SOUTHGROVE MEADOWS INC.
131 HARRIS ROAD
DELAWARE, ONTARIO, N0L 1E0
P: 519 868-2440 E: emilpattyn@gmail.com

SCALE
SCALE – 1 : 1000
10,0 0 20,0m

TITLE
SOUTHGROVE MEADOWS SUBDIVISION
STRATHROY, ON

EXTERNAL SANITARY SEWER DRAINAGE AREAS

PROJECT No. KAM–12–060
SHEET No. 8
PLAN FILE No. –

K:\2012 Projects\KAM-12-060 South Grove Meadows Subdivision\KAM CAD Files\KAM-12-060_Southgrove Meadows Inc_16-04-04.dwg

SANITARY SEWER DESIGN SHEET

Job No.: KAM-12-060 SOUTHGROVE MEADOWS INC.

q = average daily per capita flow in L/cap. day: 365
i = unit of peak extraneous flow in m³/ha. day: 6.74

Harmon Formula
M = 1 + 14/(4+P^0.5)

Designed By: EMB Date: Sept 04 2014
Revised By: DS Date: Jan 15 2015
Updated By: EMB Date: Jul 14 2015

M = peaking factor (Harmon formula)
Q(p) = peak population flow (L/s)
Q(i) = peak extraneous flow (L/s)
Q(d) = peak design flow

where P = population in 1000's
Q(p) = PqM/86.4 (L/s)
Q(i) = iA (L/s) where A = area in hectares
Q(d) = Q(p) + Q(i) (L/s)

n = 0.013

Subdivision based on Low Density: 3 people/lot
Condo Lots based on High Density: 150 units/ha (Zoning: R-2 & R-3)

LOCATION				INDIVIDUAL		CUMULATIVE		Peaking factor	Peak Pop. flow	Peak extraneous flow	Peak design flow	SEWER DATA							
Area No.	STREET	FROM U/S MH	TO D/S MH	Pop.	Area A (Ha)	Pop.	Area A (Ha)	M	Q(p) (L/s)	Q(i) (L/s)	Q(d) (L/s)	Dia. (mm)	Slope (%)	Capacity (L/s)	Full flow velocity (m/s)	Length (m)	U/S Elev.	D/S Elev.	Remarks
HDR2	FUTURE DRIVE	–	CAP	168	1.12	168	1.12	4.17	2.96	0.09	3.05								
	FUTURE DRIVE	CAP	S22		0.03	168	1.15	4.17	2.96	0.09	3.05	200	0.40%	20.76	0.66	12.7	232.429	232.378	
SA17	COLLINS WAY	S20	S21	24	0.62	24	0.62	4.37	0.44	0.05	0.49	200	0.60%	25.42	0.81	72.4	232.956	232.521	
ROW	COLLINS WAY	S21	S22			24	0.62	4.37	0.44	0.05	0.49	200	0.40%	20.76	0.66	17.1	232.471	232.403	
SA20	COLLINS WAY	S22	S23	18	0.51	210	2.28	4.14	3.87	0.16	3.85	200	0.40%	20.76	0.66	88.2	232.353	232.000	
SA22	STATHAM ST	S24	S23	24	0.67	24	0.67	4.37	0.44	0.05	0.49	200	0.60%	25.42	0.81	75.9	232.506	232.050	
SA21	COLLINS WAY	S23	S25	12	0.32	246	3.27	4.11	4.27	0.26	4.53	200	0.40%	20.76	0.66	50.2	231.975	231.774	
ROW	COLLINS WAY	S25	S26		0.082	246	3.35	4.11	4.27	0.26	4.53	200	0.40%	20.76	0.66	58.1	231.749	231.525	
SA30	ELLIOT ST	S33	S26	12	0.36	12	0.36	4.41	0.22	0.03	0.25	200	0.60%	25.42	0.81	44.9	231.844	231.575	
ROW	HARDY DRIVE	S26	S34		0.057	258	3.77	4.11	4.48	0.29	4.77	200	0.40%	20.76	0.66	28.1	231.500	231.388	
SA31	HARDY DRIVE	S34	S35	9	0.23	267	4.00	4.10	4.62	0.31	4.93	200	0.40%	20.76	0.66	43.9	231.363	231.187	
SA42	HARDY DRIVE	S35	S36	33	0.78	300	4.78	4.08	5.17	0.37	5.54	200	0.40%	20.76	0.66	84.2	231.137	230.800	
SA41	HARDY DRIVE	S36	S37	33	0.85	333	5.63	4.06	5.71	0.44	6.15	200	0.40%	20.76	0.66	82.3	230.775	230.446	
SA40	HARDY DRIVE	S37	S38	6	0.23	339	5.86	4.06	5.81	0.46	6.27	200	0.40%	20.76	0.66	12.6	230.396	230.346	
SA39	HARDY DRIVE	S38	S39	12	0.39	351	6.25	4.05	6.01	0.49	6.50	200	0.40%	20.76	0.66	81.9	230.296	229.966	
SA29	ELLIOT ST	S26	S30	21	0.6	21	0.60	4.38	0.39	0.05	0.44	200	0.60%	25.42	0.81	78.6	231.697	231.237	
ROW	ELWOOD ST	S30	S40		0.08	21	0.68	4.38	0.39	0.05	0.44	200	0.60%	25.42	0.81	46.7	231.096	230.816	
SA32	ELWOOD ST	S40	S41	9	0.25	30	0.93	4.35	0.55	0.07	0.62	200	0.50%	23.21	0.74	46.6	230.791	230.556	
SA33	LINDSAY CRES	S43	S41	9	0.30	9	0.30	4.42	0.17	0.02	0.19	200	0.70%	27.46	0.87	62	231.042	230.608	
SA43	ELWOOD ST	S41	S42	15	0.43	54	1.66	4.31	0.98	0.13	1.11	200	0.40%	20.76	0.66	73.7	230.533	230.238	
OPEN1	OPEN SPACE	–	S42	0	0.35	0	2.01	4.50		0.16	0.16								
SA44	ELWOOD ST	S42	S39	12	0.39	66	2.40	4.29	1.2	0.19	1.39	200	0.40%	20.76	0.66	73.7	230.213	229.918	
SA34	LINDSAY CRES	S43	S44	6	0.26	6	0.26	4.43	0.11	0.02	0.13	200	0.70%	27.46	0.87	18.6	231.271	231.141	
SA35	LINDSAY CRES	S44	S45	15	0.45	21	0.71	4.38	0.39	0.06	0.45	200	0.60%	25.42	0.81	61.8	231.091	230.720	
SA36	LINDSAY CRES	S45	S46	12	0.35	33	1.06	4.35	0.61	0.08	0.69	200	0.50%	23.21	0.74	62.1	230.695	230.384	
OPEN2	OPEN SPACE	-	S46	0	0.35	0	1.41	4.50		0.11	0.11								
SA37	LINDSAY CRES	S46	S47	6	0.25	39	1.66	4.34	0.72	0.13	0.85	200	0.40%	20.76	0.66	15.8	230.334	230.271	
SA38	LINDSAY CRES	S47	S39	12	0.38	51	2.04	4.31	0.93	0.16	1.09	200	0.40%	20.76	0.66	63.2	230.221	229.968	
ROW	ELWOOD ST	S39	S103		0.09	468	10.77	3.99	7.69	0.84	8.73	200	0.40%	20.76	0.66	53.1	229.893	229.681	OUTLET FOR SUB#2
HDR1	FUTURE DRIVE	–	CAP	272	1.81	272	1.81	4.10	4.71	0.14	4.85								
SA8	COLLINS WAY	CAP	S8	3	0.10	275	1.91	4.09	4.75	0.15	4.90	200	0.50%	23.21	0.74	15.2	232.218	232.142	
SA13	COLLINS WAY	S20	S19	27	0.67	27	0.67	4.36	0.50	0.05	0.55	200	0.50%	23.21	0.74	70.4	232.918	232.564	
SA12	COLLINS WAY	S19	S18	27	0.79	54	1.37	4.31	0.98	0.11	1.09	200	0.40%	20.76	0.66	81.2	232.539	232.214	
ROW	COLLINS WAY	S18	S8		0.02	54	1.39	4.31	0.98	0.11	1.09	200	0.40%	20.76	0.66	17.2	232.189	232.120	
SA7	COLLINS WAY	S8	S7	15	0.44	344	3.74	4.05	5.89	0.29	6.18	200	0.40%	20.76	0.66	62.9	232.070	231.819	
SA6	COLLINS WAY	S7	S6	21	0.56	365	4.30	4.04	6.23	0.34	6.57	200	0.40%	20.76	0.66	62.9	231.794	231.542	
SA5	COLLINS WAY	S6	S5	21	0.61	386	4.91	4.03	6.57	0.38	6.95	200	0.40%	20.76	0.66	62.9	231.517	231.266	
SA24	FOXEN ST	S29	S28	9	0.34	9	0.34	4.42	0.17	0.03	0.20	200	0.70%	27.46	0.87	59.2	232.614	232.262	
SA23	STATHAM ST	S24	S28	24	0.68	24	0.68	4.37	0.44	0.05	0.49	200	0.60%	25.42	0.81	75.9	232.768	232.312	
SA25	FOXEN ST	S28	S27	12	0.32	45	1.34	4.32	0.62	0.10	0.92	200	0.40%	20.76	0.66	59.2	232.237	232.037	
SA26	FOXEN ST	S27	S31	6	0.23	51	1.57	4.31	0.83	0.12	1.05	200	0.40%	20.76	0.66	56.2	232.012	231.811	
SA28	ELLIOT ST	S30	S31	24	0.66	24	0.66	4.37	0.44	0.05	0.49	200	0.60%	25.42	0.81	75.2	232.212	231.761	
SA27	ELLIOT ST	S31	S32	9	0.26	84	2.49	4.26	1.51	0.19	1.70	200	0.40%	20.76	0.66	46.6	231.736	231.549	
ROW	ELLIOT ST	S32	S5		0.08	84	2.57	4.26	1.51	0.20	1.71	200	0.40%	20.76	0.66	46.6	231.524	231.338	
SA4	COLLINS WAY	S5	S4	18	0.55	488	8.02	3.98	8.21	0.63	8.84	200	0.40%	20.76	0.66	74	231.241	230.945	
SA3	COLLINS WAY	S4	S3	27	0.70	515	8.72	3.97	8.64	0.68	9.32	200	0.40%	20.76	0.66	65	230.920	230.660	
SA2	COLLINS WAY	S3	S2	27	0.71	542	9.43	3.96	9.07	0.74	9.81	200	0.40%	20.76	0.66	82	230.635	230.307	

SANITARY SEWER DESIGN SHEET

Job No.: KAM-12-060 SOUTHGROVE MEADOWS INC.
EXTERNAL AREAS

q = average daily per capita flow in L/cap. day: 365
i = unit of peak extraneous flow in m³/ha. day: 6.74

Harmon Formula
M = 1 + 14/(4+P^0.5)

Designed By: EMB Date: August 15 2014
Checked By: KAM Date: September 24 2014
Revised By: DS Date: January 15 2015
Updated By: EMB Date: January 07 2016

M = peaking factor (Harmon formula)
Q(p) = peak population flow (L/s)
Q(i) = peak extraneous flow (L/s)
Q(d) = peak design flow

where P = population in 1000's
Q(p) = PqM/86.4 (L/s)
Q(i) = iA (L/s) where A = area in hectares
Q(d) = Q(p) + Q(i) (L/s)

n = 0.013

External Areas based on 60 pplha (Low/Med Density Residential)

LOCATION				INDIVIDUAL		CUMULATIVE		Peaking factor	Peak Pop. flow	Peak extraneous flow	Peak design flow	SEWER DATA							
Area No.	STREET	FROM U/S MH	TO D/S MH	Pop.	Area A (Ha)	Pop.	Area A (Ha)	M	Q(p) (L/s)	Q(i) (L/s)	Q(d) (L/s)	Dia. (mm)	Slope (%)	Capacity (L/s)	Full flow velocity (m/s)	Length (m)	U/S Elev.	D/S Elev.	Remarks
SUB#1	COLLINS WAY	S2	SA101	563	10.05	563	10.05	3.95	9.39	0.78	10.17								
EXT#1	SAXTON RD	–	SA101	33	2.68	33	2.68	4.35	0.61	0.21	0.82								
	SAXTON RD	SA101	SA102			596	12.73	3.83	9.9	0.99	10.89	375	0.13%	63.25	0.52	84.2	229.869	229.790	
	SAXTON RD	SA102	SA103			596	12.73	3.83	9.9	0.99	10.89	375	0.15%	67.95	0.62	84.2	229.760	229.635	
SUB#2	ELWOOD ST	S39	SA103	468	10.77	468	10.77	3.99	7.69	0.84	8.73								
	SAXTON RD	SA103	SA104			1064	23.50	3.78	16.99	1.83	18.82	375	0.11%	58.18	0.53	90	229.600	229.500	
	SAXTON RD	SA104	SA105			1064	23.50	3.78	16.99	1.83	18.82	375	0.14%	65.64	0.59	90	229.475	229.350	
	SAXTON RD	SA105	SA106			1064	23.50	3.78	16.99	1.83	18.82	375	0.17%	72.33	0.65	88	229.310	229.160	
EXT#3	FUTURE DEV.	FUT	SA106	648	7.19	648	7.19	3.91	10.7	0.56	11.26								
	SAXTON RD	SA106	SA107			1712	30.69	3.64	26.33	2.39	28.72	375	0.17%	72.33	0.65	90	229.130	228.980	
EXT#4	FUTURE DEV.	FUT	SA108	393	4.36	393	4.36	4.03	6.69	0.34	7.03								
	SAXTON RD	SA107	SA 108			2105	35.05	3.57	31.75	2.73	34.48	375	0.14%	65.64	0.59	87.3	228.950	228.631	
		SA108	SA109			2105	35.05	3.57	31.75	2.73	34.48	375	0.28%	76.46	0.71	16	228.603	228.731	
		SA109	EX.SA110			2105	35.05	3.57	31.75	2.73	34.48	375	0.35%	103.79	0.94	15.65	228.750	228.696	

AS CONSTRUCTED SERVICES	COMPLETION

DESIGN EMB/KAM
DRAWN EMB
CHECKED KAM
APPROVED –
DATE SEPTEMBER 2013
CAD KAM–12–060

No.	REVISIONS	D/M/Y	BY
1	ISSUED FOR CLIENT REVIEW	15/08/14	KAM
2	ISSUED TO MUNICIPALITY FOR REVIEW	25/09/14	KAM
3	ISSUED FOR MOECC ECA	07/07/15	KAM
4	REVISED FOR MUNICIPALITY COMMENTS	14/07/15	KAM
5	ISSUED FOR HYDRO ONE DESIGN	06/08/15	KAM
6	ISSUED FOR CONSTRUCTION–SAXTON RD	01/12/15	KAM
7	REVISED FOR INFILTRATION UPDATES	21/01/16	KAM
8	MINOR SOUTH P/L GRADING	06/06/16	KAM

CONSULTANT
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ENGINEER'S STAMP

ENGINEER'S STAMP

CLIENT
SOUTHGROVE MEADOWS INC.
131 HARRIS ROAD
DELAWARE, ONTARIO, N0L 1E0
P: 519 868-2440 E: emilpattyn@gmail.com

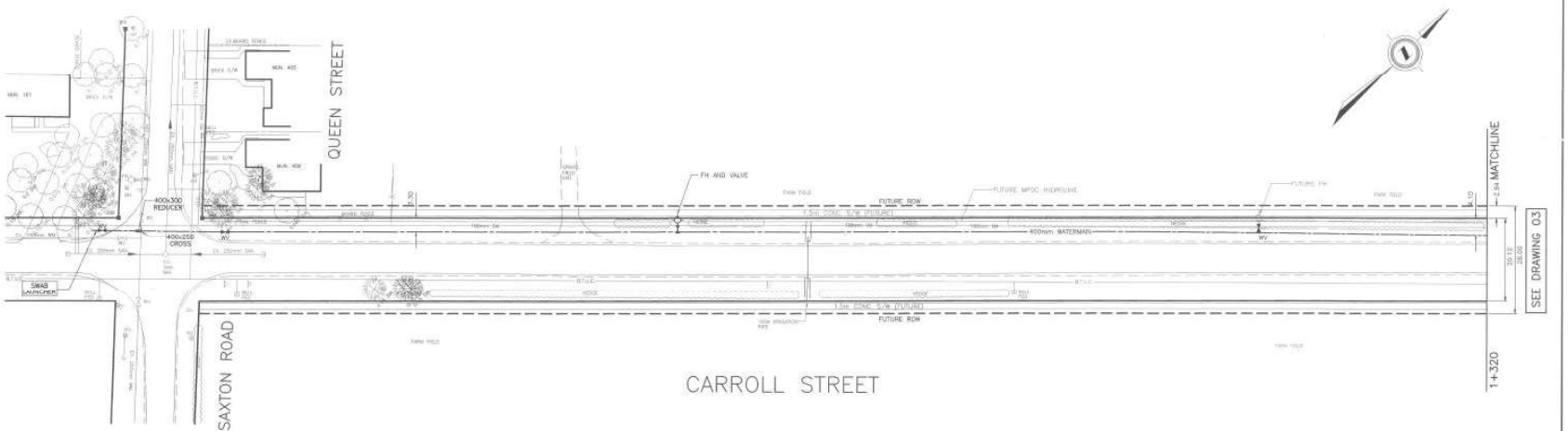
SCALE
SCALE – 1 : 1000
10,0 0 20,0m

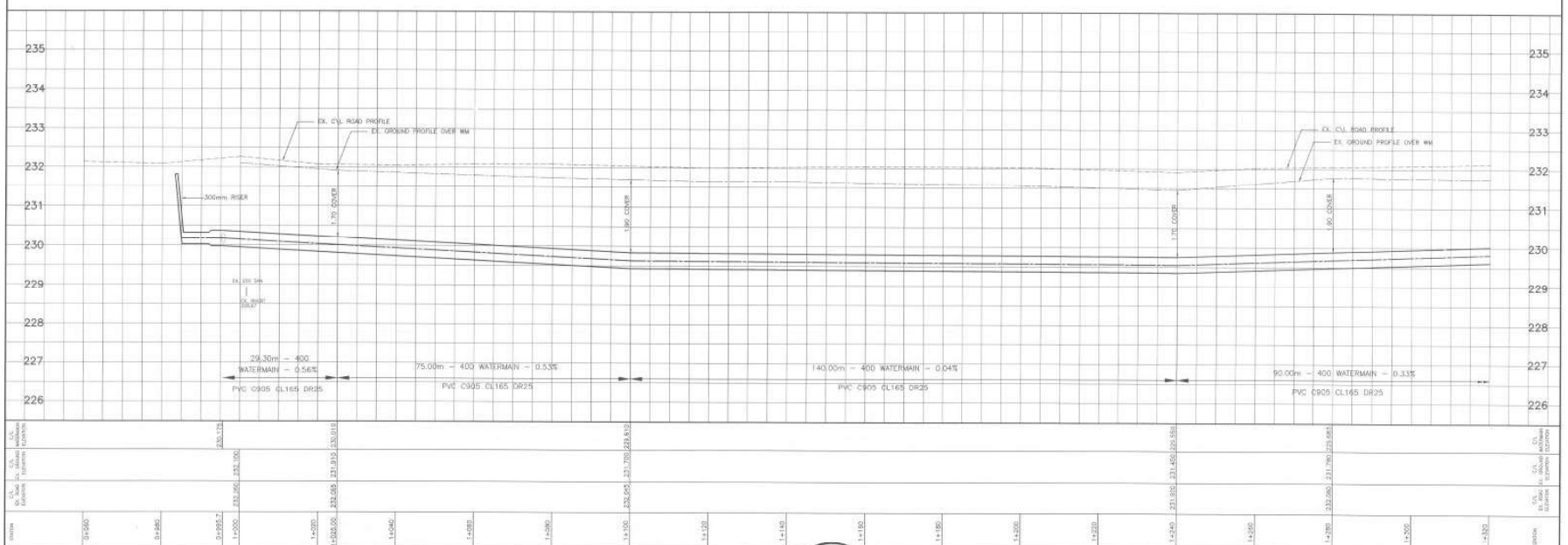
TITLE
SOUTHGROVE MEADOWS SUBDIVISION
STRATHROY, ON

SANITARY SEWER DESIGN SHEETS

PROJECT No. KAM–12–060
SHEET No. 9
PLAN FILE No. –

K:\2012 Projects\KAM-12-060 South Grove Meadows Subdivision\KAM CAD Files\KAM-12-060 Southgrove Meadows Inc - 16-04-04.dwg





AS CONSTRUCTED NOTES

AS CONSTRUCTED SERVICES — WATERMAIN — COMPLETION: FEB. 2005

DESIGN	JRM	SPB
DRAWN	JRM	SPB
CHECKED		RS
APPROVED		SPB
DATE		SEPT. 2003

No.	REVISIONS	DATE	BY
1	REVISED FOR AS-CONSTRUCTED	APRIL 2005	JRM

CONSULTANT OF DIVISION

AGM SURVEYING • ENGINEERING
ARCHIBALD, GRAY & McKAY ENGINEERING LTD.
LONDON 685-5300

LICENCED PROFESSIONAL ENGINEER — S. P. BROWN — PROVINCE OF ONTARIO

MIDDLESEX ENERGY SERVICES CORPORATION
351 FRANCES STREET
STRATHROY, ONTARIO
N7G 2L7
TEL: (519)245-2010
FAX: (519)245-5384

SCALE
HORZ SCALE - 1 : 500
0 10m
VERT SCALE - 1 : 50
0.5 0 1m

TITLE: CARROLL STREET / YORK AVENUE WATERMAIN

CARROLL STREET
FROM QUEEN STREET TO 320m
EAST OF QUEEN STREET

PROJECT No. 1006-13
SHEET No. 02
PLAN REF No.

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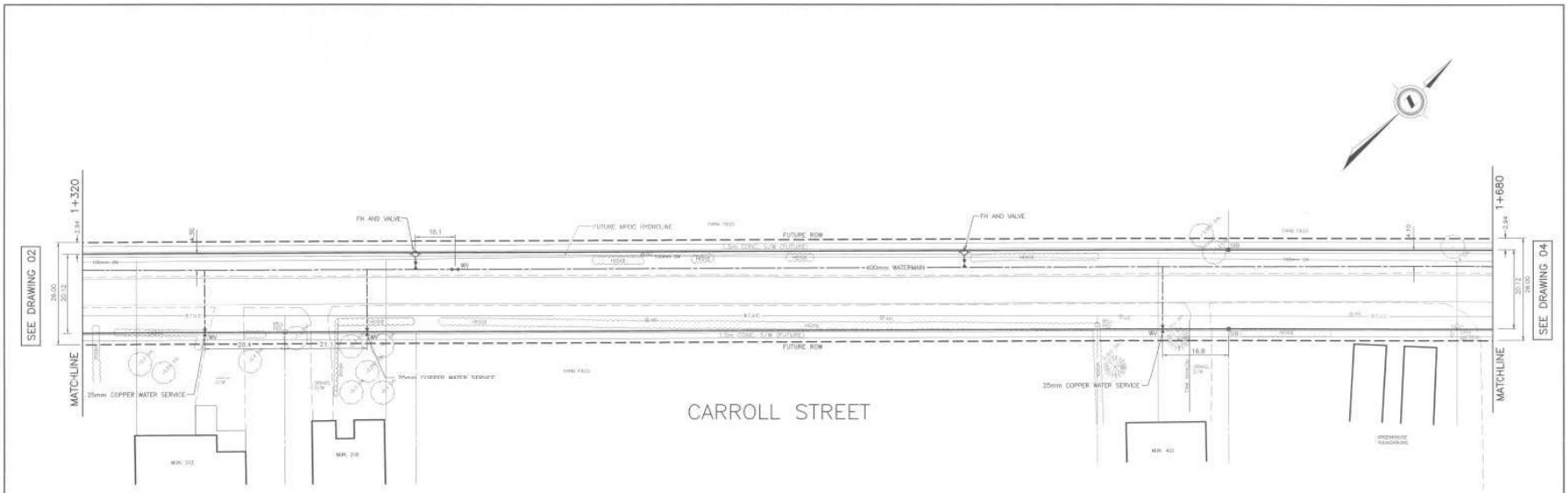

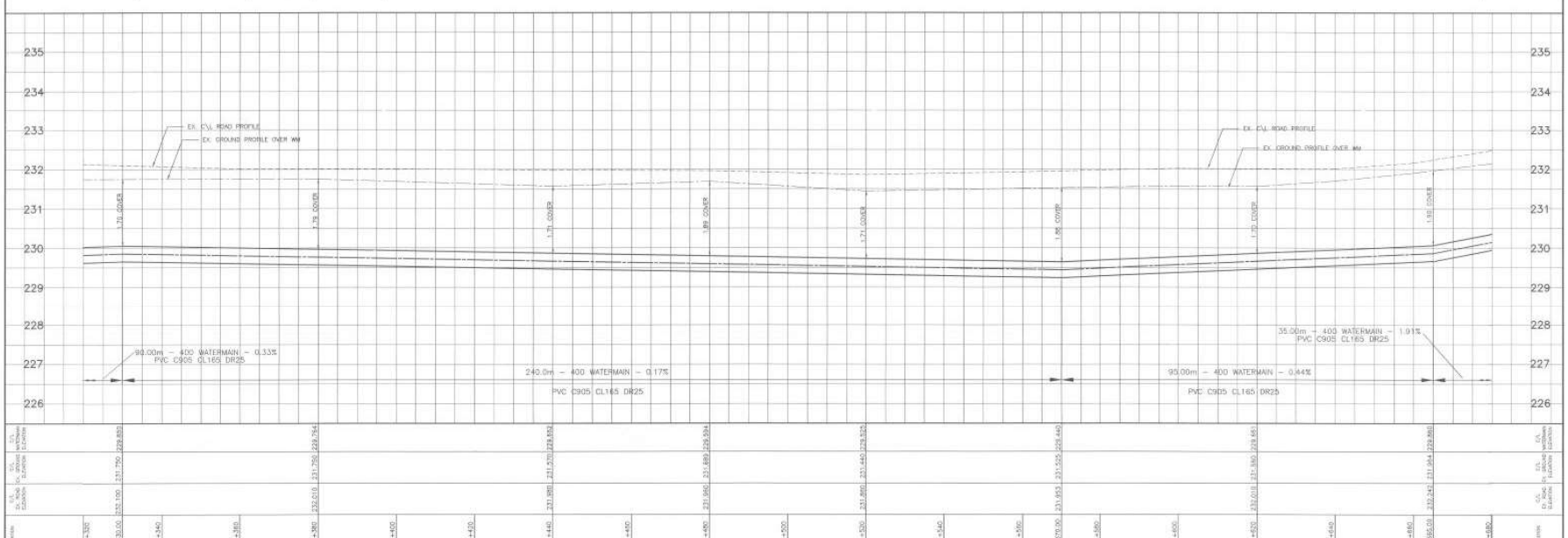

AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION
	WATERMAIN	FEB. 2003

DESIGN	JRM SPB
DRAWN	JRM SPB
CHECKED	RD
APPROVED	SPB
DATE	SEPT. 2002

No.	REVISIONS	DATE	BY
1	REVISED FOR AS-CONSTRUCTED	APRIL 2003	JRM

CONSULTANT OR DIVISION

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SCALE
HORZ SCALE - 1 : 500
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VERT SCALE - 1 : 50
0.5 0 1m

TITLE
CARROLL STREET / YORK AVENUE WATERMAIN
CARROLL STREET
FROM 320m EAST OF QUEEN STREET
TO 680m EAST OF QUEEN STREET

PROJECT No. 1006-13
SHEET No. 03
PLAN FILE No.

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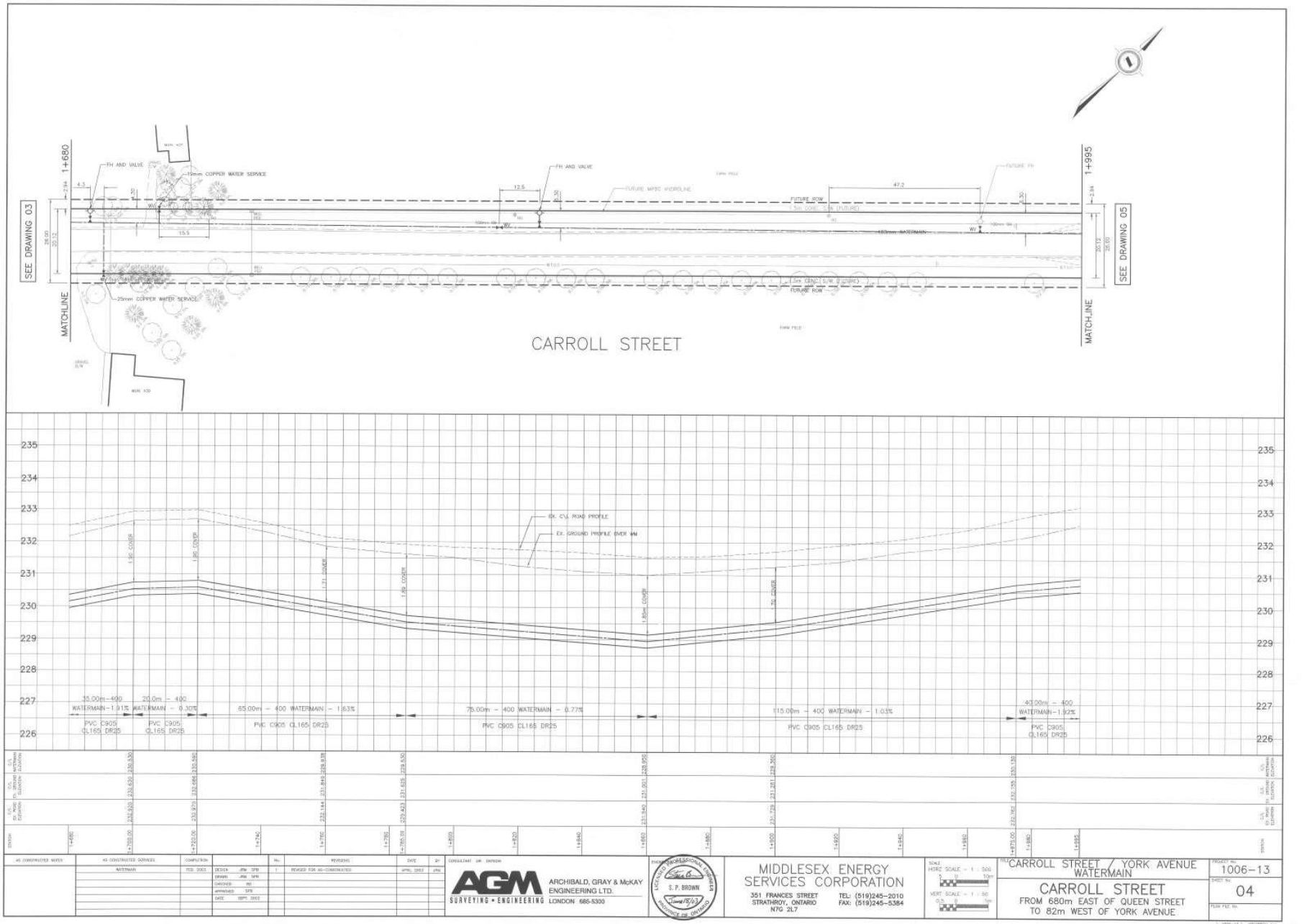

AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION
	WATERMAIN	FEB. 2003

DESIGN	JRM SPB
DRAWN	JRM SPB
CHECKED	RB
APPROVED	SPB
DATE	SEPT. 2002

No.	REVISIONS	DATE	BY
1	REVISED FOR AS-CONSTRUCTED	APRIL 2003	JRM

CONSULTANT OR DIVISION

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ARCHIBALD, GRAY & McKAY ENGINEERING LTD. LONDON 685-5300

PROFESSIONAL ENGINEER S. P. BROWN PROVINCE OF ONTARIO

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SCALE
HORZ SCALE - 1 : 500
VERT SCALE - 1 : 50

CARROLL STREET / YORK AVENUE WATERMAIN

CARROLL STREET
FROM 680m EAST OF QUEEN STREET
TO 82m WEST OF YORK AVENUE

PROJECT No. 1006-13
SHEET No. 04
PLAN REF. No.

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Appendix C

Geotechnical Report, SWM Report

Stantec Consulting Ltd.
600 - 171 Queens Avenue London, Ontario N6A 5J7

September 21, 2022
File: 1614-14253

Attention: Jacob Katz
Carroll St East Developments Inc.
140 Ann Street
Suite 202
London ON N6A 1R2

Dear Mr. Katz,

Reference: 360 Carroll Street, Strathroy, Ontario, Stormwater Management Strategy

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) has been retained by Carroll Street East Developments Inc. (Client) to assist with the engineering services, including the stormwater management (SWM) strategy, for the proposed development at 360 Carroll Street. The site is described as an 8.47 ha grass lot bounded by Carroll Street to the north, existing residential buildings to the south, and agricultural fields to the east and west. The proposed development will significantly increase of impervious surfaces on-site, and as a result a SWM strategy must be implemented. The goal of this design brief is to outline the proposed SWM Plan for this development and recommend erosion and sediment control measures immediately after and during construction.

The following tasks are summarized in this report:

• A complete review of relevant, existing documents (listed in Section 2.0 Background)

• A drainage strategy to manage the post-development runoff

• A confirmation of the stormwater management criteria and downstream receivers.

• An erosion and sediment control plan

2.0 BACKGROUND

In preparation of this report, the following documents and reports have been referenced:

- *Servicing Standards,* the Municipality of Strathroy-Caradoc, October 2021.
- *Stormwater Management Planning and Design Manual (SWMPD Manual),* Ontario Ministry of the Environment and Climate Change, March 2003.
- *Geotechnical Report,* EXP, June 2021

- *The LID SWM Planning and Design Guide* (Sustainable Technologies Evaluation Program, 2022)

3.0 STORMWATER MANAGEMENT CRITERIA

The SWM criteria for the proposed development are established as per the Municipality of Strathroy-Caradoc comments in conjunction with the relevant environmental targets. These criteria are:

- **Water Quality** – Provide sufficient treatment measures to meet the Ministry of the Environment, Conservation and Parks, (MECP) *Enhanced* (80% TSS Removal) criteria and promote the at-source removal of potential contaminants.
- **Water Quantity** – Provide sufficient water quantity control to maintain post-development peak flow rates up to the 250-year storm event to the target discharge rate allowed for the site in the design of the receiving storm sewer (2-year storm event).
- **Erosion and Sediment Control** – Provide appropriate erosion and sediment control during construction/area grading to protect adjacent properties from potential siltation.

4.0 HYDROLOGIC MODELLING

A hydrologic model was prepared to simulate drainage conditions for the site. The SWMHYMO Modelling software and design storm parameters were used to design SWM systems to ensure the previously mentioned criteria are achieved.

To address the criteria, proposed conditions were modeled for the 5-year to 250-year design storms, using the Strathroy-Caradoc Intensity-Duration-Frequency (IDF) Rainfall Curves. The IDF parameters are shown in **Table 1** below.

Table 1: IDF Rainfall Parameters – 3-hour Chicago Storm

Storm Event	A	B	C
5-year	1137.257	7.184	0.830
10-year	1425.011	7.382	0.843
25-year	1835.352	7.844	0.858
50-year	2225.884	8.620	0.871
100-year	2561.151	9.093	0.880
250-year	3048.22	10.03	0.888

5.0 EXISTING DRAINAGE CONDITIONS

The property, approximately 8.47 ha in area, is located on the south side of Carroll Street and is predominantly worked agricultural land. Under the existing conditions, rainfall infiltrates the ground across the site due to the pervious soil conditions, which are described in EXP's geotechnical report. The minimal

runoff from the site that is produced is tributary to roadside depressions and neighbouring properties, which have the capacity to account for the existing conditions. The site is illustrated in the attached Existing Conditions Plan.

5.1 SOIL CHARACTERISTICS

EXP conducted a geotechnical report, (Geotechnical Report, EXP, June 2021) to identify the soil characteristics of the site. Underlying the topsoil at each test pit location sand conditions were identified. The sand was described as compact, brown to gray, and fine to medium grained with trace silt. A small clay layer was identified in Test Pit 4, extending from a depth of 0.5m to 1.8m.

The soils have an estimated hydraulic conductivity (K) ranging between 1.0×10^{-2} and 2.2×10^{-2} cm/s, which when taking the lower rate has a safety factored infiltration rate of 64 mm/hr. Groundwater was found to be 2.3 to 4.0 m below ground surface.

6.0 PROPOSED DRAINAGE CONDITIONS

The proposed drainage conditions are described in the Storm Routing Plan (Stantec, 2022), attached. Under the proposed conditions, a dry stormwater management facility (SWMF) and underground storage will be located along the western boundary to provide water quality and quantity control for the proposed development. Additional, underground storage shall be provided on the medium density site parking lot. All minor systems onsite connect to an 525 mm diameter pipe on Willis Avenue within the Fieldcrest Subdivision north of Carroll Street (see attached preliminary plan and profile by MTE). This sewer outlets to an existing SWM Pond approximately 300 m north from the avenue's entrance on Carroll Street. The allowable maximum release rate to this sewer is 170 l/s.

It is understood the Fieldcrest Subdivision to the north of Carroll Street and its stormwater system will be available as the ultimate outlet for the subject lands at the flow rate indicated as per discussions with the Municipality and their consultant Spriet Associates.

Under the proposed conditions, the 8.47 ha site is divided into four on-site catchment areas (A201-A204), a park/SWM facility (SWM1), and 3 external areas with drain onto the site (EX201-EX203). These catchments are described below as:

- **A201: Central Catchment –** A 5.83 ha area, including the majority of the proposed residential housing, parking, and landscaped areas. Drainage over this area flows north towards the proposed dry pond on the western side of the site, denoted as SWM1.
- **A202: Northern Catchment –** A 1.16 ha area, consisting of a future medium density development and parking area which is controlled by an underground storge during major storm events. These controls would be finalized during the future site plan application. All other drainage is tributary to the existing storm controls on Willis Avenue.
- **A203: Eastern Catchment –** A 0.21 ha strip of area which drains offsite on the eastern edge of the site.
- **A204: –** A 0.08 ha strip of area which drains offsite on the western edge of the site.

- **SWM1:** A 0.37 ha park block which shall act as a 'dry pond' to control major storm events via controlled outlet to the Fieldcrest SWM facility.
- **EX201-EX203:** Three external catchments, totaling in 0.82 ha of area, which route rainfall onto A201.

The Storm Routing Plan depicts these conditions and is appended to this letter report.

7.0 STORMWATER MANAGEMENT STRATEGY

Stormwater runoff from the site will be provided with on-site water quality and water quantity controls. Water quantity control will be mainly provided using park block, acting as a dry pond at the western side of the site. An additional, underground storage facility was sized to store runoff under a parking lot in the northmost catchment. The LID SWM Planning and Design Guide (Sustainable Technologies Evaluation Program, 2022) was used to consider additional quality controls aside from Oil/Grit Separators (OGS). These controls are discussed in section 7.1 and 7.2 below.

7.1 WATER QUANTITY CONTROLS

Under the proposed conditions, most of the site, 7.02 ha, is assumed to drain towards the western side of the site. Here, pervious catchbasins and pervious pipe systems direct runoff to an underground storage system which overflows into a park block, acting as a 'dry pond' SWM facility on the western edge of the site. The dry pond provides a storage volume of 2899 m^3, while the street-level LIDs provide additional storage and promote exfiltration of the collected stormwater. For additional information regarding the park storage, see the attached calculations.

The northmost catchment, 1.16 ha, is routed to an underground storage facility, which has a total storage volume of 500 m^3. Again, this preliminary sizing would be confirmed as part of the final site plan design and approval process. The remaining catchments, which flow off the site to the surrounding farmlands, are directed using site grading via overland flow and are discussed further on in this letter.

These storages are summarized in **Table 2** below:

Table 2: Water Quality Control

LID Storage Capacity	
Storage Volume in Roadway LID (m^3)	270
Dry Pond at Western Edge of Site (SWM1)	
Underground Storage Volume (m^3)	1848
Park Storage Volume (m^3)	1051
Total Volume (m^3)	2899
Underground Storage at Northernmost Catchment	
Underground Storage Volume (m^3)	500

The underground storage will be provided in units such as ADS' Stormtech™ system or an equivalent and will be designed at the detail design stage.

7.2 WATER QUALITY CONTROLS

Due to the size of the site and the type of development proposed, *Enhanced* water quality control (a minimum of 80% TSS removal) is required. Quality treatment for the Site will be provided using a combination of pervious third pipe with catchbasin pre-treatment system as well as Oil/Grit Separators (OGS).

Pre-treatment of flows entering the third-pipe system will be done using catchbasin hoods such as ADS' Envirohood™ or equivalent, which are shown to capture floatables and remove upwards of 50% TSS. The remaining treatment for the site will be provided using Oil/Grit Separators (OGS). These OGS units will be located upstream of the underground storage systems in both the subdivision and the medium density block and will be sized to provide the *Enhanced* quality target.

7.3 MODELLING RESULTS

The system described above was modelled in SWMHYMO to determine the effectiveness of the strategy using the events described in Section 4.0. The results of that modelling are presented in the following table.

Table 3 - Modelling Results

Event	Site Outflow To Willis Street (m^3/s)	Max Storage Used (m^3)	Park Ponding Depth (m)
5YR	0.000	1127	0.00
10YR	0.000	1534	0.00
25YR	0.000	2040	0.00
50YR	0.074	2361	0.05
100YR	0.094	2583	0.10
250YR	0.134	3033	0.35

The model shows that the park does not see use as surface storage until the 50-year storm event which also corresponds with flows being seen to the Willis Street sewer. These flows do not exceed the allowable target established for the site. The entirety of the 250-year event is controlled within the proposed system.

7.4 INFILTRATION AREAS

Infiltration measures are being proposed in several areas with a third pipe system, park underground storage and medium density block storage being accounted for within the model. The third pipe system provides 270 m^3 of storage for infiltration, the entirety of the 1848 m^3 underground park storage drains by infiltration and 200 of the 500 m^3 of the medium density underground storage drains by infiltration. All infiltration galleries drain in under 24 hours. The calculations for this are found attached.

Additional infiltration opportunities exist in the rear-yard swales of the single-family lots and will be explored further as controls during detail design.

7.5 OFFSITE FLOWS

Two areas, one to the east and one to the west, consisting of rear-yards unable to be drained by the internal sewers exist on site. Expected flows from these areas are roughly double the existing flow rates seen currently. Controls consisting of swales and infiltration galleries will be utilized in detail design to reduce these flows to existing rates.

8.0 EROSION AND SEDIMENT CONTROL MEASURES

This section describes the Erosion and Sediment Control Measures that will be implemented during and immediately after construction to reduce the possibility of sediment being deposited downstream.

8.1 TYPES OF SELECTED EROSION/SEDIMENT CONTROL METHODS

The details and locations of the proposed erosion and sediment control measures are shown in the submitted drawings package. The proposed erosion and sediment control measures include the following:

- Heavy-duty silt fencing to be erected on all Site boundaries where there is potential for runoff to be discharged offsite, to protect adjacent downstream lands from migration of sediment in overland flow. The location of this fencing will be adjacent to the limit of grading.
- Stabilize all disturbed areas where work will not take place for a period of 30 days or more according to OPSS 572.
- Perform street sweeping as necessary to remove soil accumulation caused by construction traffic.
- Install and maintain catchbasin inserts at all catchbasins to prevent sediment from entering the proposed storm sewer.
- Installation of a mud mat at the main entrance to site.
- Dewatering effluent discharge areas complete with sediment traps and energy diffusers shall be constructed, as necessary, within the proposed construction limits. Filter socks will be used where necessary to further filter the discharge.
- Install and maintain strawbale filters and silt sacks at all catchbasins
- to prevent sediment from entering the proposed storm sewer.

The proposed temporary erosion & sediment control measures have been selected based on the site's susceptibility to erosion, sensitivity of the downstream environment, site slopes, and total drainage area. The proposed measures should provide adequate erosion and sediment control for the proposed project without the need for additional measures; however, the site should be monitored during construction, and additional measures may be added, if required. Such measures may include, but are not limited to, additional rows of silt fence or rock check dams in areas that are susceptible to erosion.

Reference: **360 Carroll Street, Strathroy, Ontario, Stormwater Management Strategy**

9.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the preceding documentation, the following conclusions can be drawn:

- **Water Quantity** – underground storage, along with a dry pond and LIDs shall be used to maintain the target flow rates. The downstream SWM facility will not see flows from site until the 50-year event.
- **Water Quality** – OGS units, with additional quality controls in the proposed LIDs shall be sized to provide an MECP *Enhanced* level of treatment.
- **Erosion and Sediment Control Measures** – standard measures are proposed for the site including silt-fence, a mud-mat construction entrance, and silt sacks in the catchbasins.

As the site conforms to the assumptions in the proposed SWM strategy, we trust that this report is sufficient and meets your needs. However, should you have any questions, please do not hesitate to contact the undersigned at your convenience.

Regards,

STANTEC CONSULTING LTD.

Digitally signed by Dekker, Jade
Date: 2022.09.21 10:50:55 -04'00'

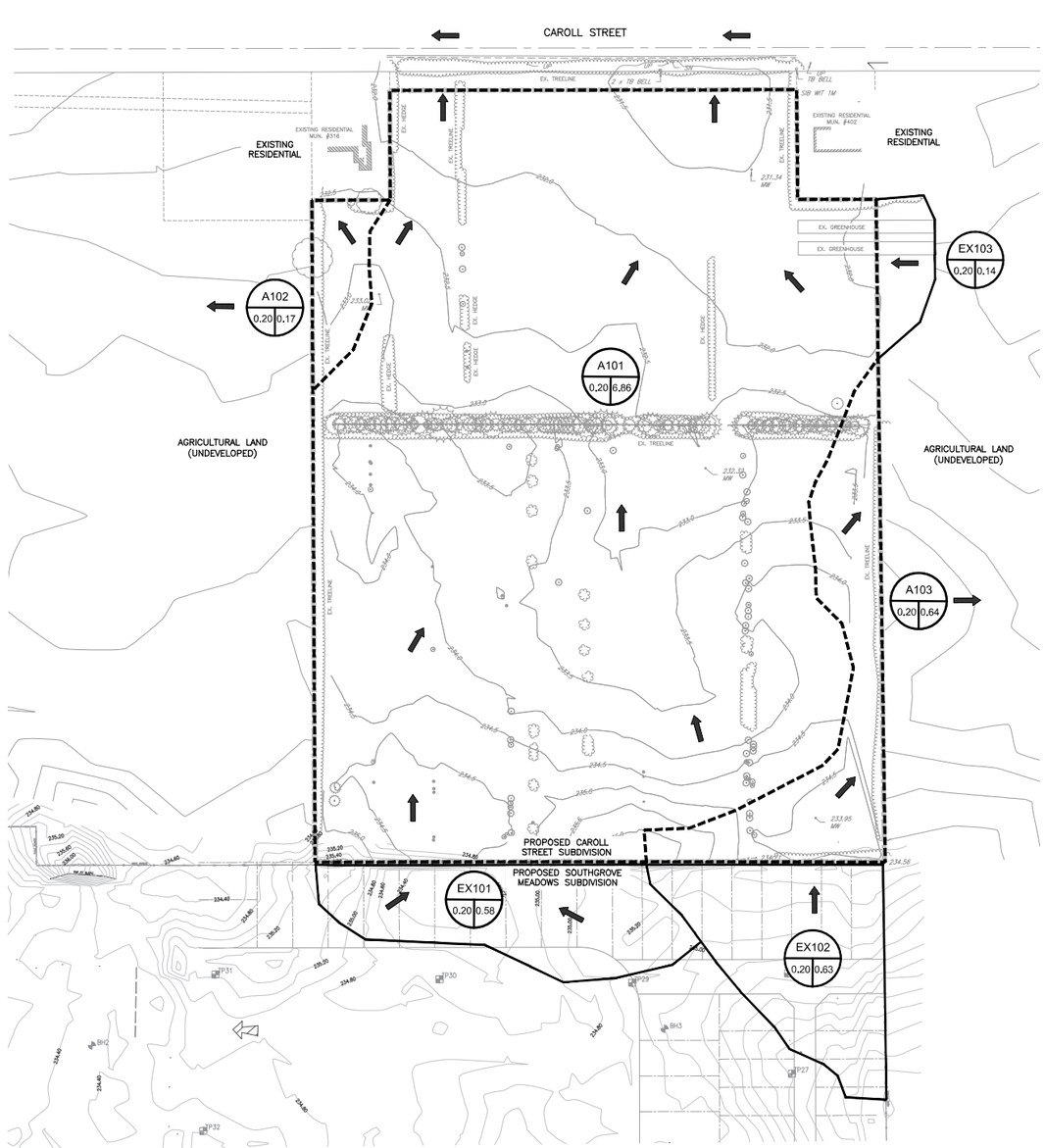
Jade Dekker
Water Resources Designer
Community Development
Phone: (226) 927 -8106
Jade.dekker@stantec.com

LICENSED PROFESSIONAL ENGINEER
A.K. KRISTOFERSON
100170788
PROVINCE OF ONTARIO

Digitally signed by Kristoferson, Adam
Date: 2022.09.21 10:53:20 -04'00'

Adam Kristoferson P.Eng.
Water Resources Engineer
Community Development
Phone: (519) 675 - 6669
Fax: (519) 645 - 6575
Adam.kristoferson@stantec.com

Attachment: Existing Storm Area Drainage Plan
Storm Routing Figure
Willis Street Plan and Profile
SWMHYMO Parameters
SWM Calculations
Model Results
SWMHYMO Inputs and Outputs



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Client/Project

CAROL STREET SUBDIVISION
STRATHROY, ON

Figure No.
1

Title
EXISTING STORM FIGURE

Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007

Legend

EXISTING OVERLAND FLOW ROUTE
SUBDIVISION BOUNDARY
DRAINAGE AREA BOUNDARY
EXTERNAL DRAINAGE AREA BOUNDARY
EXISTING STORM SEWER

RUNOFF COEFFICIENT — A101 (0.20 | 0.37) — AREA ID (PRE-DEVELOPMENT) / AREA (IN HECTARES)

PONDING SCHEDULE			
PONDING #	AREA (m²)	DEPTH (m)	VOLUME (m³)
1		0.45	69.0
2		0.45	125.0
3		0.50	1050.0
4		0.45	125.0
5		0.45	50.0
6		0.45	180.0
7	1000	0.30	150.0
		TOTAL	1749.0

SWM MODELING IS BASED ON THE FOLLOWING:
- A MINIMUM PERCENT IMPERVIOUS LEVEL OF 40% SHOULD BE USED FOR SINGLE FAMILY RESIDENTIAL WITH 30% DIRECTLY CONNECTED.
- A MINIMUM IMPERVIOUS LEVEL OF 70% SHOULD BE USED FOR MULTIFAMILY RESIDENTIAL WITH 55% DIRECTLY CONNECTED.
- ROADWAYS SHOULD BE MODELLED AT 60% IMPERVIOUS WITH 55% DIRECTLY CONNECTED.

IF ACTUAL CONDITIONS ARE ANTICIPATED TO EXCEED THESE NUMBERS THAN THE VALUES SHOULD BE CALCULATED AND SUPERSEDE THE ABOVE VALUES.
SEE TABLE BELOW FOR C-VALUES (STRATHROY SERVICING STANDARDS MANUAL, OCT. 2021)

The following runoff coefficients are to be used with the Rational Formula:

Single Family Residential (Lots smaller than 375 m²)	0.60
Single Family Residential (Lots 375m² to 550m²)	0.50
Single Family Residential (Lots larger than 550m²)	0.45
Multi-Family Residential	0.65 – 0.80
Undeveloped Residential	0.20
Commercial	0.70 – 0.85
Industrial	0.70 – 0.90
Parks, Cemetery, Playgrounds & Farmlands	0.20

Figure 4.15: Pervious Catchbasin

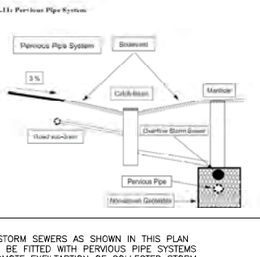
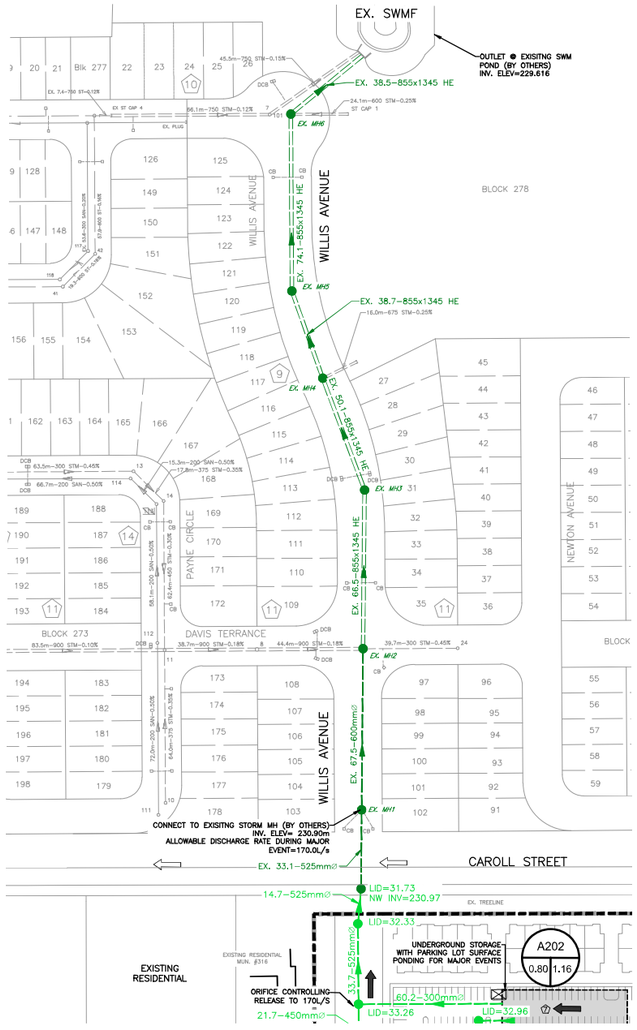
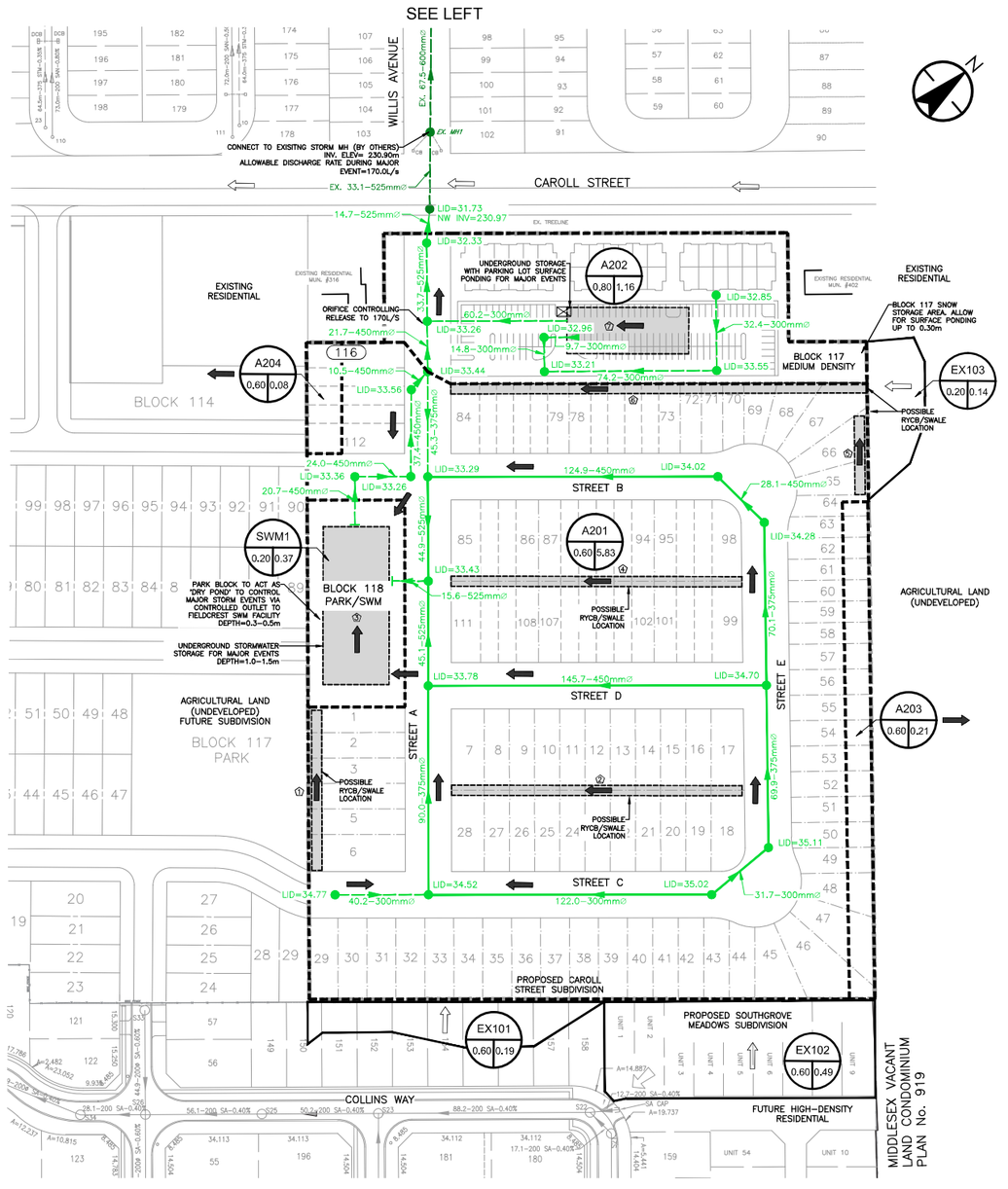


Figure 4.11: Pervious Pipe System

NOTE: STORM SEWERS AS SHOWN IN THIS PLAN ARE TO BE FITTED WITH PERVIOUS PIPE SYSTEMS TO PROMOTE EXFILTARTION OF COLLECTED STORM WATER. (SEE DETAIL ABOVE)



LOT GRADING SCHEDULE			
LOT #	GRADING TYPE	RYCB (Y/N)	LOT TYPE
1–6	BACK TO FRONT	N	REGULAR
7–28	FRONT TO BACK	Y	REGULAR
29–45	BACK TO FRONT	N	REGULAR
46–64	SPLIT	N	L/O
65–84	SPLIT	Y	REGULAR
84–111	FRONT TO BACK	Y	REGULAR
112–116	SPLIT	N	REGULAR



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JUNE 2022
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Stantec
600-171 Queens Avenue
London ON N6A 5J7
Tel. 519-645-2007

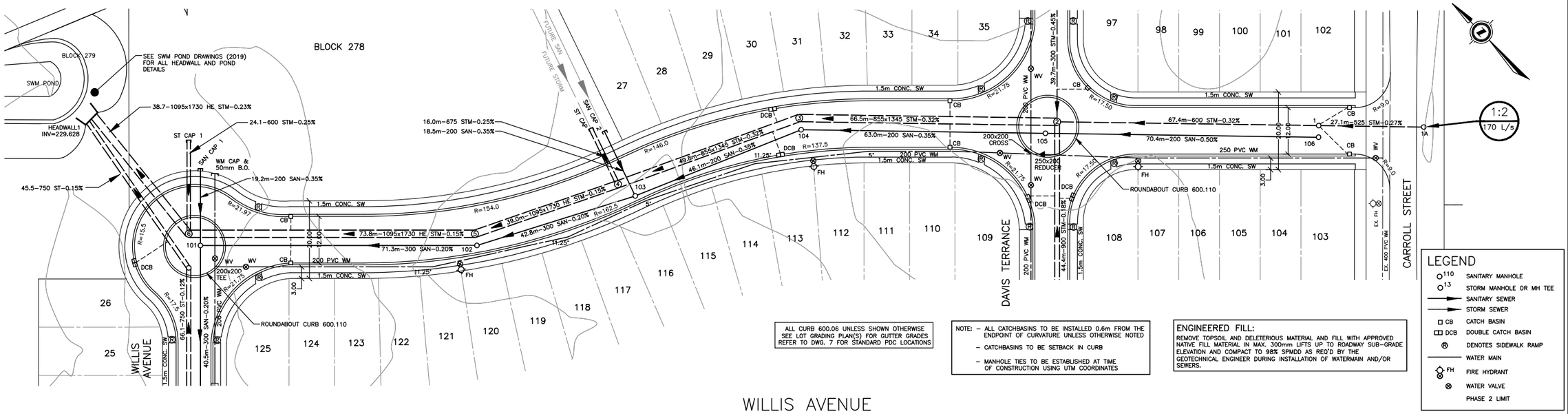
Legend

- SUBDIVISION BOUNDARY
- DRAINAGE AREA BOUNDARY
- EXTERNAL DRAINAGE AREA BOUNDARY
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPOSED STORM SEWER WITH THIRD PIPE EXFILTRATION SYSTEM
- PROPOSED OVERLAND FLOW ROUTE
- EXISTING OVERLAND FLOW ROUTE

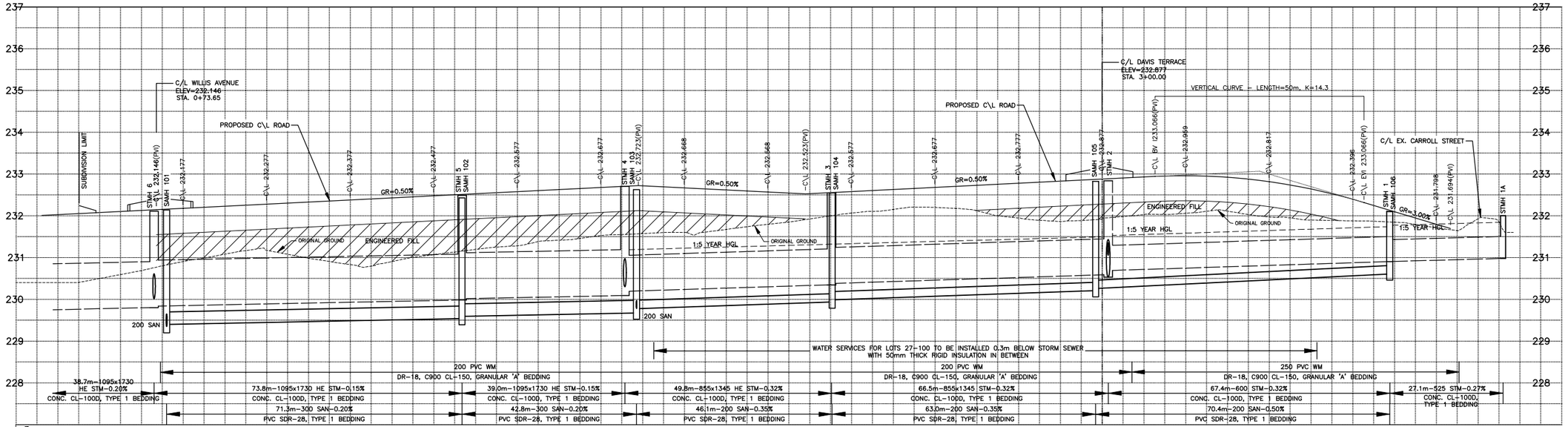
Client/Project
LITERA GROUP
360 CAROLL STREET
STRATHROY, ON

Figure No.
2

Title
STORM ROUTING FIGURE



WILLIS AVENUE



PRELIMINARY OPTION 1

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION	DETAILS	No.	REVISIONS	DATE	CONSULTANT
					DESIGN KAM				
					DRAWN BY IRA				
					CHECKED KAM				
					APPROVED KAM				
					DATE APR. 2022				

CONSULTANT OR DIVISION

MTE
Engineers, Scientists, Surveyors

ENGINEER'S STAMP

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SCALE

SCALE – 1 : 500
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FIELDCREST SUBDIVISION – PHASE 2
FIELDCREST LTD.

WILLIS AVENUE

PROJECT No. 44465-104
SHEET No. 9
PLAN FILE No.

Subject: CN Calculations
Project: Carroll Street
Project No.: 161414253
Client: Carroll Street East Developments
Date: 15-Sep-22

Site Soils: Sand

TABLE OF CURVE NUMBERS (CN's)									
Land Use		Hydrologic Soil Type							Manning's
		A	AB	B	BC	C	CD	D	'n'
Meadow		50	54	58	64.5	71	74.5	78	0.40
Woodlot		50	55.3	60.5	67	73.5	76.8	80	0.40
Long Grass		55	60	65	72	79	81.5	84	0.30
Lawns		60	65.5	71	77	83	86	89	0.25
Pasture/Range		58	61.5	65	70.5	76	78.5	81	0.17
Crop		66	70	74	78	82	84	86	0.13
Fallow (Bare)		77	82	86	89	91	93	94	0.05
Wetland		50	50	50	50	50	50	50	0.15

HYDROLOGIC SOIL TYPE (%)								
	Hydrologic Soil Type							
Catchment	A	AB	B	BC	C	CD	D	TOTAL
Existing								
A102		100.0						
A103		100.0						
Proposed								
EX201		100.0						100
EX202		100.0						100
EX203		100.0						100
A201		100.0						100
A202		100.0						100
A203		100.0						100
A204		100.0						100
SWM1		100.0						100

LAND USE (%)									
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Wetland	Total
Existing									
A102	100								
A103	100								
Proposed									
EX201				100					100
EX202				100					100
EX203	100								100
A201				100					100
A202				100					100
A203				100					100
A104				100					100
SWM1				100					100

CURVE NUMBER (CN)									
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Wetland	Weighted CN
Existing									
A102	54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.0
A103	54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.0
Proposed									
EX201	0.0	0.0	0.0	65.5	0.0	0.0	0.0	0.0	65.0
EX202	0.0	0.0	0.0	65.5	0.0	0.0	0.0	0.0	65.0
EX203	54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.0
A201	0.0	0.0	0.0	65.5	0.0	0.0	0.0	0.0	65.0
A202	0.0	0.0	0.0	65.5	0.0	0.0	0.0	0.0	65.0
A203	0.0	0.0	0.0	65.5	0.0	0.0	0.0	0.0	65.0
A204	0.0	0.0	0.0	65.5	0.0	0.0	0.0	0.0	65.0
SWM1	0.0	0.0	0.0	65.5	0.0	0.0	0.0	0.0	65.0

** post development catchments concerned with pervious CN values only
** AMC II assumed
** Hydrological Soil Group taken from MTO Drainage Manual for each soil type

Subject: SWMHYMO Parameters
Project: Carroll Street
Project No.: 161414253
Client: Carroll Street East Developments
Date: 15-Sep-22

Site Soils: Sand
Existing Conditions

Area Description	Catchment Number	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Slope (%)	Length (m)	Tc (hrs)	Tp (hrs)
Flows off site to the west	A102	DESIGN NASHYD	0.17	54	-	-	2.00	34	0.23	0.14
Flows off site to the east	A103	DESIGN NASHYD	0.64	54	-	-	2.00	65	0.31	0.19

Proposed Conditions

Area Description	Catchment Number	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Slope (%)	Length (m)	Tc (hrs)	Tp (hrs)
External rearyards draining to site from south	EX201	DESIGN STANDHYD	0.19	65	0.50	0.40	2.00	20		
External rearyards draining to site from south	EX202	DESIGN STANDHYD	0.49	65	0.50	0.40	2.00	20		
External flow from fields to the east	EX203	DESIGN NASHYD	0.14	54	-	-	2.00	31	0.22	0.13
Subdivision controlled by park storage	A201	DESIGN STANDHYD	5.83	65	0.50	0.40	2.00	20		
Medium density block controlled by onsite storage	A202	DESIGN STANDHYD	1.16	65	0.80	0.60	2.00	20		
Uncontrolled site flows sent east	A203	DESIGN STANDHYD	0.21	65	0.50	0.40	2.00	20		
Uncontrolled site flows sent west	A204	DESIGN STANDHYD	0.08	65	0.50	0.40	2.00	20		
Park area with storage controls	SWM1	DESIGN NASHYD	0.37	65	-	-	2.00	50	0.27	0.16
Total			8.47							

Notes:

CN calculated for pervious areas only for DESIGN STANDHYD. CN is a weighed average for DESIGN NASHYD

TIMP — *Total percent impervious*

XIMP — *Percent impervious directly connected*

Length — $L = [A*10000/1.5]^{0.5}$ *For NASHYD*

Time of Concentration calculated using the Airport Method → $Tc = [\ 3.26\ (1.1-C)\ L^{0.5}\ ]\ /\ S^{0.33}$

Where: *C = Runoff Coefficient = 0.2 for undeveloped areas*
L = Length of Overland Flow (m)
= (Area/1.5)^0.5
S = Slope (%)

Time to Peak → *Tp = 0.6Tc*

Subject: **Storage Sizing**
Project: **Carroll Street**
Project No.: **161414253**
Client: **Carroll Street East Developments**
Date: **15-Sep-22**

Underground Storage

Dry Pond

Park Block Storage							
Depth (m)	Side Slope (__:1)	Width (m)	Length (m)	Area (m^2)	Average Area (m^2)	Incremental Volume (m^3)	Cumulative Volume (m^3)
29.8	NA	28	66	1848			
29.9	NA	28	66	1848	1848	184.8	184.8
30	NA	28	66	1848	1848	184.8	369.6
30.1	NA	28	66	1848	1848	184.8	554.4
30.2	NA	28	66	1848	1848	184.8	739.2
30.3	NA	28	66	1848	1848	184.8	924
30.4	NA	28	66	1848	1848	184.8	1108.8
30.5	NA	28	66	1848	1848	184.8	1293.6
30.6	NA	28	66	1848	1848	184.8	1478.4
30.7	NA	28	66	1848	1848	184.8	1663.2
30.8	NA	28	66	1848	1848	184.8	1848
32	5	28	66	1848	0	0	
32.1	5	29	67	1943	1895.5	189.55	189.6
32.2	5	30	68	2040	1991.5	199.15	388.7
32.3	5	31	69	2139	2089.5	208.95	597.7
32.4	6	32.2	70.2	2260.44	2199.72	219.972	817.6
32.5	7	33.6	71.6	2405.76	2333.1	233.31	1050.9

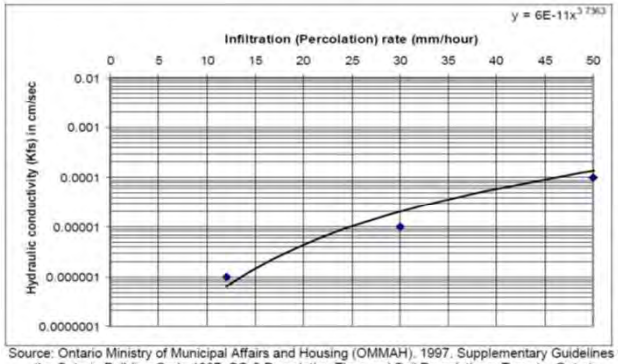
Underground Storage

Medium Density Block Storage							
Depth (m)	Side Slope (__:1)	Width (m)	Length (m)	Area (m^2)	Average Area (m^2)	Incremental Volume (m^3)	Cumulative Volume (m^3)
30.8	NA	20	50	1000			
30.9	NA	20	50	1000	1000	100	100
31	NA	20	50	1000	1000	100	200
31.1	NA	20	50	1000	1000	100	300
31.2	NA	20	50	1000	1000	100	400
31.3	NA	20	50	1000	1000	100	500

Subject: **Infiltration Calculations**
Project: **Carroll Street**
Project No.: **161414253**
Client: **Carroll Street East Developments**
Date: **15-Sep-22**

	y (K (cm/s))	x (Inf (mm/hr))	
Site	1.0E-02	160	
Safety Factor	2.5		
Safety Infiltration Rate		**64.0**	mm/hr

Note: y is as per Geotech report by exp



Source: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.

Roadway Infiltration

Length of Road	771	m	Storage	270	m³
Area of Infiltration	771	m²	Drawdown Time	5.5	hrs
Void Ratio	0.35	-			
Infiltration Rate	49344	mm/hr			
	0.0137	m³/s			

Park Storage Infiltration

Area of Infiltration	1848	m²	Storage	1848	m³
Infiltration Rate	118272	mm/hr	Drawdown Time	15.6	hrs
	0.0329	m³/s			

MD Block Storage Infiltration

Area of Infiltration	1000	m²	Storage	200	m³
Infiltration Rate	64000	mm/hr	Drawdown Time	3.1	hrs
	0.0178	m³/s			

Subject: **Stage Storage**
Project: **Carroll Street**
Project No.: **161414253**
Client: **Carroll Street East Developments**
Date: **15-Sep-22**

Elevation (m)	Park Storage (m^3)	MD Storage (m^3)	Total Storage (m^3)	Park Infiltration (m^3/s)	MD Infiltration (m^3/s)	Orifice Outlet (m^3/s)	Total Outflow (m^3/s)
29.3	0						
30.8	1848	0	1848	0.033		0	0.033
31	1848	200	2048	0.033	0.018	0	0.051
31.3	1848	500	2348	0.033	0.018	0.005	0.056
32	1848	500	2348	0.033	0.018	0.074	0.125
32.5	2899	500	3399	0.033	0.018	0.167	0.218

Orifice #1	
Orifice #1 Elev (m)	Orifice Coeff.
31.00	0.600
Orifice #1-Midpoint (m)	Perimeter (m)
31.08	0.000
Orifice Diameter (mm)	Area (m^2)
150	0.018
Weir Coeff. (Sharp)	Orientation
1.80	Vertical

Sharp crested semi-circular weir equation

Sharp crested semi-circular weir equation

$Q=C*D^{2.5}*(H/D)^{1.88}$

where

C = sharp crested semi-circular weir coefficient

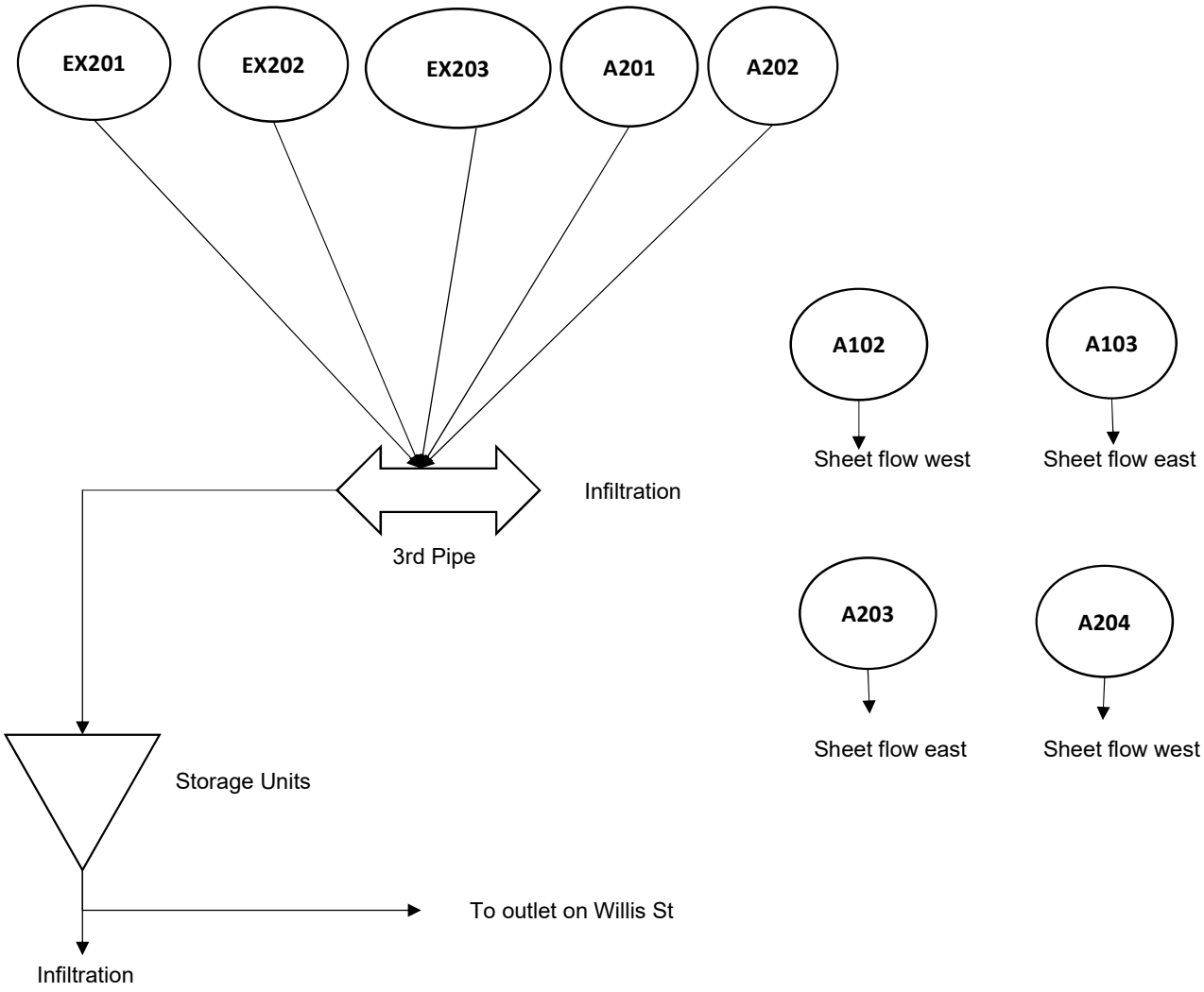
D = diameter of orifice

H = head above orifice invert

Subject: **Model Results**
Project: **Carroll Street**
Project No.: **161414253**
Client: **Carroll Street East Developments**
Date: **15-Sep-22**

Event	Existing A103 Outflow (m^3/s)	A203 Outflow (m^3/s)	Existing A102 Outflow (m^3/s)	A204 Outflow (m^3/s)	Site Outflow (m^3/s)	Site Outflow less Infiltration (m^3/s)	Max Storage Used (m^3)	Park Ponding Depth (m)
5YR	0.013	0.035	0.004	0.013	0.033	0.000	1127	0.00
10YR	0.018	0.043	0.006	0.016	0.033	0.000	1534	0.00
25YR	0.027	0.054	0.008	0.020	0.050	0.000	2040	0.00
50YR	0.034	0.063	0.011	0.023	0.125	0.074	2361	0.05
100YR	0.041	0.071	0.013	0.026	0.145	0.094	2583	0.10
250YR	0.052	0.080	0.016	0.029	0.185	0.134	3033	0.35

Subject: Model Schematic
Project: Carroll Street
Project No.: 161414253
Client: Carroll Street East Developments
Date: 15-Sep-22



```
00001> 2     Metric units
00002> *#*****************************************************************************
00003> *#  Project Name: [Carroll Street]    Project Number: [161414253]
00004> *#  Date         : 2022-09-14
00005> *#  Modeller     : [AKK]
00006> *#  Company      : Stantec Consulting Ltd. (London)
00007> *#  License #    :  4730904
00008> *#*****************************************************************************
00009> *#*****************************************************************************
00010> *#
00011> *#  This model represents the hydologic characteristics of the proposed
00012> *#  conditions in the proposed site plan.
00013> *#  Storm events modeled are:
00014> *#  5YR, 10YR, 25YR, 50YR, 100YR and 250YR 3hr Chicago STORMS (Strathroy IDF)
00015> *#
00016> *#*****************************************************************************
00017> *%-----------------|-------------------------------------------------------------|
00018> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
00019>                     ["5yr.3hr"]
00020> *%-----------------|-------------------------------------------------------------|
00021> READ STORM          STORM_FILENAME=["STORM.001"]
00022> *%-----------------|-------------------------------------------------------------|
00023> *#*****************************************************************************
00024> *#
00025> *#  Existing conditions
00026> *#
00027> *#*****************************************************************************
00028> CALIB NASHYD        ID=[07], NHYD=["A102"], DT=[1]min, AREA=[0.17](ha),
00029>                     DWF=[0](cms),  CN/C=[54], IA=[5](mm),
00030>                     N=[3], TP=[0.14]hrs,
00031>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00032> *%-----------------|-------------------------------------------------------------|
00033> CALIB NASHYD        ID=[07], NHYD=["A103"], DT=[1]min, AREA=[0.64](ha),
00034>                     DWF=[0](cms),  CN/C=[54], IA=[5](mm),
00035>                     N=[3], TP=[0.19]hrs,
00036>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00037> *%-----------------|-------------------------------------------------------------|
00038> *#*****************************************************************************
00039> *#
00040> *#  Proposed conditions
00041> *#
00042> *#*****************************************************************************
00043> CALIB STANDHYD      ID=[01], NHYD=["A201"], DT=[1](min), AREA=[5.83](ha),
00044>                     XIMP=[0.40], TIMP=[0.50], DWF=[0.0](cms), LOSS=[2],
00045>                     SCS curve number CN=[65],
00046>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00047>                                          LGP=[20](m), MNP=[0.24], SCP=[0](min),
00048>                     Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
00049>                                          LGI=[10](m), MNI=[0.013], SCI=[0](min),
00050>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00051> *%-----------------|-------------------------------------------------------------|
00052> CALIB STANDHYD      ID=[02], NHYD=["A202"], DT=[1](min), AREA=[1.16](ha),
00053>                     XIMP=[0.60], TIMP=[0.80], DWF=[0.0](cms), LOSS=[2],
00054>                     SCS curve number CN=[65],
00055>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00056>                                          LGP=[20](m), MNP=[0.24], SCP=[0](min),
00057>                     Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
00058>                                          LGI=[50](m), MNI=[0.013], SCI=[0](min),
00059>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00060> *%-----------------|-------------------------------------------------------------|
00061> CALIB STANDHYD      ID=[03], NHYD=["A203"], DT=[1](min), AREA=[0.21](ha),
00062>                     XIMP=[0.40], TIMP=[0.50], DWF=[0.0](cms), LOSS=[2],
00063>                     SCS curve number CN=[65],
00064>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00065>                                          LGP=[20](m), MNP=[0.24], SCP=[0](min),
00066>                     Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
00067>                                          LGI=[10](m), MNI=[0.013], SCI=[0](min),
00068>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00069> *%-----------------|-------------------------------------------------------------|
00070> CALIB STANDHYD      ID=[04], NHYD=["A204"], DT=[1](min), AREA=[0.08](ha),
00071>                     XIMP=[0.40], TIMP=[0.50], DWF=[0.0](cms), LOSS=[2],
00072>                     SCS curve number CN=[65],
00073>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00074>                                          LGP=[30](m), MNP=[0.24], SCP=[0](min),
00075>                     Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
00076>                                          LGI=[10](m), MNI=[0.013], SCI=[0](min),
00077>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00078> *%-----------------|-------------------------------------------------------------|
00079> CALIB STANDHYD      ID=[05], NHYD=["EX201"], DT=[1](min), AREA=[0.19](ha),
00080>                     XIMP=[0.30], TIMP=[0.40], DWF=[0.0](cms), LOSS=[2],
00081>                     SCS curve number CN=[65],
00082>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00083>                                          LGP=[20](m), MNP=[0.24], SCP=[0](min),
00084>                     Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
00085>                                          LGI=[10](m), MNI=[0.013], SCI=[0](min),
00086>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00087> *%-----------------|-------------------------------------------------------------|
00088> CALIB STANDHYD      ID=[06], NHYD=["EX202"], DT=[1](min), AREA=[0.49](ha),
00089>                     XIMP=[0.30], TIMP=[0.40], DWF=[0.0](cms), LOSS=[2],
00090>                     SCS curve number CN=[65],
00091>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00092>                                          LGP=[20](m), MNP=[0.24], SCP=[0](min),
00093>                     Impervious surfaces: IAimp=[2](mm), SLPI=[2](%),
00094>                                          LGI=[10](m), MNI=[0.013], SCI=[0](min),
00095>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00096> *%-----------------|-------------------------------------------------------------|
00097> CALIB NASHYD        ID=[07], NHYD=["EX203"], DT=[1]min, AREA=[0.14](ha),
00098>                     DWF=[0](cms),  CN/C=[54], IA=[5](mm),
00099>                     N=[3], TP=[0.13]hrs,
00100>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00101> *%-----------------|-------------------------------------------------------------|
00102> CALIB NASHYD        ID=[08], NHYD=["SWM1"], DT=[1]min, AREA=[0.37](ha),
00103>                     DWF=[0](cms),  CN/C=[65], IA=[5](mm),
00104>                     N=[3], TP=[0.16]hrs,
00105>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00106> *%-----------------|-------------------------------------------------------------|
00107> ADD HYD             IDsum=[09], NHYD=["Total"], IDs to add=[01+02+05+06+07+08]
00108> *%-----------------|-------------------------------------------------------------|
00109> *#*****************************************************************************
00110> *#  Third Pipe System
00111> *#*****************************************************************************
00112> COMPUTE DUALHYD     IDin=[09], CINLET=[0.014](cms), NINLET=[2],
00113>                     MAJID=[01], MajNHYD=["ToStorage"],
00114>                     MINID=[02], MinNHYD=["To3rd"],
00115>                     TMJSTO=[270](cu-m)
00116> *%-----------------|-------------------------------------------------------------|
00117> *#*****************************************************************************
00118> *#  Underground and above ground storage
00119> *#*****************************************************************************
00120> ROUTE RESERVOIR     IDout=[03],   NHYD=["Storage"],  IDin=[01],
00121>                     RDT=[1](min),
00122>                           TABLE of ( OUTFLOW-STORAGE ) values
00123>                                     (cms) - (ha-m)
00124>                                  [   0.000 ,  0.000 ]
00125>                                  [   0.033 ,  0.001 ]
00126>                                  [   0.033 ,  0.185 ]
00127>                                  [   0.051 ,  0.205 ]
00128>                                  [   0.056 ,  0.235 ]
00129>                                  [   0.125 ,  0.236 ]
00130>                                  [   0.218 ,  0.340 ]
00131>                                  [   -1  ,  -1  ]  (max twenty pts)
00132>                           IDovf=[04], NHYDovf=["OVFL"]
00133> *%-----------------|-------------------------------------------------------------|
00134>
00135> *%-----------------|-------------------------------------------------------------|
00136> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[10]
00137>                     ["10YR.3hr"]
00138> *%-----------------|-------------------------------------------------------------|
00139> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[25]
00140>                     ["25YR.3hr"]
00141> *%-----------------|-------------------------------------------------------------|
00142> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[50]
00143>                     ["50YR.3hr"]
00144> *%-----------------|-------------------------------------------------------------|
00145> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[100]
00146>                     ["100YR.3hr"]
00147> *%-----------------|-------------------------------------------------------------|
00148> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[250]
00149>                     ["250YR.3hr"]
00150> *%-----------------|-------------------------------------------------------------|
00151> FINISH
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```
00001> ================================================================================
00002>
00003>    SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
00004>    S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>    SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
00006>        S  W W W  M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
00007>    SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9    =========
00008>                                                          9   9  9   9   # 4730904
00009>          StormWater Management HYdrologic Model           999    999    =========
00010>
00011> ********************************************************************************
00012> ***************************** SWMHYMO Ver/4.05  ********************************
00013> *********  A single event and continuous hydrologic simulation model  *********
00014> *********     based on the principles of HYMO and its successors      *********
00015> *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
00016> ********************************************************************************
00017> ********* Distributed by:  J.F. Sabourin and Associates Inc.           *********
00018> *********                  Ottawa,  Ontario: (613) 836-3884            *********
00019> *********                  Gatineau, Quebec: (819) 243-6858            *********
00020> *********                  E-Mail: swmhymo@jfsa.com                    *********
00021> ********************************************************************************
00022>
00023> +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024> +++++++++ Licensed user: Stantec Consulting Ltd. (Kitchener)          +++++++++
00025> +++++++++                  Kitchener             SERIAL#:4730904       +++++++++
00026> +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028> ********************************************************************************
00029> *********            ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
00030> *********            Maximum value for ID numbers  :     10             *********
00031> *********            Max. number of rainfall points: 105408             *********
00032> *********            Max. number of flow points    : 105408             *********
00033> ********************************************************************************
00034>
00035>
00036> **********************   D E T A I L E D   O U T P U T   **********************
00037> ********************************************************************************
00038> *         DATE: 2022-09-20     TIME: 10:00:58     RUN COUNTER: 000078         *
00039> ********************************************************************************
00040> * Input   filename: C:\MODELL~1\14253\SWMHYMO\Prop1.dat                        *
00041> * Output  filename: C:\MODELL~1\14253\SWMHYMO\Prop1.out                        *
00042> * Summary filename: C:\MODELL~1\14253\SWMHYMO\Prop1.sum                        *
00043> * User comments:                                                              *
00044> * 1:_____________________________________________________________________________*
00045> * 2:_____________________________________________________________________________*
00046> * 3:_____________________________________________________________________________*
00047> ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001--------------------------------------------------------------------------
00051> *#*******************************************************************************
00052> *#  Project Name: [Carroll Street]    Project Number: [161414253]
00053> *#  Date        : 2022-09-14
00054> *#  Modeller    : [AKK]
00055> *#  Company     : Stantec Consulting Ltd. (London)
00056> *#  License #   :  4730904
00057> *#*******************************************************************************
00058> *#*******************************************************************************
00059> *#
00060> *#  This model represents the hydologic characteristics of the proposed
00061> *#  conditions in the proposed site plan.
00062> *#  Storm events modeled are:
00063> *#  5YR, 10YR, 25YR, 50YR, 100YR and 250YR 3hr Chicago STORMS (Strathroy IDF)
00064> *#
00065> *#*******************************************************************************
00066>  ** END OF RUN :   4
00067>
00068> ********************************************************************************
00069>
00070>
00071>
00072>
00073>
00074> --------------------
00075> | START            |  Project  dir.: C:\MODELL~1\14253\SWMHYMO\
00076> --------------------  Rainfall dir.: C:\MODELL~1\14253\SWMHYMO\
00077>     TZERO =   .00 hrs on        0
00078>     METOUT=   2 (output = METRIC)
00079>     NRUN  = 005
00080>     NSTORM=   1
00081>            #  1=5yr.3hr
00082> --------------------------------------------------------------------------------
00083> 005:0002--------------------------------------------------------------------------
00084> *#*******************************************************************************
00085> *#  Project Name: [Carroll Street]    Project Number: [161414253]
00086> *#  Date        : 2022-09-14
00087> *#  Modeller    : [AKK]
00088> *#  Company     : Stantec Consulting Ltd. (London)
00089> *#  License #   :  4730904
00090> *#*******************************************************************************
00091> *#*******************************************************************************
00092> *#
00093> *#  This model represents the hydologic characteristics of the proposed
00094> *#  conditions in the proposed site plan.
00095> *#  Storm events modeled are:
00096> *#  5YR, 10YR, 25YR, 50YR, 100YR and 250YR 3hr Chicago STORMS (Strathroy IDF)
00097> *#
00098> *#*******************************************************************************
00099> --------------------------------------------------------------------------------
00100> 005:0002--------------------------------------------------------------------------
00101> ---------------------
00102> | READ STORM       |    Filename: 5-yr, 3hr Chicago Storm from Strathroy I
00103> | Ptotal=  44.36 mm|    Comments: 5-yr, 3hr Chicago Storm from Strathroy I
00104> ---------------------
00105>                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00106>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00107>                 .08   3.263 |    .83  20.866 |   1.58  10.120 |   2.33   4.397
00108>                 .17   3.582 |    .92  49.986 |   1.67   8.819 |   2.42   4.145
00109>                 .25   3.976 |   1.00 142.775 |   1.75   7.817 |   2.50   3.921
00110>                 .33   4.476 |   1.08  64.719 |   1.83   7.022 |   2.58   3.722
00111>                 .42   5.130 |   1.17  35.904 |   1.92   6.377 |   2.67   3.543
00112>                 .50   6.023 |   1.25  24.205 |   2.00   5.844 |   2.75   3.382
00113>                 .58   7.313 |   1.33  18.064 |   2.08   5.395 |   2.83   3.235
00114>                 .67   9.334 |   1.42  14.343 |   2.17   5.013 |   2.92   3.102
00115>                 .75  12.924 |   1.50  11.871 |   2.25   4.684 |   3.00   2.979
00116>
00117> --------------------------------------------------------------------------------
00118> 005:0003--------------------------------------------------------------------------
00119> *#*******************************************************************************
00120> *#
00121> *#  Existing conditions
00122> *#
00123> *#*******************************************************************************
00124> ----------------------
00125> | CALIB NASHYD       |   Area     (ha)=     .17   Curve Number   (CN)=54.00
00126> | 07:A102   DT= 1.00 |   Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00127> ----------------------   U.H. Tp(hrs)=    .140
00128>
00129>      Unit Hyd Qpeak  (cms)=     .046
00130>
00131>      PEAK FLOW       (cms)=     .004 (i)
00132>      TIME TO PEAK    (hrs)=    1.200
00133>      RUNOFF VOLUME    (mm)=    6.055
00134>      TOTAL RAINFALL   (mm)=   44.356
00135>      RUNOFF COEFFICIENT   =     .137
00136>
00137>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00138>
00139> --------------------------------------------------------------------------------
00140> 005:0004--------------------------------------------------------------------------
00141> ----------------------
00142> | CALIB NASHYD       |   Area     (ha)=     .64   Curve Number   (CN)=54.00
00143> | 07:A103   DT= 1.00 |   Ia       (mm)=    5.000   # of Linear Res.(N)= 3.00
00144> ----------------------   U.H. Tp(hrs)=    .190
00145>
00146>      Unit Hyd Qpeak  (cms)=     .129
00147>
00148>      PEAK FLOW       (cms)=     .013 (i)
00149>      TIME TO PEAK    (hrs)=    1.267
00150>      RUNOFF VOLUME    (mm)=    6.056
00151>      TOTAL RAINFALL   (mm)=   44.356
00152>      RUNOFF COEFFICIENT   =     .137
00153>
00154>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00155>
00156> --------------------------------------------------------------------------------
00157> 005:0005--------------------------------------------------------------------------
00158> *#*******************************************************************************
00159> *#
00160> *#  Proposed conditions
00161> *#
00162> *#*******************************************************************************
00163> ----------------------
00164> | CALIB STANDHYD     |   Area     (ha)=    5.83
00165> | 01:A201   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
00166> ----------------------
00167>                                IMPERVIOUS    PERVIOUS (i)
00168>      Surface Area     (ha)=       2.91         2.91
00169>      Dep. Storage     (mm)=       2.00         5.00
00170>      Average Slope     (%)=       2.00         2.00
00171>      Length            (m)=      10.00        20.00
00172>      Mannings n            =       .013         .240
00173>
00174>      Max.eff.Inten.(mm/hr)=     142.77        28.05
00175>                over (min)          1.00         8.00
00176>      Storage Coeff.  (min)=        .45 (ii)     8.01 (ii)
00177>      Unit Hyd. Tpeak (min)=       1.00         8.00
00178>      Unit Hyd. peak  (cms)=       1.51          .14
00179>                                                          *TOTALS*
00180>      PEAK FLOW       (cms)=        .92          .15          .974 (iii)
00181>      TIME TO PEAK    (hrs)=       1.00         1.17         1.000
00182>      RUNOFF VOLUME    (mm)=      42.36        10.48        23.229
00183>      TOTAL RAINFALL   (mm)=      44.36        44.36        44.356
00184>      RUNOFF COEFFICIENT   =        .95          .24          .524
00185>
00186>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00187>            CN* =  65.0    Ia = Dep. Storage  (Above)
00188>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00189>            THAN THE STORAGE COEFFICIENT.
00190>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00191>
00192> --------------------------------------------------------------------------------
00193> 005:0006--------------------------------------------------------------------------
00194> ----------------------
00195> | CALIB STANDHYD     |   Area     (ha)=    1.16
00196> | 02:A202   DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   60.00
00197> ----------------------
00198>                                IMPERVIOUS    PERVIOUS (i)
00199>      Surface Area     (ha)=        .93          .23
00200>      Dep. Storage     (mm)=       2.00         5.00
00201>      Average Slope     (%)=       2.00         2.00
00202>      Length            (m)=      50.00        20.00
00203>      Mannings n            =       .013         .240
00204>
00205>      Max.eff.Inten.(mm/hr)=     142.77        82.04
00206>                over (min)          1.00         6.00
00207>      Storage Coeff.  (min)=       1.19 (ii)    6.11 (ii)
00208>      Unit Hyd. Tpeak (min)=       1.00         6.00
00209>      Unit Hyd. peak  (cms)=        .97          .19
00210>                                                          *TOTALS*
00211>      PEAK FLOW       (cms)=        .27          .04          .292 (iii)
00212>      TIME TO PEAK    (hrs)=       1.00         1.08         1.000
00213>      RUNOFF VOLUME    (mm)=      42.36        15.89        31.770
00214>      TOTAL RAINFALL   (mm)=      44.36        44.36        44.356
00215>      RUNOFF COEFFICIENT   =        .95          .36          .716
00216>
00217>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00218>            CN* =  65.0    Ia = Dep. Storage  (Above)
00219>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00220>            THAN THE STORAGE COEFFICIENT.
00221>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00222>
00223> --------------------------------------------------------------------------------
00224> 005:0007--------------------------------------------------------------------------
00225> ----------------------
00226> | CALIB STANDHYD     |   Area     (ha)=     .21
00227> | 03:A203   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
00228> ----------------------
00229>                                IMPERVIOUS    PERVIOUS (i)
00230>      Surface Area     (ha)=        .10          .10
00231>      Dep. Storage     (mm)=       2.00         5.00
00232>      Average Slope     (%)=       2.00         2.00
00233>      Length            (m)=      10.00        20.00
00234>      Mannings n            =       .013         .240
00235>
00236>      Max.eff.Inten.(mm/hr)=     142.77        28.05
00237>                over (min)          1.00         8.00
00238>      Storage Coeff.  (min)=        .45 (ii)     8.01 (ii)
00239>      Unit Hyd. Tpeak (min)=       1.00         8.00
00240>      Unit Hyd. peak  (cms)=       1.51          .14
00241>                                                          *TOTALS*
00242>      PEAK FLOW       (cms)=        .03          .01          .035 (iii)
00243>      TIME TO PEAK    (hrs)=       1.00         1.17         1.000
00244>      RUNOFF VOLUME    (mm)=      42.36        10.48        23.229
00245>      TOTAL RAINFALL   (mm)=      44.36        44.36        44.356
00246>      RUNOFF COEFFICIENT   =        .95          .24          .524
00247>
00248>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00249>            CN* =  65.0    Ia = Dep. Storage  (Above)
00250>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00251>            THAN THE STORAGE COEFFICIENT.
00252>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00253>
00254> --------------------------------------------------------------------------------
```

```
00255> 005:0008-----------------------------------------------------------------------------
00256> ----------------------
00257> | CALIB STANDHYD     |   Area    (ha)=     .08
00258> | 04:A204   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
00259> ----------------------
00260>                              IMPERVIOUS    PERVIOUS (i)
00261>      Surface Area     (ha)=        .04         .04
00262>      Dep. Storage     (mm)=       2.00        5.00
00263>      Average Slope     (%)=       2.00        2.00
00264>      Length            (m)=      10.00       30.00
00265>      Mannings n            =       .013        .240
00266>
00267>      Max.eff.Inten.(mm/hr)=     142.77       26.91
00268>                   over (min)        1.00       10.00
00269>      Storage Coeff.  (min)=        .45 (ii)   10.25 (ii)
00270>      Unit Hyd. Tpeak (min)=       1.00       10.00
00271>      Unit Hyd. peak  (cms)=       1.51         .11
00272>                                                      *TOTALS*
00273>      PEAK FLOW       (cms)=        .01         .00        .013 (iii)
00274>      TIME TO PEAK    (hrs)=       1.00        1.20       1.000
00275>      RUNOFF VOLUME    (mm)=      42.36       10.48      23.229
00276>      TOTAL RAINFALL   (mm)=      44.36       44.36      44.356
00277>      RUNOFF COEFFICIENT   =        .95         .24        .524
00278>
00279>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00280>            CN* =  65.0    Ia = Dep. Storage  (Above)
00281>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00282>            THAN THE STORAGE COEFFICIENT.
00283>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00284>
00285> -----------------------------------------------------------------------------
00286> 005:0009-----------------------------------------------------------------------------
00287> ----------------------
00288> | CALIB STANDHYD     |   Area    (ha)=     .19
00289> | 05:EX201  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
00290> ----------------------
00291>                              IMPERVIOUS    PERVIOUS (i)
00292>      Surface Area     (ha)=        .08         .11
00293>      Dep. Storage     (mm)=       2.00        5.00
00294>      Average Slope     (%)=       2.00        2.00
00295>      Length            (m)=      10.00       20.00
00296>      Mannings n            =       .013        .240
00297>
00298>      Max.eff.Inten.(mm/hr)=     142.77       26.48
00299>                   over (min)        1.00        8.00
00300>      Storage Coeff.  (min)=        .45 (ii)    8.18 (ii)
00301>      Unit Hyd. Tpeak (min)=       1.00        8.00
00302>      Unit Hyd. peak  (cms)=       1.51         .14
00303>                                                      *TOTALS*
00304>      PEAK FLOW       (cms)=        .02         .01        .024 (iii)
00305>      TIME TO PEAK    (hrs)=       1.00        1.17       1.000
00306>      RUNOFF VOLUME    (mm)=      42.36       10.21      19.852
00307>      TOTAL RAINFALL   (mm)=      44.36       44.36      44.356
00308>      RUNOFF COEFFICIENT   =        .95         .23        .448
00309>
00310>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00311>            CN* =  65.0    Ia = Dep. Storage  (Above)
00312>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00313>            THAN THE STORAGE COEFFICIENT.
00314>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00315>
00316> -----------------------------------------------------------------------------
00317> 005:0010-----------------------------------------------------------------------------
00318> ----------------------
00319> | CALIB STANDHYD     |   Area    (ha)=     .49
00320> | 06:EX202  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
00321> ----------------------
00322>                              IMPERVIOUS    PERVIOUS (i)
00323>      Surface Area     (ha)=        .20         .29
00324>      Dep. Storage     (mm)=       2.00        5.00
00325>      Average Slope     (%)=       2.00        2.00
00326>      Length            (m)=      10.00       20.00
00327>      Mannings n            =       .013        .240
00328>
00329>      Max.eff.Inten.(mm/hr)=     142.77       26.48
00330>                   over (min)        1.00        8.00
00331>      Storage Coeff.  (min)=        .45 (ii)    8.18 (ii)
00332>      Unit Hyd. Tpeak (min)=       1.00        8.00
00333>      Unit Hyd. peak  (cms)=       1.51         .14
00334>                                                      *TOTALS*
00335>      PEAK FLOW       (cms)=        .06         .01        .063 (iii)
00336>      TIME TO PEAK    (hrs)=       1.00        1.17       1.000
00337>      RUNOFF VOLUME    (mm)=      42.36       10.21      19.852
00338>      TOTAL RAINFALL   (mm)=      44.36       44.36      44.356
00339>      RUNOFF COEFFICIENT   =        .95         .23        .448
00340>
00341>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00342>            CN* =  65.0    Ia = Dep. Storage  (Above)
00343>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00344>            THAN THE STORAGE COEFFICIENT.
00345>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00346>
00347> -----------------------------------------------------------------------------
00348> 005:0011-----------------------------------------------------------------------------
00349> ----------------------
00350> | CALIB NASHYD       |   Area    (ha)=     .14   Curve Number   (CN)=54.00
00351> | 07:EX203  DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
00352> ----------------------   U.H. Tp(hrs)=    .130
00353>
00354>      Unit Hyd Qpeak  (cms)=     .041
00355>
00356>      PEAK FLOW       (cms)=     .003 (i)
00357>      TIME TO PEAK    (hrs)=    1.183
00358>      RUNOFF VOLUME    (mm)=    6.055
00359>      TOTAL RAINFALL   (mm)=   44.356
00360>      RUNOFF COEFFICIENT   =     .137
00361>
00362>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00363>
00364> -----------------------------------------------------------------------------
00365> 005:0012-----------------------------------------------------------------------------
00366> ----------------------
00367> | CALIB NASHYD       |   Area    (ha)=     .37   Curve Number   (CN)=65.00
00368> | 08:SWM1   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
00369> ----------------------   U.H. Tp(hrs)=    .160
00370>
00371>      Unit Hyd Qpeak  (cms)=     .088
00372>
00373>      PEAK FLOW       (cms)=     .012 (i)
00374>      TIME TO PEAK    (hrs)=    1.217
00375>      RUNOFF VOLUME    (mm)=    8.794
00376>      TOTAL RAINFALL   (mm)=   44.356
00377>      RUNOFF COEFFICIENT   =     .198
00378>
00379>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00380>
00381> -----------------------------------------------------------------------------

00382> 005:0013-----------------------------------------------------------------------------
00383> ------------------------
00384> | ADD HYD (Total     ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
00385> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
00386>                        ID1 01:A201          5.83     .974    1.00  23.23    .000
00387>                       +ID2 02:A202          1.16     .292    1.00  31.77    .000
00388>                       +ID3 05:EX201          .19     .024    1.00  19.85    .000
00389>                       +ID4 06:EX202          .49     .063    1.00  19.85    .000
00390>                       +ID5 07:EX203          .14     .003    1.18   6.05    .000
00391>                       +ID6 08:SWM1           .37     .012    1.22   8.79    .000
00392>                        ==========================================================
00393>                        SUM 09:Total          8.18    1.357    1.00  23.21    .000
00394>
00395>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00396>
00397> -----------------------------------------------------------------------------
00398> 005:0014-----------------------------------------------------------------------------
00399> *#*****************************************************************************
00400> *#  Third Pipe System
00401> *#*****************************************************************************
00402> ----------------------
00403> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .014  (cms)
00404> | TotalHyd 09:Total  |   Number of inlets in system [NINLET] =      2
00405> ----------------------   Total minor system capacity          =    .028  (cms)
00406>                          Total major system storage [TMJSTO] =    270.(cu.m.)
00407>
00408>                    ID: NHYD        AREA     QPEAK     TPEAK      R.V.       DWF
00409>                                    (ha)     (cms)     (hrs)      (mm)     (cms)
00410>      TOTAL HYD.   09:Total         8.18     1.357     1.000    23.212     .000
00411>      ================================================================================
00412>      MAJOR SYST   01:ToStor        5.86     1.329     1.000    23.212     .000
00413>      MINOR SYST   02:To3rd         2.32      .028      .483    23.223     .000
00414>
00415>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00416>
00417>      Maximum MAJOR SYSTEM storage used =     270.(cu.m.)
00418>
00419> -----------------------------------------------------------------------------
00420> 005:0015-----------------------------------------------------------------------------
00421> *#*****************************************************************************
00422> *#  Underground and above ground storage
00423> *#*****************************************************************************
00424> ----------------------
00425> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00426> |  IN>01:(ToStor)    |
00427> | OUT<03:(Storag)    |    =========  OUTFLOW STORAGE TABLE  =========
00428> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00429>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
00430>                              .000  .0000E+00    |     .056  .2350E+00
00431>                              .033  .1000E-02    |     .125  .2360E+00
00432>                              .033  .1850E+00    |     .218  .3400E+00
00433>                              .051  .2050E+00    |     .000  .0000E+00
00434>
00435>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00436>      ---------------------      (ha)     (cms)     (hrs)       (mm)
00437>      INFLOW >01: (ToStor)       5.86     1.329     1.000     23.212
00438>      OUTFLOW<03: (Storag)       5.86      .033      .933     23.212
00439>     OVERFLOW<04: (OVFL  )        .00      .000      .000       .000
00440>
00441>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00442>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00443>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00444>
00445>
00446>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.483
00447>                    TIME SHIFT OF PEAK FLOW         (min)=    -4.00
00448>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1127E+00
00449>
00450> -----------------------------------------------------------------------------
00451> 005:0016-----------------------------------------------------------------------------
00452>   ** END OF RUN :   9
00453>
00454> *****************************************************************************
00455>
00456>
00457>
00458>
00459>
00460> --------------------
00461> | START            |  Project  dir.: C:\MODELL~1\14253\SWMHYMO\
00462> --------------------  Rainfall dir.: C:\MODELL~1\14253\SWMHYMO\
00463>     TZERO =   .00 hrs on        0
00464>     METOUT=   2 (output = METRIC)
00465>     NRUN  = 010
00466>     NSTORM=   1
00467>              #  1=10YR.3hr
00468> -----------------------------------------------------------------------------
00469> 010:0002-----------------------------------------------------------------------------
00470> *#*****************************************************************************
00471> *#  Project Name: [Carroll Street]    Project Number: [161414253]
00472> *#  Date        : 2022-09-14
00473> *#  Modeller    : [AKK]
00474> *#  Company     : Stantec Consulting Ltd. (London)
00475> *#  License #   :  4730904
00476> *#*****************************************************************************
00477> *#*****************************************************************************
00478> *#
00479> *#  This model represents the hydologic characteristics of the proposed
00480> *#  conditions in the proposed site plan.
00481> *#  Storm events modeled are:
00482> *#  5YR, 10YR, 25YR, 50YR, 100YR and 250YR 3hr Chicago STORMS (Strathroy IDF)
00483> *#
00484> *#*****************************************************************************
00485> -----------------------------------------------------------------------------
00486> 010:0002-----------------------------------------------------------------------------
00487> --------------------
00488> | READ STORM       |    Filename: 10-yr, 3hr Chicago Storm from Strathroy
00489> | Ptotal=  51.88 mm|    Comments: 10-yr, 3hr Chicago Storm from Strathroy
00490> --------------------
00491>                TIME    RAIN |  TIME    RAIN |  TIME    RAIN |  TIME    RAIN
00492>                 hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr |   hrs   mm/hr
00493>                 .08   3.605 |   .83  24.391 |  1.58  11.585 |  2.33   4.903
00494>                 .17   3.969 |   .92  59.464 |  1.67  10.053 |  2.42   4.613
00495>                 .25   4.420 |  1.00 170.842 |  1.75   8.876 |  2.50   4.357
00496>                 .33   4.994 |  1.08  77.235 |  1.83   7.947 |  2.58   4.129
00497>                 .42   5.748 |  1.17  42.478 |  1.92   7.195 |  2.67   3.925
00498>                 .50   6.783 |  1.25  28.394 |  2.00   6.575 |  2.75   3.741
00499>                 .58   8.287 |  1.33  21.032 |  2.08   6.055 |  2.83   3.574
00500>                 .67  10.659 |  1.42  16.593 |  2.17   5.613 |  2.92   3.422
00501>                 .75  14.907 |  1.50  13.657 |  2.25   5.233 |  3.00   3.283
00502>
00503> -----------------------------------------------------------------------------
00504> 010:0003-----------------------------------------------------------------------------
00505> *#*****************************************************************************
00506> *#
00507> *#  Existing conditions
00508> *#
```

```
00509> *#*************************************************************************
00510> ----------------------
00511> | CALIB NASHYD       |   Area    (ha)=     .17   Curve Number    (CN)=54.00
00512> | 07:A102   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
00513> ----------------------   U.H. Tp(hrs)=    .140
00514>
00515>      Unit Hyd Qpeak  (cms)=     .046
00516>
00517>      PEAK FLOW       (cms)=     .006 (i)
00518>      TIME TO PEAK    (hrs)=    1.183
00519>      RUNOFF VOLUME    (mm)=    8.346
00520>      TOTAL RAINFALL   (mm)=   51.878
00521>      RUNOFF COEFFICIENT   =     .161
00522>
00523>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00524>
00525> -------------------------------------------------------------------------------
00526> 010:0004---------------------------------------------------------------------
00527> ----------------------
00528> | CALIB NASHYD       |   Area    (ha)=     .64   Curve Number    (CN)=54.00
00529> | 07:A103   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
00530> ----------------------   U.H. Tp(hrs)=    .190
00531>
00532>      Unit Hyd Qpeak  (cms)=     .129
00533>
00534>      PEAK FLOW       (cms)=     .018 (i)
00535>      TIME TO PEAK    (hrs)=    1.267
00536>      RUNOFF VOLUME    (mm)=    8.347
00537>      TOTAL RAINFALL   (mm)=   51.878
00538>      RUNOFF COEFFICIENT   =     .161
00539>
00540>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00541>
00542> -------------------------------------------------------------------------------
00543> 010:0005---------------------------------------------------------------------
00544> *#*************************************************************************
00545> *#
00546> *#  Proposed conditions
00547> *#
00548> *#*************************************************************************
00549> ----------------------
00550> | CALIB STANDHYD     |   Area    (ha)=    5.83
00551> | 01:A201   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
00552> ----------------------
00553>                              IMPERVIOUS    PERVIOUS (i)
00554>      Surface Area     (ha)=       2.91         2.91
00555>      Dep. Storage     (mm)=       2.00         5.00
00556>      Average Slope     (%)=       2.00         2.00
00557>      Length            (m)=      10.00        20.00
00558>      Mannings n            =       .013         .240
00559>
00560>      Max.eff.Inten.(mm/hr)=     170.84        40.50
00561>                  over (min)        1.00         7.00
00562>      Storage Coeff.  (min)=        .42 (ii)    6.94 (ii)
00563>      Unit Hyd. Tpeak (min)=       1.00         7.00
00564>      Unit Hyd. peak  (cms)=       1.54          .16
00565>                                                        *TOTALS*
00566>      PEAK FLOW       (cms)=       1.11          .22      1.197 (iii)
00567>      TIME TO PEAK    (hrs)=       1.00         1.12      1.000
00568>      RUNOFF VOLUME    (mm)=      49.88        14.08     28.399
00569>      TOTAL RAINFALL   (mm)=      51.88        51.88     51.878
00570>      RUNOFF COEFFICIENT   =        .96          .27       .547
00571>
00572>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00573>            CN* =  65.0    Ia = Dep. Storage  (Above)
00574>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00575>            THAN THE STORAGE COEFFICIENT.
00576>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00577>
00578> -------------------------------------------------------------------------------
00579> 010:0006---------------------------------------------------------------------
00580> ----------------------
00581> | CALIB STANDHYD     |   Area    (ha)=    1.16
00582> | 02:A202   DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   60.00
00583> ----------------------
00584>                              IMPERVIOUS    PERVIOUS (i)
00585>      Surface Area     (ha)=        .93          .23
00586>      Dep. Storage     (mm)=       2.00         5.00
00587>      Average Slope     (%)=       2.00         2.00
00588>      Length            (m)=      50.00        20.00
00589>      Mannings n            =       .013         .240
00590>
00591>      Max.eff.Inten.(mm/hr)=     170.84       120.39
00592>                  over (min)        1.00         5.00
00593>      Storage Coeff.  (min)=       1.11 (ii)    5.32 (ii)
00594>      Unit Hyd. Tpeak (min)=       1.00         5.00
00595>      Unit Hyd. peak  (cms)=       1.01          .22
00596>                                                        *TOTALS*
00597>      PEAK FLOW       (cms)=        .33          .05       .361 (iii)
00598>      TIME TO PEAK    (hrs)=       1.00         1.07      1.000
00599>      RUNOFF VOLUME    (mm)=      49.88        20.70     38.209
00600>      TOTAL RAINFALL   (mm)=      51.88        51.88     51.878
00601>      RUNOFF COEFFICIENT   =        .96          .40       .737
00602>
00603>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00604>            CN* =  65.0    Ia = Dep. Storage  (Above)
00605>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00606>            THAN THE STORAGE COEFFICIENT.
00607>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00608>
00609> -------------------------------------------------------------------------------
00610> 010:0007---------------------------------------------------------------------
00611> ----------------------
00612> | CALIB STANDHYD     |   Area    (ha)=     .21
00613> | 03:A203   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
00614> ----------------------
00615>                              IMPERVIOUS    PERVIOUS (i)
00616>      Surface Area     (ha)=        .10          .10
00617>      Dep. Storage     (mm)=       2.00         5.00
00618>      Average Slope     (%)=       2.00         2.00
00619>      Length            (m)=      10.00        20.00
00620>      Mannings n            =       .013         .240
00621>
00622>      Max.eff.Inten.(mm/hr)=     170.84        40.50
00623>                  over (min)        1.00         7.00
00624>      Storage Coeff.  (min)=        .42 (ii)    6.94 (ii)
00625>      Unit Hyd. Tpeak (min)=       1.00         7.00
00626>      Unit Hyd. peak  (cms)=       1.54          .16
00627>                                                        *TOTALS*
00628>      PEAK FLOW       (cms)=        .04          .01       .043 (iii)
00629>      TIME TO PEAK    (hrs)=       1.00         1.12      1.000
00630>      RUNOFF VOLUME    (mm)=      49.88        14.08     28.399
00631>      TOTAL RAINFALL   (mm)=      51.88        51.88     51.878
00632>      RUNOFF COEFFICIENT   =        .96          .27       .547
00633>
00634>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00635>            CN* =  65.0    Ia = Dep. Storage  (Above)
00636>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00637>            THAN THE STORAGE COEFFICIENT.
00638>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00639>
00640> -------------------------------------------------------------------------------
00641> 010:0008---------------------------------------------------------------------
00642> ----------------------
00643> | CALIB STANDHYD     |   Area    (ha)=     .08
00644> | 04:A204   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
00645> ----------------------
00646>                              IMPERVIOUS    PERVIOUS (i)
00647>      Surface Area     (ha)=        .04          .04
00648>      Dep. Storage     (mm)=       2.00         5.00
00649>      Average Slope     (%)=       2.00         2.00
00650>      Length            (m)=      10.00        30.00
00651>      Mannings n            =       .013         .240
00652>
00653>      Max.eff.Inten.(mm/hr)=     170.84        38.73
00654>                  over (min)        1.00         9.00
00655>      Storage Coeff.  (min)=        .42 (ii)    8.89 (ii)
00656>      Unit Hyd. Tpeak (min)=       1.00         9.00
00657>      Unit Hyd. peak  (cms)=       1.54          .13
00658>                                                        *TOTALS*
00659>      PEAK FLOW       (cms)=        .02          .00       .016 (iii)
00660>      TIME TO PEAK    (hrs)=       1.00         1.17      1.000
00661>      RUNOFF VOLUME    (mm)=      49.88        14.08     28.399
00662>      TOTAL RAINFALL   (mm)=      51.88        51.88     51.878
00663>      RUNOFF COEFFICIENT   =        .96          .27       .547
00664>
00665>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00666>            CN* =  65.0    Ia = Dep. Storage  (Above)
00667>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00668>            THAN THE STORAGE COEFFICIENT.
00669>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00670>
00671> -------------------------------------------------------------------------------
00672> 010:0009---------------------------------------------------------------------
00673> ----------------------
00674> | CALIB STANDHYD     |   Area    (ha)=     .19
00675> | 05:EX201  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
00676> ----------------------
00677>                              IMPERVIOUS    PERVIOUS (i)
00678>      Surface Area     (ha)=        .08          .11
00679>      Dep. Storage     (mm)=       2.00         5.00
00680>      Average Slope     (%)=       2.00         2.00
00681>      Length            (m)=      10.00        20.00
00682>      Mannings n            =       .013         .240
00683>
00684>      Max.eff.Inten.(mm/hr)=     170.84        38.31
00685>                  over (min)        1.00         7.00
00686>      Storage Coeff.  (min)=        .42 (ii)    7.09 (ii)
00687>      Unit Hyd. Tpeak (min)=       1.00         7.00
00688>      Unit Hyd. peak  (cms)=       1.54          .16
00689>                                                        *TOTALS*
00690>      PEAK FLOW       (cms)=        .03          .01       .030 (iii)
00691>      TIME TO PEAK    (hrs)=       1.00         1.13      1.000
00692>      RUNOFF VOLUME    (mm)=      49.88        13.74     24.583
00693>      TOTAL RAINFALL   (mm)=      51.88        51.88     51.878
00694>      RUNOFF COEFFICIENT   =        .96          .26       .474
00695>
00696>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00697>            CN* =  65.0    Ia = Dep. Storage  (Above)
00698>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00699>            THAN THE STORAGE COEFFICIENT.
00700>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00701>
00702> -------------------------------------------------------------------------------
00703> 010:0010---------------------------------------------------------------------
00704> ----------------------
00705> | CALIB STANDHYD     |   Area    (ha)=     .49
00706> | 06:EX202  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
00707> ----------------------
00708>                              IMPERVIOUS    PERVIOUS (i)
00709>      Surface Area     (ha)=        .20          .29
00710>      Dep. Storage     (mm)=       2.00         5.00
00711>      Average Slope     (%)=       2.00         2.00
00712>      Length            (m)=      10.00        20.00
00713>      Mannings n            =       .013         .240
00714>
00715>      Max.eff.Inten.(mm/hr)=     170.84        38.31
00716>                  over (min)        1.00         7.00
00717>      Storage Coeff.  (min)=        .42 (ii)    7.09 (ii)
00718>      Unit Hyd. Tpeak (min)=       1.00         7.00
00719>      Unit Hyd. peak  (cms)=       1.54          .16
00720>                                                        *TOTALS*
00721>      PEAK FLOW       (cms)=        .07          .02       .078 (iii)
00722>      TIME TO PEAK    (hrs)=       1.00         1.13      1.000
00723>      RUNOFF VOLUME    (mm)=      49.88        13.74     24.583
00724>      TOTAL RAINFALL   (mm)=      51.88        51.88     51.878
00725>      RUNOFF COEFFICIENT   =        .96          .26       .474
00726>
00727>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00728>            CN* =  65.0    Ia = Dep. Storage  (Above)
00729>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00730>            THAN THE STORAGE COEFFICIENT.
00731>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00732>
00733> -------------------------------------------------------------------------------
00734> 010:0011---------------------------------------------------------------------
00735> ----------------------
00736> | CALIB NASHYD       |   Area    (ha)=     .14   Curve Number    (CN)=54.00
00737> | 07:EX203  DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
00738> ----------------------   U.H. Tp(hrs)=    .130
00739>
00740>      Unit Hyd Qpeak  (cms)=     .041
00741>
00742>      PEAK FLOW       (cms)=     .005 (i)
00743>      TIME TO PEAK    (hrs)=    1.167
00744>      RUNOFF VOLUME    (mm)=    8.346
00745>      TOTAL RAINFALL   (mm)=   51.878
00746>      RUNOFF COEFFICIENT   =     .161
00747>
00748>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00749>
00750> -------------------------------------------------------------------------------
00751> 010:0012---------------------------------------------------------------------
00752> ----------------------
00753> | CALIB NASHYD       |   Area    (ha)=     .37   Curve Number    (CN)=65.00
00754> | 08:SWM1   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
00755> ----------------------   U.H. Tp(hrs)=    .160
00756>
00757>      Unit Hyd Qpeak  (cms)=     .088
00758>
00759>      PEAK FLOW       (cms)=     .017 (i)
00760>      TIME TO PEAK    (hrs)=    1.217
00761>      RUNOFF VOLUME    (mm)=   11.965
00762>      TOTAL RAINFALL   (mm)=   51.878
```

```
      RUNOFF COEFFICIENT   =     .231

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

------------------------------------------------------------------------------
010:0013----------------------------------------------------------------------
----------------------
| ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:A201          5.83    1.197    1.00  28.40    .000
                     +ID2 02:A202           1.16     .361    1.00  38.21    .000
                     +ID3 05:EX201           .19     .030    1.00  24.58    .000
                     +ID4 06:EX202           .49     .078    1.00  24.58    .000
                     +ID5 07:EX203           .14     .005    1.17   8.35    .000
                     +ID6 08:SWM1            .37     .017    1.22  11.97    .000
                      ================================================
                      SUM 09:Total          8.18    1.672    1.00  28.39    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0014----------------------------------------------------------------------
*#**************************************************************************
*#  Third Pipe System
*#**************************************************************************
----------------------
| COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .014  (cms)
| TotalHyd 09:Total  |   Number of inlets in system [NINLET] =      2
----------------------   Total minor system capacity          =    .028  (cms)
                         Total major system storage [TMJSTO] =    270.(cu.m.)

                  ID: NHYD        AREA     QPEAK     TPEAK      R.V.       DWF
                                   (ha)     (cms)     (hrs)      (mm)     (cms)
     TOTAL HYD.   09:Total         8.18     1.672     1.000    28.386     .000
     ================================================================
     MAJOR SYST   01:ToStor        6.27     1.644     1.000    28.386     .000
     MINOR SYST   02:To3rd         1.91      .028      .450    28.451     .000

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     Maximum MAJOR SYSTEM storage used =     270.(cu.m.)

------------------------------------------------------------------------------
010:0015----------------------------------------------------------------------
*#**************************************************************************
*#  Underground and above ground storage
*#**************************************************************************
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>01:(ToStor)    |
| OUT<03:(Storag)    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
                             .000  .0000E+00    |     .056  .2350E+00
                             .033  .1000E-02    |     .125  .2360E+00
                             .033  .1850E+00    |     .218  .3400E+00
                             .051  .2050E+00    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (ToStor)       6.27     1.644     1.000     28.386
     OUTFLOW<03: (Storag)       6.27      .033      .933     28.386
    OVERFLOW<04: (OVFL  )        .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.007
                    TIME SHIFT OF PEAK FLOW         (min)=    -4.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1534E+00

------------------------------------------------------------------------------
010:0016----------------------------------------------------------------------
------------------------------------------------------------------------------
010:0002----------------------------------------------------------------------
  ** END OF RUN :  24

 ****************************************************************************
```

```
--------------------
| START            |  Project  dir.: C:\MODELL~1\14253\SWMHYMO\
--------------------  Rainfall dir.: C:\MODELL~1\14253\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 025
    NSTORM=   1
          #  1=25YR.3hr
------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [Carroll Street]    Project Number: [161414253]
*#  Date        : 2022-09-14
*#  Modeller    : [AKK]
*#  Company     : Stantec Consulting Ltd. (London)
*#  License #   :  4730904
*#**************************************************************************
*#**************************************************************************
*#
*#  This model represents the hydologic characteristics of the proposed
*#  conditions in the proposed site plan.
*#  Storm events modeled are:
*#  5YR, 10YR, 25YR, 50YR, 100YR and 250YR 3hr Chicago STORMS (Strathroy IDF)
*#
*#**************************************************************************
------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 25-yr, 3hr Chicago Storm from Strathroy
| Ptotal=  61.64 mm|    Comments: 25-yr, 3hr Chicago Storm from Strathroy
--------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                .08   4.019 |    .83  29.207 |   1.58  13.537 |   2.33   5.534
                .17   4.442 |    .92  72.190 |   1.67  11.682 |   2.42   5.194
                .25   4.968 |   1.00 205.331 |   1.75  10.264 |   2.50   4.894
                .33   5.641 |   1.08  93.891 |   1.83   9.148 |   2.58   4.628
                .42   6.531 |   1.17  51.449 |   1.92   8.249 |   2.67   4.390
                .50   7.759 |   1.25  34.127 |   2.00   7.511 |   2.75   4.176
                .58   9.557 |   1.33  25.078 |   2.08   6.893 |   2.83   3.983
                .67  12.416 |   1.42  19.638 |   2.17   6.371 |   2.92   3.807
                .75  17.581 |   1.50  16.054 |   2.25   5.922 |   3.00   3.647
```

```

------------------------------------------------------------------------------
025:0003----------------------------------------------------------------------
*#**************************************************************************
*#
*#  Existing conditions
*#
*#**************************************************************************
----------------------
| CALIB NASHYD       |   Area    (ha)=     .17   Curve Number   (CN)=54.00
| 07:A102   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .140

     Unit Hyd Qpeak  (cms)=     .046

     PEAK FLOW       (cms)=     .008 (i)
     TIME TO PEAK    (hrs)=    1.183
     RUNOFF VOLUME    (mm)=   11.750
     TOTAL RAINFALL   (mm)=   61.642
     RUNOFF COEFFICIENT   =     .191

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

------------------------------------------------------------------------------
025:0004----------------------------------------------------------------------
----------------------
| CALIB NASHYD       |   Area    (ha)=     .64   Curve Number   (CN)=54.00
| 07:A103   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .129

     PEAK FLOW       (cms)=     .027 (i)
     TIME TO PEAK    (hrs)=    1.250
     RUNOFF VOLUME    (mm)=   11.751
     TOTAL RAINFALL   (mm)=   61.642
     RUNOFF COEFFICIENT   =     .191

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

------------------------------------------------------------------------------
025:0005----------------------------------------------------------------------
*#**************************************************************************
*#
*#  Proposed conditions
*#
*#**************************************************************************
----------------------
| CALIB STANDHYD     |   Area    (ha)=    5.83
| 01:A201   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
----------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         2.91          2.91
     Dep. Storage     (mm)=         2.00          5.00
     Average Slope     (%)=         2.00          2.00
     Length            (m)=        10.00         20.00
     Mannings n           =         .013          .240

     Max.eff.Inten.(mm/hr)=       205.33         60.38
                   over (min)         1.00          6.00
     Storage Coeff.  (min)=          .39 (ii)     5.95 (ii)
     Unit Hyd. Tpeak (min)=         1.00          6.00
     Unit Hyd. peak  (cms)=         1.57           .19
                                                          *TOTALS*
     PEAK FLOW       (cms)=         1.33           .34          1.500 (iii)
     TIME TO PEAK    (hrs)=         1.00          1.08          1.000
     RUNOFF VOLUME    (mm)=        59.64         19.27         35.418
     TOTAL RAINFALL   (mm)=        61.64         61.64         61.642
     RUNOFF COEFFICIENT   =          .97           .31           .575

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
025:0006----------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=    1.16
| 02:A202   DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   60.00
----------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          .93           .23
     Dep. Storage     (mm)=         2.00          5.00
     Average Slope     (%)=         2.00          2.00
     Length            (m)=        50.00         20.00
     Mannings n           =         .013          .240

     Max.eff.Inten.(mm/hr)=       205.33        165.76
                   over (min)         1.00          5.00
     Storage Coeff.  (min)=         1.03 (ii)     4.74 (ii)
     Unit Hyd. Tpeak (min)=         1.00          5.00
     Unit Hyd. peak  (cms)=         1.06           .23
                                                          *TOTALS*
     PEAK FLOW       (cms)=          .39           .07           .445 (iii)
     TIME TO PEAK    (hrs)=         1.00          1.07          1.000
     RUNOFF VOLUME    (mm)=        59.64         27.43         46.757
     TOTAL RAINFALL   (mm)=        61.64         61.64         61.642
     RUNOFF COEFFICIENT   =          .97           .44           .759

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
025:0007----------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .21
| 03:A203   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
----------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          .10           .10
     Dep. Storage     (mm)=         2.00          5.00
     Average Slope     (%)=         2.00          2.00
     Length            (m)=        10.00         20.00
     Mannings n           =         .013          .240

     Max.eff.Inten.(mm/hr)=       205.33         60.38
                   over (min)         1.00          6.00
     Storage Coeff.  (min)=          .39 (ii)     5.95 (ii)
     Unit Hyd. Tpeak (min)=         1.00          6.00
     Unit Hyd. peak  (cms)=         1.57           .19
                                                          *TOTALS*
     PEAK FLOW       (cms)=          .05           .01           .054 (iii)
```

```
01017>      TIME TO PEAK    (hrs)=      1.00        1.08         1.000
01018>      RUNOFF VOLUME    (mm)=     59.64       19.27        35.418
01019>      TOTAL RAINFALL   (mm)=     61.64       61.64        61.642
01020>      RUNOFF COEFFICIENT   =       .97         .31          .575
01021>
01022>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01023>            CN* =  65.0    Ia = Dep. Storage  (Above)
01024>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01025>            THAN THE STORAGE COEFFICIENT.
01026>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01027>
01028> ---------------------------------------------------------------------------
01029> 025:0008----------------------------------------------------------------------
01030> ----------------------
01031> | CALIB STANDHYD     |   Area    (ha)=     .08
01032> | 04:A204   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
01033> ----------------------
01034>                             IMPERVIOUS    PERVIOUS (i)
01035>      Surface Area     (ha)=        .04         .04
01036>      Dep. Storage     (mm)=       2.00        5.00
01037>      Average Slope     (%)=       2.00        2.00
01038>      Length            (m)=      10.00       30.00
01039>      Mannings n             =      .013        .240
01040>
01041>      Max.eff.Inten.(mm/hr)=     205.33       55.95
01042>                  over (min)        1.00        8.00
01043>      Storage Coeff.  (min)=        .39 (ii)    7.70 (ii)
01044>      Unit Hyd. Tpeak (min)=       1.00        8.00
01045>      Unit Hyd. peak  (cms)=       1.57         .15
01046>                                                      *TOTALS*
01047>      PEAK FLOW       (cms)=        .02         .00          .020 (iii)
01048>      TIME TO PEAK    (hrs)=       1.00        1.13         1.000
01049>      RUNOFF VOLUME    (mm)=      59.64       19.27        35.418
01050>      TOTAL RAINFALL   (mm)=      61.64       61.64        61.642
01051>      RUNOFF COEFFICIENT   =        .97         .31          .575
01052>
01053>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01054>            CN* =  65.0    Ia = Dep. Storage  (Above)
01055>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01056>            THAN THE STORAGE COEFFICIENT.
01057>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01058>
01059> ---------------------------------------------------------------------------
01060> 025:0009----------------------------------------------------------------------
01061> ----------------------
01062> | CALIB STANDHYD     |   Area    (ha)=     .19
01063> | 05:EX201  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
01064> ----------------------
01065>                             IMPERVIOUS    PERVIOUS (i)
01066>      Surface Area     (ha)=        .08         .11
01067>      Dep. Storage     (mm)=       2.00        5.00
01068>      Average Slope     (%)=       2.00        2.00
01069>      Length            (m)=      10.00       20.00
01070>      Mannings n             =      .013        .240
01071>
01072>      Max.eff.Inten.(mm/hr)=     205.33       57.15
01073>                  over (min)        1.00        6.00
01074>      Storage Coeff.  (min)=        .39 (ii)    6.07 (ii)
01075>      Unit Hyd. Tpeak (min)=       1.00        6.00
01076>      Unit Hyd. peak  (cms)=       1.57         .19
01077>                                                      *TOTALS*
01078>      PEAK FLOW       (cms)=        .03         .01          .039 (iii)
01079>      TIME TO PEAK    (hrs)=       1.00        1.10         1.000
01080>      RUNOFF VOLUME    (mm)=      59.64       18.84        31.083
01081>      TOTAL RAINFALL   (mm)=      61.64       61.64        61.642
01082>      RUNOFF COEFFICIENT   =        .97         .31          .504
01083>
01084>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01085>            CN* =  65.0    Ia = Dep. Storage  (Above)
01086>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01087>            THAN THE STORAGE COEFFICIENT.
01088>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01089>
01090> ---------------------------------------------------------------------------
01091> 025:0010----------------------------------------------------------------------
01092> ----------------------
01093> | CALIB STANDHYD     |   Area    (ha)=     .49
01094> | 06:EX202  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
01095> ----------------------
01096>                             IMPERVIOUS    PERVIOUS (i)
01097>      Surface Area     (ha)=        .20         .29
01098>      Dep. Storage     (mm)=       2.00        5.00
01099>      Average Slope     (%)=       2.00        2.00
01100>      Length            (m)=      10.00       20.00
01101>      Mannings n             =      .013        .240
01102>
01103>      Max.eff.Inten.(mm/hr)=     205.33       57.15
01104>                  over (min)        1.00        6.00
01105>      Storage Coeff.  (min)=        .39 (ii)    6.07 (ii)
01106>      Unit Hyd. Tpeak (min)=       1.00        6.00
01107>      Unit Hyd. peak  (cms)=       1.57         .19
01108>                                                      *TOTALS*
01109>      PEAK FLOW       (cms)=        .08         .03          .100 (iii)
01110>      TIME TO PEAK    (hrs)=       1.00        1.10         1.000
01111>      RUNOFF VOLUME    (mm)=      59.64       18.84        31.083
01112>      TOTAL RAINFALL   (mm)=      61.64       61.64        61.642
01113>      RUNOFF COEFFICIENT   =        .97         .31          .504
01114>
01115>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01116>            CN* =  65.0    Ia = Dep. Storage  (Above)
01117>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01118>            THAN THE STORAGE COEFFICIENT.
01119>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01120>
01121> ---------------------------------------------------------------------------
01122> 025:0011----------------------------------------------------------------------
01123> ----------------------
01124> | CALIB NASHYD       |   Area    (ha)=     .14   Curve Number   (CN)=54.00
01125> | 07:EX203  DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
01126> ----------------------   U.H. Tp(hrs)=    .130
01127>
01128>      Unit Hyd Qpeak  (cms)=     .041
01129>
01130>      PEAK FLOW       (cms)=     .007 (i)
01131>      TIME TO PEAK    (hrs)=    1.167
01132>      RUNOFF VOLUME    (mm)=   11.750
01133>      TOTAL RAINFALL   (mm)=   61.642
01134>      RUNOFF COEFFICIENT   =     .191
01135>
01136>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01137>
01138> ---------------------------------------------------------------------------
01139> 025:0012----------------------------------------------------------------------
01140> ----------------------
01141> | CALIB NASHYD       |   Area    (ha)=     .37   Curve Number   (CN)=65.00
01142> | 08:SWM1   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
01143> ----------------------   U.H. Tp(hrs)=    .160
01144>
01145>      Unit Hyd Qpeak  (cms)=     .088
01146>
01147>      PEAK FLOW       (cms)=     .024 (i)
01148>      TIME TO PEAK    (hrs)=    1.217
01149>      RUNOFF VOLUME    (mm)=   16.588
01150>      TOTAL RAINFALL   (mm)=   61.642
01151>      RUNOFF COEFFICIENT   =     .269
01152>
01153>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01154>
01155> ---------------------------------------------------------------------------
01156> 025:0013----------------------------------------------------------------------
01157> ----------------------
01158> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01159> ----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
01160>                         ID1 01:A201        5.83    1.500    1.00  35.42    .000
01161>                        +ID2 02:A202        1.16     .445    1.00  46.76    .000
01162>                        +ID3 05:EX201        .19     .039    1.00  31.08    .000
01163>                        +ID4 06:EX202        .49     .100    1.00  31.08    .000
01164>                        +ID5 07:EX203        .14     .007    1.17  11.75    .000
01165>                        +ID6 08:SWM1         .37     .024    1.22  16.59    .000
01166>                         ==========================================================
01167>                         SUM 09:Total       8.18    2.092    1.00  35.41    .000
01168>
01169>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01170>
01171> ---------------------------------------------------------------------------
01172> 025:0014----------------------------------------------------------------------
01173> *#*************************************************************************
01174> *#  Third Pipe System
01175> *#*************************************************************************
01176> ----------------------
01177> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .014  (cms)
01178> | TotalHyd 09:Total  |   Number of inlets in system [NINLET] =       2
01179> ----------------------   Total minor system capacity         =    .028  (cms)
01180>                          Total major system storage [TMJSTO] =    270.(cu.m.)
01181>
01182>                    ID: NHYD        AREA     QPEAK     TPEAK     R.V.       DWF
01183>                                    (ha)     (cms)     (hrs)     (mm)     (cms)
01184>      TOTAL HYD.   09:Total        8.18     2.092     1.000   35.408     .000
01185>      ==========================================================================
01186>      MAJOR SYST   01:ToStor       6.63     2.064     1.000   35.408     .000
01187>      MINOR SYST   02:To3rd        1.55      .028      .417   35.457     .000
01188>
01189>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01190>
01191>      Maximum MAJOR SYSTEM storage used =     270.(cu.m.)
01192>
01193> ---------------------------------------------------------------------------
01194> 025:0015----------------------------------------------------------------------
01195> *#*************************************************************************
01196> *#  Underground and above ground storage
01197> *#*************************************************************************
01198> ----------------------
01199> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01200> |  IN>01:(ToStor)    |
01201> | OUT<03:(Storag)    |    =========  OUTLFOW STORAGE TABLE  =========
01202> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01203>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
01204>                             .000  .0000E+00   |     .056  .2350E+00
01205>                             .033  .1000E-02   |     .125  .2360E+00
01206>                             .033  .1850E+00   |     .218  .3400E+00
01207>                             .051  .2050E+00   |     .000  .0000E+00
01208>
01209>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01210>      --------------------       (ha)     (cms)     (hrs)        (mm)
01211>      INFLOW >01: (ToStor)       6.63     2.064     1.000      35.408
01212>      OUTFLOW<03: (Storag)       6.63      .050     2.600      35.408
01213>     OVERFLOW<04: (OVFL  )        .00      .000      .000       .000
01214>
01215>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
01216>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
01217>                    PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
01218>
01219>
01220>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     2.427
01221>                    TIME SHIFT OF PEAK FLOW         (min)=     96.00
01222>                    MAXIMUM  STORAGE   USED       (ha.m.)=.2040E+00
01223>
01224> ---------------------------------------------------------------------------
01225> 025:0016----------------------------------------------------------------------
01226> ---------------------------------------------------------------------------
01227> 025:0002----------------------------------------------------------------------
01228> ---------------------------------------------------------------------------
01229> 025:0002----------------------------------------------------------------------
01230>   ** END OF RUN :  49
01231>
01232> ***************************************************************************
01233>
01234>
01235>
01236>
01237>
01238> ----------------------
01239> | START              |  Project  dir.: C:\MODELL~1\14253\SWMHYMO\
01240> ----------------------  Rainfall dir.: C:\MODELL~1\14253\SWMHYMO\
01241>     TZERO =   .00 hrs on       0
01242>     METOUT=   2 (output = METRIC)
01243>     NRUN  = 050
01244>     NSTORM=   1
01245>                #  1=50YR.3hr
01246> ---------------------------------------------------------------------------
01247> 050:0002----------------------------------------------------------------------
01248> *#*************************************************************************
01249> *#  Project Name: [Carroll Street]    Project Number: [161414253]
01250> *#  Date        : 2022-09-14
01251> *#  Modeller    : [AKK]
01252> *#  Company     : Stantec Consulting Ltd. (London)
01253> *#  License #   :  4730904
01254> *#*************************************************************************
01255> *#*************************************************************************
01256> *#
01257> *#  This model represents the hydologic characteristics of the proposed
01258> *#  conditions in the proposed site plan.
01259> *#  Storm events modeled are:
01260> *#  5YR, 10YR, 25YR, 50YR, 100YR and 250YR 3hr Chicago STORMS (Strathroy IDF)
01261> *#
01262> *#*************************************************************************
01263> ---------------------------------------------------------------------------
01264> 050:0002----------------------------------------------------------------------
01265> --------------------
01266> | READ STORM       |    Filename: 50-yr, 3hr Chicago Storm from Strathroy
01267> | Ptotal=  69.59 mm|    Comments: 50-yr, 3hr Chicago Storm from Strathroy
01268> --------------------
01269>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01270>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
```

```
                .08   4.324 |    .83  33.634 |   1.58  15.280 |   2.33   6.033
                .17   4.798 |    .92  83.173 |   1.67  13.118 |   2.42   5.647
                .25   5.392 |   1.00 228.894 |   1.75  11.471 |   2.50   5.308
                .33   6.155 |   1.08 107.905 |   1.83  10.179 |   2.58   5.008
                .42   7.169 |   1.17  59.542 |   1.92   9.141 |   2.67   4.740
                .50   8.577 |   1.25  39.395 |   2.00   8.291 |   2.75   4.500
                .58  10.652 |   1.33  28.800 |   2.08   7.583 |   2.83   4.283
                .67  13.974 |   1.42  22.420 |   2.17   6.986 |   2.92   4.087
                .75  20.011 |   1.50  18.223 |   2.25   6.474 |   3.00   3.908

--------------------------------------------------------------------------------
050:0003--------------------------------------------------------------------------
*#*****************************************************************************
*#
*#  Existing conditions
*#
*#*****************************************************************************
----------------------
| CALIB NASHYD       |   Area     (ha)=     .17   Curve Number   (CN)=54.00
| 07:A102   DT= 1.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .140

     Unit Hyd Qpeak  (cms)=     .046

     PEAK FLOW       (cms)=     .011 (i)
     TIME TO PEAK    (hrs)=    1.183
     RUNOFF VOLUME    (mm)=   14.847
     TOTAL RAINFALL   (mm)=   69.590
     RUNOFF COEFFICIENT   =     .213

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

--------------------------------------------------------------------------------
050:0004--------------------------------------------------------------------------
----------------------
| CALIB NASHYD       |   Area     (ha)=     .64   Curve Number   (CN)=54.00
| 07:A103   DT= 1.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .129

     PEAK FLOW       (cms)=     .034 (i)
     TIME TO PEAK    (hrs)=    1.250
     RUNOFF VOLUME    (mm)=   14.848
     TOTAL RAINFALL   (mm)=   69.590
     RUNOFF COEFFICIENT   =     .213

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

--------------------------------------------------------------------------------
050:0005--------------------------------------------------------------------------
*#*****************************************************************************
*#
*#  Proposed conditions
*#
*#*****************************************************************************
----------------------
| CALIB STANDHYD     |   Area     (ha)=    5.83
| 01:A201   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.91         2.91
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      10.00        20.00
     Mannings n             =     .013         .240

     Max.eff.Inten.(mm/hr)=     228.89        80.33
               over (min)        1.00         5.00
     Storage Coeff.  (min)=      .37 (ii)    5.33 (ii)
     Unit Hyd. Tpeak (min)=      1.00         5.00
     Unit Hyd. peak  (cms)=      1.58          .22
                                                        *TOTALS*
     PEAK FLOW       (cms)=      1.48          .44         1.757 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.00         1.000
     RUNOFF VOLUME    (mm)=     67.59        23.86        41.351
     TOTAL RAINFALL   (mm)=     69.59        69.59        69.590
     RUNOFF COEFFICIENT   =       .97          .34          .594

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0006--------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area     (ha)=    1.16
| 02:A202   DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   60.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .93          .23
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     50.00        20.00
     Mannings n             =     .013         .240

     Max.eff.Inten.(mm/hr)=     228.89       212.94
               over (min)        1.00         4.00
     Storage Coeff.  (min)=       .98 (ii)    4.34 (ii)
     Unit Hyd. Tpeak (min)=      1.00         4.00
     Unit Hyd. peak  (cms)=      1.08          .27
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .44          .09          .515 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.05         1.000
     RUNOFF VOLUME    (mm)=     67.59        33.22        53.843
     TOTAL RAINFALL   (mm)=     69.59        69.59        69.590
     RUNOFF COEFFICIENT   =       .97          .48          .774

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0007--------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area     (ha)=     .21
| 03:A203   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .10          .10
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     10.00        20.00
     Mannings n             =     .013         .240

     Max.eff.Inten.(mm/hr)=     228.89        80.33
               over (min)        1.00         5.00
     Storage Coeff.  (min)=      .37 (ii)    5.33 (ii)
     Unit Hyd. Tpeak (min)=      1.00         5.00
     Unit Hyd. peak  (cms)=      1.58          .22
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .05          .02          .063 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.07         1.000
     RUNOFF VOLUME    (mm)=     67.59        23.86        41.351
     TOTAL RAINFALL   (mm)=     69.59        69.59        69.590
     RUNOFF COEFFICIENT   =       .97          .34          .594

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0008--------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area     (ha)=     .08
| 04:A204   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .04          .04
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     10.00        30.00
     Mannings n             =     .013         .240

     Max.eff.Inten.(mm/hr)=     228.89        72.18
               over (min)        1.00         7.00
     Storage Coeff.  (min)=      .37 (ii)    6.98 (ii)
     Unit Hyd. Tpeak (min)=      1.00         7.00
     Unit Hyd. peak  (cms)=      1.58          .16
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .02          .01          .023 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.12         1.000
     RUNOFF VOLUME    (mm)=     67.59        23.86        41.351
     TOTAL RAINFALL   (mm)=     69.59        69.59        69.590
     RUNOFF COEFFICIENT   =       .97          .34          .594

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0009--------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area     (ha)=     .19
| 05:EX201  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .08          .11
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     10.00        20.00
     Mannings n             =     .013         .240

     Max.eff.Inten.(mm/hr)=     228.89        71.49
               over (min)        1.00         6.00
     Storage Coeff.  (min)=      .37 (ii)    5.57 (ii)
     Unit Hyd. Tpeak (min)=      1.00         6.00
     Unit Hyd. peak  (cms)=      1.58          .20
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .04          .02          .045 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.08         1.000
     RUNOFF VOLUME    (mm)=     67.59        23.36        36.631
     TOTAL RAINFALL   (mm)=     69.59        69.59        69.590
     RUNOFF COEFFICIENT   =       .97          .34          .526

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0010--------------------------------------------------------------------------
----------------------
| CALIB STANDHYD     |   Area     (ha)=     .49
| 06:EX202  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .20          .29
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      2.00         2.00
     Length            (m)=     10.00        20.00
     Mannings n             =     .013         .240

     Max.eff.Inten.(mm/hr)=     228.89        71.49
               over (min)        1.00         6.00
     Storage Coeff.  (min)=      .37 (ii)    5.57 (ii)
     Unit Hyd. Tpeak (min)=      1.00         6.00
     Unit Hyd. peak  (cms)=      1.58          .20
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .09          .04          .115 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.08         1.000
     RUNOFF VOLUME    (mm)=     67.59        23.36        36.631
     TOTAL RAINFALL   (mm)=     69.59        69.59        69.590
     RUNOFF COEFFICIENT   =       .97          .34          .526

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  65.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0011--------------------------------------------------------------------------
----------------------
| CALIB NASHYD       |   Area     (ha)=     .14   Curve Number   (CN)=54.00
| 07:EX203  DT= 1.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .130

     Unit Hyd Qpeak  (cms)=     .041

     PEAK FLOW       (cms)=     .009 (i)
     TIME TO PEAK    (hrs)=    1.167
     RUNOFF VOLUME    (mm)=   14.847
     TOTAL RAINFALL   (mm)=   69.590
     RUNOFF COEFFICIENT   =     .213
```

```
01525>
01526>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01527>
01528> ---------------------------------------------------------------------------
01529> 050:0012-----------------------------------------------------------------
01530> ----------------------
01531> | CALIB NASHYD       |   Area     (ha)=     .37   Curve Number    (CN)=65.00
01532> | 08:SWM1   DT= 1.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
01533> ----------------------   U.H. Tp(hrs)=    .160
01534>
01535>      Unit Hyd Qpeak  (cms)=     .088
01536>
01537>      PEAK FLOW       (cms)=     .031 (i)
01538>      TIME TO PEAK    (hrs)=    1.200
01539>      RUNOFF VOLUME    (mm)=   20.718
01540>      TOTAL RAINFALL   (mm)=   69.590
01541>      RUNOFF COEFFICIENT   =     .298
01542>
01543>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01544>
01545> ---------------------------------------------------------------------------
01546> 050:0013-----------------------------------------------------------------
01547> ------------------------
01548> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01549> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01550>                        ID1 01:A201          5.83    1.757    1.00  41.35    .000
01551>                       +ID2 02:A202          1.16     .515    1.00  53.84    .000
01552>                       +ID3 05:EX201          .19     .045    1.00  36.63    .000
01553>                       +ID4 06:EX202          .49     .115    1.00  36.63    .000
01554>                       +ID5 07:EX203          .14     .009    1.17  14.85    .000
01555>                       +ID6 08:SWM1           .37     .031    1.20  20.72    .000
01556>                        ========================================================
01557>                        SUM 09:Total          8.18    2.442    1.00  41.34    .000
01558>
01559>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01560>
01561> ---------------------------------------------------------------------------
01562> 050:0014-----------------------------------------------------------------
01563> *#*************************************************************************
01564> *#  Third Pipe System
01565> *#*************************************************************************
01566> ----------------------
01567> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .014  (cms)
01568> | TotalHyd 09:Total  |   Number of inlets in system [NINLET] =       2
01569> ----------------------   Total minor system capacity         =    .028  (cms)
01570>                          Total major system storage [TMJSTO] =    270.(cu.m.)
01571>
01572>                    ID: NHYD        AREA     QPEAK     TPEAK      R.V.      DWF
01573>                                     (ha)     (cms)     (hrs)      (mm)    (cms)
01574>      TOTAL HYD.   09:Total         8.18     2.442     1.000    41.343     .000
01575>      ========================================================================
01576>      MAJOR SYST   01:ToStor        6.85     2.414     1.000    41.343     .000
01577>      MINOR SYST   02:To3rd         1.33      .028      .383    41.426     .000
01578>
01579>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01580>
01581>      Maximum MAJOR SYSTEM storage used =     270.(cu.m.)
01582>
01583> ---------------------------------------------------------------------------
01584> 050:0015-----------------------------------------------------------------
01585> *#*************************************************************************
01586> *#  Underground and above ground storage
01587> *#*************************************************************************
01588> ----------------------
01589> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01590> |  IN>01:(ToStor)    |
01591> | OUT<03:(Storag)    |    =========  OUTLFOW STORAGE TABLE  =========
01592> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01593>                             (cms)     (ha.m.)   |   (cms)     (ha.m.)
01594>                              .000  .0000E+00    |     .056  .2350E+00
01595>                              .033  .1000E-02    |     .125  .2360E+00
01596>                              .033  .1850E+00    |     .218  .3400E+00
01597>                              .051  .2050E+00    |     .000  .0000E+00
01598>
01599>      ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
01600>      --------------------         (ha)     (cms)     (hrs)       (mm)
01601>      INFLOW >01: (ToStor)        6.85     2.414     1.000     41.343
01602>      OUTFLOW<03: (Storag)        6.85      .125     1.950     41.343
01603>     OVERFLOW<04: (OVFL  )         .00      .000      .000       .000
01604>
01605>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01606>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
01607>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
01608>
01609>
01610>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.181
01611>                     TIME SHIFT OF PEAK FLOW          (min)=    57.00
01612>                     MAXIMUM  STORAGE   USED       (ha.m.)=.2361E+00
01613>
01614> ---------------------------------------------------------------------------
01615> 050:0016-----------------------------------------------------------------
01616> ---------------------------------------------------------------------------
01617> 050:0002-----------------------------------------------------------------
01618> ---------------------------------------------------------------------------
01619> 050:0002-----------------------------------------------------------------
01620> ---------------------------------------------------------------------------
01621> 050:0002-----------------------------------------------------------------
01622>   ** END OF RUN :  99
01623>
01624> ***************************************************************************
01625>
01626>
01627>
01628>
01629>
01630> --------------------
01631> | START            |  Project  dir.: C:\MODELL~1\14253\SWMHYMO\
01632> --------------------  Rainfall dir.: C:\MODELL~1\14253\SWMHYMO\
01633>     TZERO =   .00 hrs on        0
01634>     METOUT=   2 (output = METRIC)
01635>     NRUN  = 100
01636>     NSTORM=   1
01637>            #  1=100YR.3hr
01638> ---------------------------------------------------------------------------
01639> 100:0002-----------------------------------------------------------------
01640> *#*************************************************************************
01641> *#  Project Name: [Carroll Street]    Project Number: [161414253]
01642> *#  Date        : 2022-09-14
01643> *#  Modeller    : [AKK]
01644> *#  Company     : Stantec Consulting Ltd. (London)
01645> *#  License #   :  4730904
01646> *#*************************************************************************
01647> *#*************************************************************************
01648> *#
01649> *#  This model represents the hydologic characteristics of the proposed
01650> *#  conditions in the proposed site plan.
01651> *#  Storm events modeled are:
01652> *#  5YR, 10YR, 25YR, 50YR, 100YR and 250YR 3hr Chicago STORMS (Strathroy IDF)
01653> *#
01654> *#*************************************************************************
01655> ---------------------------------------------------------------------------
01656> 100:0002-----------------------------------------------------------------
01657> --------------------
01658> | READ STORM       |    Filename: 100-yr, 3hr Chicago Storm from Strathroy
01659> | Ptotal=  76.21 mm|    Comments: 100-yr, 3hr Chicago Storm from Strathroy
01660> --------------------
01661>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01662>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01663>                .08   4.566 |    .83  37.249 |   1.58  16.692 |   2.33   6.431
01664>                .17   5.082 |    .92  92.269 |   1.67  14.280 |   2.42   6.009
01665>                .25   5.730 |   1.00 249.639 |   1.75  12.446 |   2.50   5.639
01666>                .33   6.565 |   1.08 119.567 |   1.83  11.010 |   2.58   5.311
01667>                .42   7.680 |   1.17  66.191 |   1.92   9.859 |   2.67   5.019
01668>                .50   9.235 |   1.25  43.702 |   2.00   8.919 |   2.75   4.758
01669>                .58  11.535 |   1.33  31.833 |   2.08   8.137 |   2.83   4.522
01670>                .67  15.235 |   1.42  24.683 |   2.17   7.478 |   2.92   4.309
01671>                .75  21.985 |   1.50  19.982 |   2.25   6.916 |   3.00   4.116
01672>
01673> ---------------------------------------------------------------------------
01674> 100:0003-----------------------------------------------------------------
01675> *#*************************************************************************
01676> *#
01677> *#  Existing conditions
01678> *#
01679> *#*************************************************************************
01680> ----------------------
01681> | CALIB NASHYD       |   Area     (ha)=     .17   Curve Number    (CN)=54.00
01682> | 07:A102   DT= 1.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
01683> ----------------------   U.H. Tp(hrs)=    .140
01684>
01685>      Unit Hyd Qpeak  (cms)=     .046
01686>
01687>      PEAK FLOW       (cms)=     .013 (i)
01688>      TIME TO PEAK    (hrs)=    1.183
01689>      RUNOFF VOLUME    (mm)=   17.634
01690>      TOTAL RAINFALL   (mm)=   76.215
01691>      RUNOFF COEFFICIENT   =     .231
01692>
01693>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01694>
01695> ---------------------------------------------------------------------------
01696> 100:0004-----------------------------------------------------------------
01697> ----------------------
01698> | CALIB NASHYD       |   Area     (ha)=     .64   Curve Number    (CN)=54.00
01699> | 07:A103   DT= 1.00 |   Ia       (mm)=   5.000   # of Linear Res.(N)= 3.00
01700> ----------------------   U.H. Tp(hrs)=    .190
01701>
01702>      Unit Hyd Qpeak  (cms)=     .129
01703>
01704>      PEAK FLOW       (cms)=     .041 (i)
01705>      TIME TO PEAK    (hrs)=    1.250
01706>      RUNOFF VOLUME    (mm)=   17.635
01707>      TOTAL RAINFALL   (mm)=   76.215
01708>      RUNOFF COEFFICIENT   =     .231
01709>
01710>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01711>
01712> ---------------------------------------------------------------------------
01713> 100:0005-----------------------------------------------------------------
01714> *#*************************************************************************
01715> *#
01716> *#  Proposed conditions
01717> *#
01718> *#*************************************************************************
01719> ----------------------
01720> | CALIB STANDHYD     |   Area     (ha)=    5.83
01721> | 01:A201   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
01722> ----------------------
01723>                                  IMPERVIOUS    PERVIOUS (i)
01724>      Surface Area     (ha)=          2.91          2.91
01725>      Dep. Storage     (mm)=          2.00          5.00
01726>      Average Slope     (%)=          2.00          2.00
01727>      Length            (m)=         10.00         20.00
01728>      Mannings n             =         .013          .240
01729>
01730>      Max.eff.Inten.(mm/hr)=        249.64         94.97
01731>                    over (min)          1.00          5.00
01732>      Storage Coeff.  (min)=           .36 (ii)      5.00 (ii)
01733>      Unit Hyd. Tpeak (min)=          1.00          5.00
01734>      Unit Hyd. peak  (cms)=          1.59           .23
01735>                                                              *TOTALS*
01736>      PEAK FLOW       (cms)=          1.62           .54          1.958 (iii)
01737>      TIME TO PEAK    (hrs)=          1.00          1.07          1.000
01738>      RUNOFF VOLUME    (mm)=         74.21         27.90         46.429
01739>      TOTAL RAINFALL   (mm)=         76.21         76.21         76.215
01740>      RUNOFF COEFFICIENT   =           .97           .37           .609
01741>
01742>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01743>            CN* =  65.0    Ia = Dep. Storage  (Above)
01744>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01745>            THAN THE STORAGE COEFFICIENT.
01746>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01747>
01748> ---------------------------------------------------------------------------
01749> 100:0006-----------------------------------------------------------------
01750> ----------------------
01751> | CALIB STANDHYD     |   Area     (ha)=    1.16
01752> | 02:A202   DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   60.00
01753> ----------------------
01754>                                  IMPERVIOUS    PERVIOUS (i)
01755>      Surface Area     (ha)=           .93           .23
01756>      Dep. Storage     (mm)=          2.00          5.00
01757>      Average Slope     (%)=          2.00          2.00
01758>      Length            (m)=         50.00         20.00
01759>      Mannings n             =         .013          .240
01760>
01761>      Max.eff.Inten.(mm/hr)=        249.64        246.46
01762>                    over (min)          1.00          4.00
01763>      Storage Coeff.  (min)=           .95 (ii)      4.12 (ii)
01764>      Unit Hyd. Tpeak (min)=          1.00          4.00
01765>      Unit Hyd. peak  (cms)=          1.11           .28
01766>                                                              *TOTALS*
01767>      PEAK FLOW       (cms)=           .48           .11           .570 (iii)
01768>      TIME TO PEAK    (hrs)=          1.00          1.05          1.000
01769>      RUNOFF VOLUME    (mm)=         74.21         38.24         59.825
01770>      TOTAL RAINFALL   (mm)=         76.21         76.21         76.215
01771>      RUNOFF COEFFICIENT   =           .97           .50           .785
01772>
01773>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01774>            CN* =  65.0    Ia = Dep. Storage  (Above)
01775>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01776>            THAN THE STORAGE COEFFICIENT.
01777>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01778>
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01779> --------------------------------------------------------------------------------
01780> 100:0007--------------------------------------------------------------------------
01781> ----------------------
01782> | CALIB STANDHYD     |   Area    (ha)=     .21
01783> | 03:A203   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
01784> ----------------------
01785>                              IMPERVIOUS    PERVIOUS (i)
01786>      Surface Area     (ha)=        .10          .10
01787>      Dep. Storage     (mm)=       2.00         5.00
01788>      Average Slope     (%)=       2.00         2.00
01789>      Length            (m)=      10.00        20.00
01790>      Mannings n            =       .013         .240
01791>
01792>      Max.eff.Inten.(mm/hr)=     249.64        94.97
01793>                 over (min)        1.00         5.00
01794>      Storage Coeff.  (min)=        .36 (ii)     5.00 (ii)
01795>      Unit Hyd. Tpeak (min)=       1.00         5.00
01796>      Unit Hyd. peak  (cms)=       1.59          .23
01797>                                                          *TOTALS*
01798>      PEAK FLOW       (cms)=        .06          .02          .071 (iii)
01799>      TIME TO PEAK    (hrs)=       1.00         1.07         1.000
01800>      RUNOFF VOLUME    (mm)=      74.21        27.90        46.429
01801>      TOTAL RAINFALL   (mm)=      76.21        76.21        76.215
01802>      RUNOFF COEFFICIENT   =        .97          .37          .609
01803>
01804>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01805>            CN* =  65.0    Ia = Dep. Storage  (Above)
01806>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01807>            THAN THE STORAGE COEFFICIENT.
01808>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01809>
01810> --------------------------------------------------------------------------------
01811> 100:0008--------------------------------------------------------------------------
01812> ----------------------
01813> | CALIB STANDHYD     |   Area    (ha)=     .08
01814> | 04:A204   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
01815> ----------------------
01816>                              IMPERVIOUS    PERVIOUS (i)
01817>      Surface Area     (ha)=        .04          .04
01818>      Dep. Storage     (mm)=       2.00         5.00
01819>      Average Slope     (%)=       2.00         2.00
01820>      Length            (m)=      10.00        30.00
01821>      Mannings n            =       .013         .240
01822>
01823>      Max.eff.Inten.(mm/hr)=     249.64        89.19
01824>                 over (min)        1.00         6.00
01825>      Storage Coeff.  (min)=        .36 (ii)     6.43 (ii)
01826>      Unit Hyd. Tpeak (min)=       1.00         6.00
01827>      Unit Hyd. peak  (cms)=       1.59          .18
01828>                                                          *TOTALS*
01829>      PEAK FLOW       (cms)=        .02          .01          .026 (iii)
01830>      TIME TO PEAK    (hrs)=       1.00         1.10         1.000
01831>      RUNOFF VOLUME    (mm)=      74.21        27.91        46.429
01832>      TOTAL RAINFALL   (mm)=      76.21        76.21        76.215
01833>      RUNOFF COEFFICIENT   =        .97          .37          .609
01834>
01835>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01836>            CN* =  65.0    Ia = Dep. Storage  (Above)
01837>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01838>            THAN THE STORAGE COEFFICIENT.
01839>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01840>
01841> --------------------------------------------------------------------------------
01842> 100:0009--------------------------------------------------------------------------
01843> ----------------------
01844> | CALIB STANDHYD     |   Area    (ha)=     .19
01845> | 05:EX201  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
01846> ----------------------
01847>                              IMPERVIOUS    PERVIOUS (i)
01848>      Surface Area     (ha)=        .08          .11
01849>      Dep. Storage     (mm)=       2.00         5.00
01850>      Average Slope     (%)=       2.00         2.00
01851>      Length            (m)=      10.00        20.00
01852>      Mannings n            =       .013         .240
01853>
01854>      Max.eff.Inten.(mm/hr)=     249.64        90.08
01855>                 over (min)        1.00         5.00
01856>      Storage Coeff.  (min)=        .36 (ii)     5.10 (ii)
01857>      Unit Hyd. Tpeak (min)=       1.00         5.00
01858>      Unit Hyd. peak  (cms)=       1.59          .22
01859>                                                          *TOTALS*
01860>      PEAK FLOW       (cms)=        .04          .02          .052 (iii)
01861>      TIME TO PEAK    (hrs)=       1.00         1.07         1.000
01862>      RUNOFF VOLUME    (mm)=      74.21        27.35        41.411
01863>      TOTAL RAINFALL   (mm)=      76.21        76.21        76.215
01864>      RUNOFF COEFFICIENT   =        .97          .36          .543
01865>
01866>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01867>            CN* =  65.0    Ia = Dep. Storage  (Above)
01868>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01869>            THAN THE STORAGE COEFFICIENT.
01870>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01871>
01872> --------------------------------------------------------------------------------
01873> 100:0010--------------------------------------------------------------------------
01874> ----------------------
01875> | CALIB STANDHYD     |   Area    (ha)=     .49
01876> | 06:EX202  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
01877> ----------------------
01878>                              IMPERVIOUS    PERVIOUS (i)
01879>      Surface Area     (ha)=        .20          .29
01880>      Dep. Storage     (mm)=       2.00         5.00
01881>      Average Slope     (%)=       2.00         2.00
01882>      Length            (m)=      10.00        20.00
01883>      Mannings n            =       .013         .240
01884>
01885>      Max.eff.Inten.(mm/hr)=     249.64        90.08
01886>                 over (min)        1.00         5.00
01887>      Storage Coeff.  (min)=        .36 (ii)     5.10 (ii)
01888>      Unit Hyd. Tpeak (min)=       1.00         5.00
01889>      Unit Hyd. peak  (cms)=       1.59          .22
01890>                                                          *TOTALS*
01891>      PEAK FLOW       (cms)=        .10          .05          .134 (iii)
01892>      TIME TO PEAK    (hrs)=       1.00         1.07         1.000
01893>      RUNOFF VOLUME    (mm)=      74.21        27.35        41.411
01894>      TOTAL RAINFALL   (mm)=      76.21        76.21        76.215
01895>      RUNOFF COEFFICIENT   =        .97          .36          .543
01896>
01897>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01898>            CN* =  65.0    Ia = Dep. Storage  (Above)
01899>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01900>            THAN THE STORAGE COEFFICIENT.
01901>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01902>
01903> --------------------------------------------------------------------------------
01904> 100:0011--------------------------------------------------------------------------
01905> ----------------------
01906> | CALIB NASHYD       |   Area    (ha)=     .14   Curve Number   (CN)=54.00
01907> | 07:EX203  DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
01908> ----------------------   U.H. Tp(hrs)=    .130
01909>
01910>      Unit Hyd Qpeak  (cms)=     .041
01911>
01912>      PEAK FLOW       (cms)=     .011 (i)
01913>      TIME TO PEAK    (hrs)=    1.167
01914>      RUNOFF VOLUME    (mm)=   17.633
01915>      TOTAL RAINFALL   (mm)=   76.215
01916>      RUNOFF COEFFICIENT   =     .231
01917>
01918>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01919>
01920> --------------------------------------------------------------------------------
01921> 100:0012--------------------------------------------------------------------------
01922> ----------------------
01923> | CALIB NASHYD       |   Area    (ha)=     .37   Curve Number   (CN)=65.00
01924> | 08:SWM1   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
01925> ----------------------   U.H. Tp(hrs)=    .160
01926>
01927>      Unit Hyd Qpeak  (cms)=     .088
01928>
01929>      PEAK FLOW       (cms)=     .037 (i)
01930>      TIME TO PEAK    (hrs)=    1.200
01931>      RUNOFF VOLUME    (mm)=   24.384
01932>      TOTAL RAINFALL   (mm)=   76.215
01933>      RUNOFF COEFFICIENT   =     .320
01934>
01935>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01936>
01937> --------------------------------------------------------------------------------
01938> 100:0013--------------------------------------------------------------------------
01939> ----------------------
01940> | ADD HYD (Total     ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
01941> ----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
01942>                         ID1 01:A201          5.83    1.958   1.00  46.43    .000
01943>                        +ID2 02:A202          1.16     .570   1.00  59.82    .000
01944>                        +ID3 05:EX201          .19     .052   1.00  41.41    .000
01945>                        +ID4 06:EX202          .49     .134   1.00  41.41    .000
01946>                        +ID5 07:EX203          .14     .011   1.17  17.63    .000
01947>                        +ID6 08:SWM1           .37     .037   1.20  24.38    .000
01948>                         ==========================================================
01949>                         SUM 09:Total          8.18    2.728   1.00  46.42    .000
01950>
01951>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01952>
01953> --------------------------------------------------------------------------------
01954> 100:0014--------------------------------------------------------------------------
01955> *#*************************************************************************
01956> *#  Third Pipe System
01957> *#*************************************************************************
01958> ----------------------
01959> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .014  (cms)
01960> | TotalHyd 09:Total  |   Number of inlets in system [NINLET] =       2
01961> ----------------------   Total minor system capacity         =    .028  (cms)
01962>                          Total major system storage [TMJSTO] =     270.(cu.m.)
01963>
01964>                  ID: NHYD        AREA     QPEAK     TPEAK      R.V.       DWF
01965>                                  (ha)     (cms)      (hrs)      (mm)     (cms)
01966>     TOTAL HYD.   09:Total        8.18     2.728     1.000    46.421     .000
01967>     ==========================================================================
01968>     MAJOR SYST   01:ToStor       6.99     2.700     1.000    46.421     .000
01969>     MINOR SYST   02:To3rd        1.19      .028      .367    46.494     .000
01970>
01971>     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01972>
01973>     Maximum MAJOR SYSTEM storage used =     270.(cu.m.)
01974>
01975> --------------------------------------------------------------------------------
01976> 100:0015--------------------------------------------------------------------------
01977> *#*************************************************************************
01978> *#  Underground and above ground storage
01979> *#*************************************************************************
01980> ----------------------
01981> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01982> |  IN>01:(ToStor)    |
01983> | OUT<03:(Storag)    |    =========  OUTFLOW STORAGE TABLE  =========
01984> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01985>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
01986>                              .000  .0000E+00   |     .056  .2350E+00
01987>                              .033  .1000E-02   |     .125  .2360E+00
01988>                              .033  .1850E+00   |     .218  .3400E+00
01989>                              .051  .2050E+00   |     .000  .0000E+00
01990>
01991>      ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
01992>      --------------------        (ha)     (cms)     (hrs)       (mm)
01993>      INFLOW >01: (ToStor)       6.99     2.700     1.000     46.421
01994>      OUTFLOW<03: (Storag)       6.99      .145     1.933     46.420
01995>     OVERFLOW<04: (OVFL  )        .00      .000      .000       .000
01996>
01997>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01998>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
01999>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
02000>
02001>
02002>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.369
02003>                    TIME SHIFT OF PEAK FLOW          (min)=    56.00
02004>                    MAXIMUM  STORAGE   USED       (ha.m.)=.2583E+00
02005>
02006> --------------------------------------------------------------------------------
02007> 100:0016--------------------------------------------------------------------------
02008> --------------------------------------------------------------------------------
02009> 100:0002--------------------------------------------------------------------------
02010> --------------------------------------------------------------------------------
02011> 100:0002--------------------------------------------------------------------------
02012> --------------------------------------------------------------------------------
02013> 100:0002--------------------------------------------------------------------------
02014> --------------------------------------------------------------------------------
02015> 100:0002--------------------------------------------------------------------------
02016>   ** END OF RUN : 249
02017>
02018> ********************************************************************************
02019>
02020>
02021>
02022>
02023>
02024> ---------------------
02025> | START             |  Project  dir.: C:\MODELL~1\14253\SWMHYMO\
02026> ---------------------  Rainfall dir.: C:\MODELL~1\14253\SWMHYMO\
02027>     TZERO =   .00 hrs on        0
02028>     METOUT=   2 (output = METRIC)
02029>     NRUN  = 250
02030>     NSTORM=   1
02031>            #  1=250YR.3hr
02032> --------------------------------------------------------------------------------
```

```
02033> 250:0002------------------------------------------------------------------------------
02034> *#*****************************************************************************
02035> *#  Project Name: [Carroll Street]    Project Number: [161414253]
02036> *#  Date        : 2022-09-14
02037> *#  Modeller    : [AKK]
02038> *#  Company     : Stantec Consulting Ltd. (London)
02039> *#  License #   :  4730904
02040> *#*****************************************************************************
02041> *#*****************************************************************************
02042> *#
02043> *#  This model represents the hydologic characteristics of the proposed
02044> *#  conditions in the proposed site plan.
02045> *#  Storm events modeled are:
02046> *#  5YR, 10YR, 25YR, 50YR, 100YR and 250YR 3hr Chicago STORMS (Strathroy IDF)
02047> *#
02048> *#*****************************************************************************
02049> ------------------------------------------------------------------------------
02050> 250:0002------------------------------------------------------------------------------
02051> --------------------
02052> | READ STORM      |    Filename: 250-yr, 3hr Chicago Storm from Strathroy
02053> | Ptotal=  86.60 mm|    Comments: 250-yr, 3hr Chicago Storm from Strathroy
02054> --------------------
02055>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
02056>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
02057>               .08   5.095 |    .83  43.425 |   1.58  19.302 |   2.33   7.254
02058>               .17   5.690 |    .92 106.077 |   1.67  16.460 |   2.42   6.764
02059>               .25   6.440 |   1.00 274.730 |   1.75  14.300 |   2.50   6.334
02060>               .33   7.410 |   1.08 136.668 |   1.83  12.612 |   2.58   5.955
02061>               .42   8.710 |   1.17  76.864 |   1.92  11.261 |   2.67   5.617
02062>               .50  10.529 |   1.25  50.954 |   2.00  10.158 |   2.75   5.316
02063>               .58  13.230 |   1.33  37.106 |   2.08   9.244 |   2.83   5.044
02064>               .67  17.585 |   1.42  28.713 |   2.17   8.474 |   2.92   4.799
02065>               .75  25.536 |   1.50  23.179 |   2.25   7.819 |   3.00   4.577
02066>
02067> ------------------------------------------------------------------------------
02068> 250:0003------------------------------------------------------------------------------
02069> *#*****************************************************************************
02070> *#
02071> *#  Existing conditions
02072> *#
02073> *#*****************************************************************************
02074> ----------------------
02075> | CALIB NASHYD       |   Area    (ha)=     .17   Curve Number   (CN)=54.00
02076> | 07:A102   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
02077> ----------------------   U.H. Tp(hrs)=    .140
02078>
02079>      Unit Hyd Qpeak  (cms)=     .046
02080>
02081>      PEAK FLOW       (cms)=     .016 (i)
02082>      TIME TO PEAK    (hrs)=    1.183
02083>      RUNOFF VOLUME    (mm)=   22.346
02084>      TOTAL RAINFALL   (mm)=   86.603
02085>      RUNOFF COEFFICIENT   =     .258
02086>
02087>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02088>
02089> ------------------------------------------------------------------------------
02090> 250:0004------------------------------------------------------------------------------
02091> ----------------------
02092> | CALIB NASHYD       |   Area    (ha)=     .64   Curve Number   (CN)=54.00
02093> | 07:A103   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
02094> ----------------------   U.H. Tp(hrs)=    .190
02095>
02096>      Unit Hyd Qpeak  (cms)=     .129
02097>
02098>      PEAK FLOW       (cms)=     .052 (i)
02099>      TIME TO PEAK    (hrs)=    1.250
02100>      RUNOFF VOLUME    (mm)=   22.347
02101>      TOTAL RAINFALL   (mm)=   86.603
02102>      RUNOFF COEFFICIENT   =     .258
02103>
02104>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02105>
02106> ------------------------------------------------------------------------------
02107> 250:0005------------------------------------------------------------------------------
02108> *#*****************************************************************************
02109> *#
02110> *#  Proposed conditions
02111> *#
02112> *#*****************************************************************************
02113> ----------------------
02114> | CALIB STANDHYD     |   Area    (ha)=    5.83
02115> | 01:A201   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
02116> ----------------------
02117>                              IMPERVIOUS    PERVIOUS (i)
02118>      Surface Area     (ha)=       2.91         2.91
02119>      Dep. Storage     (mm)=       2.00         5.00
02120>      Average Slope     (%)=       2.00         2.00
02121>      Length            (m)=      10.00        20.00
02122>      Mannings n             =      .013         .240
02123>
02124>      Max.eff.Inten.(mm/hr)=     274.73       116.10
02125>                  over (min)        1.00         5.00
02126>      Storage Coeff.  (min)=        .35 (ii)    4.63 (ii)
02127>      Unit Hyd. Tpeak (min)=       1.00         5.00
02128>      Unit Hyd. peak  (cms)=       1.60          .24
02129>                                                          *TOTALS*
02130>      PEAK FLOW       (cms)=       1.78          .68        2.226 (iii)
02131>      TIME TO PEAK    (hrs)=       1.00         1.07          1.000
02132>      RUNOFF VOLUME    (mm)=      84.60        34.60         54.601
02133>      TOTAL RAINFALL   (mm)=      86.60        86.60         86.603
02134>      RUNOFF COEFFICIENT   =        .98          .40           .630
02135>
02136>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02137>            CN* =  65.0    Ia = Dep. Storage  (Above)
02138>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02139>            THAN THE STORAGE COEFFICIENT.
02140>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02141>
02142> ------------------------------------------------------------------------------
02143> 250:0006------------------------------------------------------------------------------
02144> ----------------------
02145> | CALIB STANDHYD     |   Area    (ha)=    1.16
02146> | 02:A202   DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   60.00
02147> ----------------------
02148>                              IMPERVIOUS    PERVIOUS (i)
02149>      Surface Area     (ha)=        .93          .23
02150>      Dep. Storage     (mm)=       2.00         5.00
02151>      Average Slope     (%)=       2.00         2.00
02152>      Length            (m)=      50.00        20.00
02153>      Mannings n             =      .013         .240
02154>
02155>      Max.eff.Inten.(mm/hr)=     274.73       292.58
02156>                  over (min)        1.00         4.00
02157>      Storage Coeff.  (min)=        .91 (ii)    3.87 (ii)
02158>      Unit Hyd. Tpeak (min)=       1.00         4.00
02159>      Unit Hyd. peak  (cms)=       1.13          .29
02160>                                                          *TOTALS*
02161>      PEAK FLOW       (cms)=        .53          .14           .641 (iii)
02162>      TIME TO PEAK    (hrs)=       1.00         1.05          1.000
02163>      RUNOFF VOLUME    (mm)=      84.60        46.39         69.316
02164>      TOTAL RAINFALL   (mm)=      86.60        86.60         86.603
02165>      RUNOFF COEFFICIENT   =        .98          .54           .800
02166>
02167>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02168>            CN* =  65.0    Ia = Dep. Storage  (Above)
02169>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02170>            THAN THE STORAGE COEFFICIENT.
02171>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02172>
02173> ------------------------------------------------------------------------------
02174> 250:0007------------------------------------------------------------------------------
02175> ----------------------
02176> | CALIB STANDHYD     |   Area    (ha)=     .21
02177> | 03:A203   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
02178> ----------------------
02179>                              IMPERVIOUS    PERVIOUS (i)
02180>      Surface Area     (ha)=        .10          .10
02181>      Dep. Storage     (mm)=       2.00         5.00
02182>      Average Slope     (%)=       2.00         2.00
02183>      Length            (m)=      10.00        20.00
02184>      Mannings n             =      .013         .240
02185>
02186>      Max.eff.Inten.(mm/hr)=     274.73       116.10
02187>                  over (min)        1.00         5.00
02188>      Storage Coeff.  (min)=        .35 (ii)    4.63 (ii)
02189>      Unit Hyd. Tpeak (min)=       1.00         5.00
02190>      Unit Hyd. peak  (cms)=       1.60          .24
02191>                                                          *TOTALS*
02192>      PEAK FLOW       (cms)=        .06          .02           .080 (iii)
02193>      TIME TO PEAK    (hrs)=       1.00         1.07          1.000
02194>      RUNOFF VOLUME    (mm)=      84.60        34.60         54.601
02195>      TOTAL RAINFALL   (mm)=      86.60        86.60         86.603
02196>      RUNOFF COEFFICIENT   =        .98          .40           .630
02197>
02198>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02199>            CN* =  65.0    Ia = Dep. Storage  (Above)
02200>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02201>            THAN THE STORAGE COEFFICIENT.
02202>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02203>
02204> ------------------------------------------------------------------------------
02205> 250:0008------------------------------------------------------------------------------
02206> ----------------------
02207> | CALIB STANDHYD     |   Area    (ha)=     .08
02208> | 04:A204   DT= 1.00 |   Total Imp(%)=   50.00   Dir. Conn.(%)=   40.00
02209> ----------------------
02210>                              IMPERVIOUS    PERVIOUS (i)
02211>      Surface Area     (ha)=        .04          .04
02212>      Dep. Storage     (mm)=       2.00         5.00
02213>      Average Slope     (%)=       2.00         2.00
02214>      Length            (m)=      10.00        30.00
02215>      Mannings n             =      .013         .240
02216>
02217>      Max.eff.Inten.(mm/hr)=     274.73       109.24
02218>                  over (min)        1.00         6.00
02219>      Storage Coeff.  (min)=        .35 (ii)    5.94 (ii)
02220>      Unit Hyd. Tpeak (min)=       1.00         6.00
02221>      Unit Hyd. peak  (cms)=       1.60          .19
02222>                                                          *TOTALS*
02223>      PEAK FLOW       (cms)=        .02          .01           .029 (iii)
02224>      TIME TO PEAK    (hrs)=       1.00         1.08          1.000
02225>      RUNOFF VOLUME    (mm)=      84.60        34.60         54.601
02226>      TOTAL RAINFALL   (mm)=      86.60        86.60         86.603
02227>      RUNOFF COEFFICIENT   =        .98          .40           .630
02228>
02229>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02230>            CN* =  65.0    Ia = Dep. Storage  (Above)
02231>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02232>            THAN THE STORAGE COEFFICIENT.
02233>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02234>
02235> ------------------------------------------------------------------------------
02236> 250:0009------------------------------------------------------------------------------
02237> ----------------------
02238> | CALIB STANDHYD     |   Area    (ha)=     .19
02239> | 05:EX201  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
02240> ----------------------
02241>                              IMPERVIOUS    PERVIOUS (i)
02242>      Surface Area     (ha)=        .08          .11
02243>      Dep. Storage     (mm)=       2.00         5.00
02244>      Average Slope     (%)=       2.00         2.00
02245>      Length            (m)=      10.00        20.00
02246>      Mannings n             =      .013         .240
02247>
02248>      Max.eff.Inten.(mm/hr)=     274.73       110.29
02249>                  over (min)        1.00         5.00
02250>      Storage Coeff.  (min)=        .35 (ii)    4.72 (ii)
02251>      Unit Hyd. Tpeak (min)=       1.00         5.00
02252>      Unit Hyd. peak  (cms)=       1.60          .23
02253>                                                          *TOTALS*
02254>      PEAK FLOW       (cms)=        .04          .03           .060 (iii)
02255>      TIME TO PEAK    (hrs)=       1.00         1.07          1.000
02256>      RUNOFF VOLUME    (mm)=      84.60        33.96         49.151
02257>      TOTAL RAINFALL   (mm)=      86.60        86.60         86.603
02258>      RUNOFF COEFFICIENT   =        .98          .39           .568
02259>
02260>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02261>            CN* =  65.0    Ia = Dep. Storage  (Above)
02262>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02263>            THAN THE STORAGE COEFFICIENT.
02264>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02265>
02266> ------------------------------------------------------------------------------
02267> 250:0010------------------------------------------------------------------------------
02268> ----------------------
02269> | CALIB STANDHYD     |   Area    (ha)=     .49
02270> | 06:EX202  DT= 1.00 |   Total Imp(%)=   40.00   Dir. Conn.(%)=   30.00
02271> ----------------------
02272>                              IMPERVIOUS    PERVIOUS (i)
02273>      Surface Area     (ha)=        .20          .29
02274>      Dep. Storage     (mm)=       2.00         5.00
02275>      Average Slope     (%)=       2.00         2.00
02276>      Length            (m)=      10.00        20.00
02277>      Mannings n             =      .013         .240
02278>
02279>      Max.eff.Inten.(mm/hr)=     274.73       110.29
02280>                  over (min)        1.00         5.00
02281>      Storage Coeff.  (min)=        .35 (ii)    4.72 (ii)
02282>      Unit Hyd. Tpeak (min)=       1.00         5.00
02283>      Unit Hyd. peak  (cms)=       1.60          .23
02284>                                                          *TOTALS*
02285>      PEAK FLOW       (cms)=        .11          .06           .154 (iii)
02286>      TIME TO PEAK    (hrs)=       1.00         1.07          1.000
```

```
02287>      RUNOFF VOLUME    (mm)=      84.60        33.96         49.151
02288>      TOTAL RAINFALL   (mm)=      86.60        86.60         86.603
02289>      RUNOFF COEFFICIENT   =        .98          .39           .568
02290>
02291>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02292>            CN* =  65.0    Ia = Dep. Storage  (Above)
02293>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02294>            THAN THE STORAGE COEFFICIENT.
02295>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02296>
02297> ---------------------------------------------------------------------------
02298> 250:0011-----------------------------------------------------------------------
02299> ----------------------
02300> | CALIB NASHYD       |   Area    (ha)=     .14   Curve Number   (CN)=54.00
02301> | 07:EX203  DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
02302> ----------------------   U.H. Tp(hrs)=    .130
02303>
02304>      Unit Hyd Qpeak  (cms)=     .041
02305>
02306>      PEAK FLOW       (cms)=     .014 (i)
02307>      TIME TO PEAK    (hrs)=    1.167
02308>      RUNOFF VOLUME    (mm)=   22.346
02309>      TOTAL RAINFALL   (mm)=   86.603
02310>      RUNOFF COEFFICIENT   =     .258
02311>
02312>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02313>
02314> ---------------------------------------------------------------------------
02315> 250:0012-----------------------------------------------------------------------
02316> ----------------------
02317> | CALIB NASHYD       |   Area    (ha)=     .37   Curve Number   (CN)=65.00
02318> | 08:SWM1   DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
02319> ----------------------   U.H. Tp(hrs)=    .160
02320>
02321>      Unit Hyd Qpeak  (cms)=     .088
02322>
02323>      PEAK FLOW       (cms)=     .046 (i)
02324>      TIME TO PEAK    (hrs)=    1.200
02325>      RUNOFF VOLUME    (mm)=   30.493
02326>      TOTAL RAINFALL   (mm)=   86.603
02327>      RUNOFF COEFFICIENT   =     .352
02328>
02329>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02330>
02331> ---------------------------------------------------------------------------
02332> 250:0013-----------------------------------------------------------------------
02333> -------------------------
02334> | ADD HYD (Total     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02335> -------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
02336>                         ID1 01:A201          5.83    2.226    1.00  54.60    .000
02337>                        +ID2 02:A202          1.16     .641    1.00  69.32    .000
02338>                        +ID3 05:EX201          .19     .060    1.00  49.15    .000
02339>                        +ID4 06:EX202          .49     .154    1.00  49.15    .000
02340>                        +ID5 07:EX203          .14     .014    1.17  22.35    .000
02341>                        +ID6 08:SWM1           .37     .046    1.20  30.49    .000
02342>                         ==========================================================
02343>                         SUM 09:Total          8.18    3.099    1.00  54.59    .000
02344>
02345>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02346>
02347> ---------------------------------------------------------------------------
02348> 250:0014-----------------------------------------------------------------------
02349> *#*************************************************************************
02350> *#  Third Pipe System
02351> *#*************************************************************************
02352> ----------
02353> | COMPUTE DUALHYD    |   Average inlet capacities   [CINLET] =    .014  (cms)
02354> | TotalHyd 09:Total  |   Number of inlets in system [NINLET] =      2
02355> ----------------------   Total minor system capacity          =    .028  (cms)
02356>                          Total major system storage [TMJSTO] =     270.(cu.m.)
02357>
02358>                    ID: NHYD        AREA     QPEAK     TPEAK     R.V.      DWF
02359>                                     (ha)     (cms)     (hrs)     (mm)    (cms)
02360>      TOTAL HYD.   09:Total        8.18     3.099     1.000   54.592     .000
02361>      ==========================================================================
02362>      MAJOR SYST   01:ToStor       7.16     3.071     1.000   54.592     .000
02363>      MINOR SYST   02:To3rd        1.02      .028      .350   54.599     .000
02364>
02365>      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02366>
02367>      Maximum MAJOR SYSTEM storage used =     270.(cu.m.)
02368>
02369> ---------------------------------------------------------------------------
02370> 250:0015-----------------------------------------------------------------------
02371> *#*************************************************************************
02372> *#  Underground and above ground storage
02373> *#*************************************************************************
02374> ----------------------
02375> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
02376> |  IN>01:(ToStor)    |
02377> | OUT<03:(Storag)    |    =========  OUTFLOW STORAGE TABLE  =========
02378> ----------------------    OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
02379>                             (cms)     (ha.m.)    |    (cms)    (ha.m.)
02380>                              .000  .0000E+00     |     .056  .2350E+00
02381>                              .033  .1000E-02     |     .125  .2360E+00
02382>                              .033  .1850E+00     |     .218  .3400E+00
02383>                              .051  .2050E+00     |     .000  .0000E+00
02384>
02385>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
02386>      ---------------            (ha)     (cms)     (hrs)       (mm)
02387>      INFLOW >01: (ToStor)       7.16     3.071     1.000     54.592
02388>      OUTFLOW<03: (Storag)       7.16      .185     1.917     54.591
02389>     OVERFLOW<04: (OVFL  )        .00      .000      .000       .000
02390>
02391>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
02392>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
02393>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
02394>
02395>
02396>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.030
02397>                     TIME SHIFT OF PEAK FLOW          (min)=    55.00
02398>                     MAXIMUM  STORAGE   USED       (ha.m.)=.3033E+00
02399>
02400> ---------------------------------------------------------------------------
02401> 250:0016-----------------------------------------------------------------------
02402> ---------------------------------------------------------------------------
02403> 250:0002-----------------------------------------------------------------------
02404> ---------------------------------------------------------------------------
02405> 250:0002-----------------------------------------------------------------------
02406> ---------------------------------------------------------------------------
02407> 250:0002-----------------------------------------------------------------------
02408> ---------------------------------------------------------------------------
02409> 250:0002-----------------------------------------------------------------------
02410> ---------------------------------------------------------------------------
02411> 250:0002-----------------------------------------------------------------------
02412>       FINISH
02413> ---------------------------------------------------------------------------
02414> ***************************************************************************
02415>      WARNINGS / ERRORS / NOTES
02416>      -------------------------
02417>    Simulation ended on 2022-09-20     at 10:01:00
02418> ===========================================================================
02419>
```

Geotechnical Investigation

Litera Properties Inc.

Project Name:
Proposed Development
430 Carroll Street East
Strathroy, Ontario

Project Number:
LON-21008023-A0

Prepared By:
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Date Submitted:
June 8, 2021

Geotechnical Investigation

Litera Properties Inc.

Type of Document:

Report

Project Name:
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Date Submitted:

June 8, 2021

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Appendices

1. Introduction and Background

1.1 Introduction

EXP Services Inc. (EXP) was retained by **Litera Properties Inc.** to carry out a geotechnical investigation and prepare a geotechnical report relating to the proposed development located at 430 Carroll Street East in Strathroy, Ontario, hereinafter referred to as the 'Site'.

Based on an interpretation of the factual test hole data and a review of soil and groundwater information from test holes advanced at the site, EXP has provided geotechnical engineering guidelines to support the proposed Site development.

1.2 Terms of Reference

The geotechnical investigation was generally completed in accordance with the scope of work outlined through email correspondence. Authorization to proceed with this investigation was received from Mr. Jacob Katz of **Litera Properties Inc.** through email correspondence.

The purpose of the investigation was to examine the subsoil and groundwater conditions at the site by advancing a series of test pits at the locations chosen by EXP and illustrated on the attached Test Pit Location Plan (**Drawing 1**).

Based on an interpretation of the factual test pit data, and a review of soil and groundwater information from test holes advanced at the site, EXP Services Inc. has provided engineering guidelines for the geotechnical design and construction of the proposed development. More specifically, this report provides comments on site preparation, excavations, dewatering, foundations, slab-on-grade and basement construction, bedding and backfill, earthquake design considerations, pavement recommendations, and curbs and sidewalks.

This report is provided on the basis of the terms of reference presented above, and on the assumption that the design will be in accordance with applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning geotechnical aspects of the codes and standards, this office should be contacted to review the design.

The information in this report in no way reflects on the environmental aspects of the soil. Should specific information in this regard be needed, additional testing may be required.

Reference is made to **Appendix D** of this report, which contains further information necessary for the proper interpretation and use of this report.

2. Methodology

The fieldwork was carried out on May 11, 2021. In general, the geotechnical investigation consisted of the advancement of five (5) test pits at the locations denoted on **Drawing 1** as TP1 to TP5, inclusive.

Prior to excavation, buried service clearances were obtained for the test hole locations by the Client.

The test holes were advanced using a locally subcontracted excavator under the full-time supervision of EXP geotechnical staff.

During the excavation, the stratigraphy in the test pits were examined and logged in the field by EXP geotechnical personnel. Short-term groundwater level observations within the open test pits are recorded on the test pit summary attached.

Following excavation, the water levels were measured in the open test pits. They were then backfilled with the excavated material and surfaced with the reclaimed topsoil.

Representative samples of the various soil strata encountered at the test pit locations were taken to our laboratory in London for further examination by a Geotechnical Engineer and laboratory classification testing.

Samples remaining after the classification testing will be stored for a period of three months following the issuance of report (i.e., until August 2021). After this time, they will be discarded unless prior arrangements have been made for longer storage.

The location of each test pit was established in the field in conjunction with a preliminary site plan provided by the Client. Ground surface elevations at each test pit locations were surveyed and referenced to a temporary benchmark at the northwest corner of the entrance slab of the main storage building at Zimmerman's Nursery. The temporary benchmark was assigned an assumed elevation of 100.00 m and is shown in **Drawing 1**.

3. Site and Subsurface Conditions

3.1 Site Description

The subject area is currently used as a plant nursery, with turf and rows of various species of small trees. The Site is generally bounded by agricultural fields to the east and west and residential buildings to the south. The following sections provide a summary of the soil and groundwater conditions.

3.2 Soil Stratigraphy

The detailed stratigraphy encountered in each test hole is shown on the test pit summary found in **Appendix A** and summarized in the following paragraphs. It must be noted that boundaries of soil indicated in the test pit summary are based on observations during excavation. These boundaries are intended to reflect transition zones for geotechnical design and should not be interpreted as exact planes of geological change.

3.2.1 Topsoil

Four test pits were surfaced with a layer of topsoil. The topsoil thickness typically ranged between 300 mm and 500 mm. There was no distinct topsoil layer noted at TP2.

It should be noted that topsoil quantities should not be established from the information provided at the test hole locations only. If required, a more detailed analysis (involving additional shallow test pits) is recommended to accurately quantify the amount of topsoil to be removed for construction purposes.

3.2.2 Sand

Underlying the topsoil at each test pit location was sand. Each test pit was terminated in the sand. In general, the sand was described as compact, brown to grey, fine to medium grained with trace silt and moist.

3.2.3 Clayey Silt

A layer of clayey silt extending from a depth of 0.5 m to 1.8 m was encountered in TP4.

3.3 Groundwater Conditions

Details of the groundwater conditions observed within the test holes are provided on the attached test pit summary. Upon completion of excavation, the open test pits were examined for the presence of groundwater and groundwater seepage. Groundwater was measured between 2.3 m and 4.0 m bgs (Assumed Elevation 96.77 m to 97.74 m) in Test Pits TP1, TP2, TP3, and TP5 upon completion of excavation. No groundwater seepage was observed in TP4 at the termination depth of 4.1 m (97.52m). Monitoring wells were installed in the four test pits with noted water seepage.

It is also noted that the depth to the groundwater table may vary in response to climatic or seasonal conditions, and, as such, may differ at the time of construction, with higher levels in wet seasons. Capillary rise effects should also be anticipated in fine-grained soil deposits.

4. Discussion and Recommendations

At the time of writing, specific details of the proposed development were unknown.

The following sections of this report provide geotechnical comments and recommendations regarding site preparation, excavations and dewatering, foundations, slab-on-grade and basement design, bedding and backfill, earthquake design considerations, pavement design and curbs and sidewalks.

4.1 Site Preparation

Prior to placement foundations and/or engineered fill, all surficial topsoil, vegetation and/or otherwise deleterious materials should be stripped. Thicker areas of topsoil may be anticipated in areas with trees and/or heavy vegetative cover. It is anticipated that the surficial topsoil may be stockpiled on site for possible reuse as landscaping fill.

It is understood that the existing structures on site will be moved off the site. The removal of the buildings should include all building debris, foundation walls, footings and concrete floor slabs. The removal and disposal of the previously occupied buildings and associated fill must satisfy the local building standards, Ontario Building Code (OBC), Ministry of Labour (MOL) and the Ministry of Environment, Conservation and Parks (MECP) requirements. If any potable wells are present on site, they should be properly decommissioned by a licensed well contractor, in accordance with Ontario Regulation 903.

Following the removal of the topsoil and building debris and prior to fill placement, the exposed subgrade should be inspected by a Geotechnical Engineer. Any loose or soft zones noted in the inspection should be over-excavated and replaced with approved fill.

It is recommended that construction traffic be minimized on the finished subgrade, and that the subgrade be sloped to promote surface drainage and runoff.

In the building areas where the grade will be raised, the fill material should comprise imported granular or approved onsite (excavated) material. The fill material should be inspected and approved by a Geotechnical Engineer and should be placed in maximum 300 mm (12 inch) thick lifts and uniformly compacted to 100 percent Standard Proctor Maximum Dry Density (SPMDD) within 3 percent of optimum moisture content. The geometric requirements for engineered fill are provided on **Drawing 2**.

The natural and inorganic fill materials on site would be suitable for reuse as engineered fill. The material should be examined and approved by a Geotechnical Engineer prior to reuse.

In areas along proposed roadways, fill material used to raise grades may comprise of onsite excavated soils, or imported granular fill approved by an engineer. The fill should be placed in maximum 300 mm (12 inch) thick loose lifts and uniformly compacted to 95/98 percent SPMDD within 3 percent of optimum moisture content to provide adequate stability for the new pavements.

In situ compaction testing should be carried out during the fill placement to ensure that the specified compaction is being achieved.

If imported fill material is utilized at the site, verification of the suitability of the fill may be required from an environmental standpoint. Conventional geotechnical testing will not determine the suitability of the material in this regard. Analytical testing and environmental site assessment may be required at the source. This will best be

assessed prior to the selection of the material source. A quality assurance program should be implemented to ensure that the fill material will comply with the current Ministry of Environment, Conservation and Parks (MECP) standards for placement and transportation. The disposal of excavated materials must also conform to the MECP Guidelines and requirements. EXP can be of assistance if an assessment of the materials is required.

4.2 Excavation and Groundwater Control

4.2.1 General

All work associated with design and construction relative to excavations must be carried out in accordance with Part III of Ontario Regulation 213/91 under the Occupational Health and Safety Act. Based on the results of the geotechnical investigation and in accordance with Section 226 of Ontario Regulation 213/91, the soils encountered at the site are classified as Type 3 soils.

For reference, temporary excavation sidewalls which extend through and terminate within Type 2 soil may be cut vertical in the bottom 1.2 m (4 ft.), and cut back at an inclination of 1 horizontal to 1 vertical above that level. Where excavations extend into or through Type 3 soil, excavation side slopes must be cut back at a maximum inclination of about 1H:1V from the base of the excavation. Should groundwater egress loosen the side slopes of Type 2 or Type 3 soils, slopes of 3H:1V or flatter will be required.

Geotechnical inspection at the time of excavation can confirm the soil type present.

4.2.2 Excavation Support

The recommendations for side slopes given in the above section would apply to most of the conventional excavations expected for the proposed development. However, in areas adjacent to buried services that are located above the base of the excavations, side slopes may require support to prevent possible disturbance or distress to these structures. This concept also applies to connections to existing services. In granular soils above the groundwater and in cohesive natural soils, bracing will not normally be required if the structures are behind a 45-degree line drawn up from the toe of the excavation. In wet sandy or silty soils, the setback should be about 3H to 1V if bracing is to be avoided.

For support of excavations such as for any deep manholes, shoring such as sheeting or soldier piles and lagging can be considered. The design and use of the support system should conform to the requirements set out in the most recent version of the Occupational Health and Safety Act for Construction Projects and approved by the Ministry of Labour. Excavations should conform to the guidelines set out in the proceeding section and the Safety Act.

The shoring should also be designed in accordance with the guidelines set out in the Canadian Foundation Engineering Manual, 4th Edition. Soil-related parameters considered appropriate for a soldier pile and lagging system are shown below.

Where applicable, the lateral earth pressure acting on the excavation shoring walls may be calculated from the following equation:

$$P = K (\gamma h + q)$$

where, P = lateral earth pressure in kPa acting at depth h;

γ = natural unit weight, a value of 20.4 kN/m3 may be assumed;

h = depth of point of interest in m;

q = equivalent value of any surcharge on the ground surface in kPa.

The earth pressure coefficient (K) may be taken as 0.25 where small movements are acceptable and adjacent footing or movement sensitive services are not above a line extending at 45 degrees from the bottom edge of the excavation; 0.35 where utilities, roads, sidewalks must be protected from significant movement; and 0.45 where adjacent building footings or movement sensitive services (gas and water mains) are above a line of 60 degrees from the horizontal extending from the bottom edge of the excavation.

For long term design, a K at rest (K_o) of a minimum of 0.5 should be considered.

The above expression assumes that no hydrostatic pressure will be applied against the shoring system. It should be recognized that the final shoring design will be prepared by the shoring contractor. It is not possible to comment further on specific design details until this design is completed.

If the shoring is exposed to freezing temperatures, appropriate insulation may be provided to prevent outward movement.

The performance of the shoring must be checked through monitoring for lateral movement of the walls of the excavation to ensure that the shoring movements remain within design limits. The most effective method for monitoring the shoring movements can best be devised by this office when the shoring plans become available. The shoring designer should however assess the specific site requirements and submit the shoring plans to the engineer for review and comment.

4.2.3 Construction Dewatering

Groundwater seepage was measured between 2.3 m and 4.0 m below ground surface (bgs) (Assumed Elevation 96.77 m to 97.74 m). For excavations extending below the groundwater table, suitable groundwater control measures will be required to maintain a dry and stable excavation base and sides.

To ensure the stability of excavations, it is recommended that the base of any excavations on site be set a minimum of 0.5 m higher than the above-mentioned elevations. If the above recommendation is followed, it is expected that any minor groundwater infiltration can be accommodated using conventional sump pumping techniques. In the event groundwater infiltration persists, positive groundwater control may be required.

The collected water should be discharged a sufficient distance away from the excavated area to prevent the discharge water from returning to the excavation. Sediment control measures should be provided at the discharge point of the dewatering system. Caution should also be taken to avoid any adverse impacts to the environment.

It is important to mention that for any projects requiring positive groundwater control with a removal rate of 50,000 liters to less than 400,000 liters (L) per day, an Environmental Activity and Sector Registry (EASR) will be required. Permit to take Water (PTTW) applications are required for removal rates more than 400,000 L per day and will need to be approved by the MECP per Sections 34 and 98 of the Ontario Water Resources Act R.S.O. 1990 and the Water Taking and Transfer Regulation O. Reg. 387/04. It is noted that a standard geotechnical investigation will not determine all the groundwater parameters which may be required to support the application. Accordingly, a detailed hydrogeological assessment from a quantitative point of view may be required to estimate the quantity of water to be removed. EXP can assist if the need arises.

4.3 Foundations

4.3.1 Conventional Strip and Spread Footings

Low rise residential buildings can be supported on conventional spread and strip footings founded below the topsoil or unsuitable soils on the natural competent subgrade soils, or engineered fill.

For preliminary purposes, the following allowable bearing pressures (net stress increase) can be assumed on the natural, undisturbed soils below a typical depth of approximately 1.2 m below existing grade throughout the site:

Bearing Resistance at Serviceability Limit States (SLS)	75 kPa (1,550 psf)
Factored Bearing Resistance at Ultimate Limit States (ULS)	100 kPa (2,100 psf)

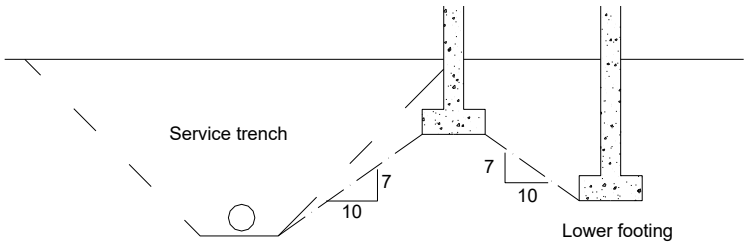
Sand deposits of the nature observed in the test pits are known to have localized variably looser and more compact pockets. During inspection, proof rolling or plate tamping the founding subgrade in conjunction with nominal concrete reinforcement in the footings may be recommended at the time of construction if conditions warrant.

It should be noted that the recommended founding depths are the minimum depths. As discussed in Section 4.2.3, groundwater seepage was measured between 2.3 m and 4.0 m bgs (Assumed Elevation 96.77 m to 97.74 m) in some of the test pits. It is recommended that the footing depths of any permanent structures be founded at a maximum depth of 0.6 m above the stabilized groundwater table. Geotechnical and/or hydrogeological drilling is recommended to assist in delineating the depth to groundwater across the site, once the final design layout of buildings and services is available. More accurate assessment of allowable bearing pressure would also be possible.

If the grades are to be raised or restored, engineered fill can be used for foundation support. The geometric requirements for the fill placement are shown on **Drawing 2**, appended. The available SLS bearing capacity for the engineered fill is 75 kPa (1,550 psf). For footings placed on engineered fill, it is recommended that the strip footings be widened to 500 mm (20 inches) and contain nominal concrete reinforcing steel. Verification of the soil conditions and the extent of reinforcement are best determined by the Geotechnical Engineer at the time of excavation.

4.3.2 Foundations - General

Footings at different elevations should be located such that the higher footings are set below a line drawn up at 10 horizontal to 7 vertical from the near edge of the lower footing. This concept should also be applied to service excavation, etc. to ensure that undermining is not a problem.



FOOTINGS NEAR SERVICE TRENCHES OR AT DIFFERENT ELEVATIONS

Provided that the footing bases are not disturbed due to construction activity, precipitation, freezing and thawing action, etc., and the aforementioned bearing pressures are not exceeded, the total and differential settlements of footings designed in accordance with the recommendations of this report and with careful attention to construction detail are expected to be less than 25 mm and 20 mm (1 and ¾ inch) respectively.

All footings exposed to seasonal freezing conditions should be protected from frost action by at least 1.2 m (4 ft) of soil cover or equivalent insulation.

It should be noted that the recommended bearing capacities have been calculated by EXP from the test pit information for the design stage only. The investigation and comments are necessarily on-going as new information of underground conditions becomes available. For example, if more specific information becomes available with respect to conditions between test pits when foundation construction is underway. The interpretation between the test pits and the recommendations of this report must therefore be checked through field inspections provided by EXP to validate the information for use during the construction stage.

4.4 Basements

If the development includes buildings with basements, the basement floors can be constructed using cast slab-on-grade techniques provided the subgrade is stripped of all topsoil and other obviously objectionable material. The subgrade should then be proof-rolled thoroughly. Any soft zones detected should be dug out and replaced with compactable excavated material placed in accordance with the requirements outlined in the previous Section 4.1.

A 200 mm (8 inch) compacted layer of 19 mm (¾ inch) clear stone should be placed between the prepared subgrade and the floor slab to serve as a moisture barrier.

The installation and requirement of a vapour barrier under the floor slab, where applicable, should conform to the flooring manufacturer's and designer's requirements. Moisture emission testing is recommended to determine the concrete condition prior to flooring installation.

All basement walls should be damp-proofed and must be designed to resist a horizontal earth pressure 'p' at any depth 'h' below the surface as given by the following expression:

$$P = K (\gamma h + q)$$

where, P = lateral earth pressure in kPa acting at a depth h:

K = earth pressure coefficient, assumed to be 0.4;

γ = unit weight of backfill, a value of 20.4 kN/m3 may be assumed;

h = depth to point of interest in m and,

q = equivalent value of any surcharge on the ground surface.

If basements are planned, installation of perimeter drains is required. The above expression assumes that the perimeter drainage system prevents the build-up of any hydrostatic pressure behind the wall. Suggestions for permanent perimeter drainage are given on **Drawing 3**. Due to the presence of groundwater in the sand soils and expected fluctuations in the level of the groundwater table, water proofing measures will be required to minimize the ingress of water seepage. An underfloor drainage system will be required for all buildings with basements planned at the Site. If the founding level is at least 1.0 m above the groundwater level, water proofing measures may not be necessary. Groundwater mounding should be considered if Low Impact Development (LID) is considered. Ongoing liaison from this office will be required.

4.5 Slab-on-Grade Construction

Preparation of the subgrade should include the removal of all topsoil and/or deleterious material from the proposed building area. The entire floor slab area should then be thoroughly proof-rolled with a heavy roller and examined by a Geotechnical Engineer. Any excessively soft or loose areas should be sub-excavated and replaced with suitable compacted fill. Where the exposed subgrade requires reconstruction to achieve the design elevations, structural fill should be used. It is recommended that structural fill comprises granular material, such as OPSS Granular 'B', or approved alternative material. The fill should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98 percent Standard Proctor Maximum Dry Density (SPMDD). For best compaction results, the *in situ* moisture content of the fill should be within about three percent of optimum, as determined by Standard Proctor density testing.

No special underfloor drains are required provided that the exterior grades are lower than the floor slab, and positively sloped away from the slab. It is recommended that an impermeable soil seal such as clay, asphalt or concrete be provided on the surface to minimize water infiltration from the exterior of the building. See **Drawing 4** for Drainage and Backfill recommendations for slab-on-grade construction.

A moisture barrier, consisting of a 200 mm (8 in.) thick, compacted layer of 19 mm (3/4 in.) clear stone, should be then placed between the prepared granular sub-base and the floor slab. A layer of filter cloth should be placed between the native sand and the stone moisture barrier.

The installation and requirement of a vapour barrier under a concrete slab should conform to the flooring manufacturer's and designer's requirements. Moisture emission testing will be required to determine the concrete condition prior to flooring installation. In order to minimize the potential for excess moisture in the floor slab at the time of the flooring installation, a concrete mixture with a low water-to-cement ratio (i.e., 0.45 to 0.55) should be

used. Chemical additives may be required at the time of placement to make the concrete workable and should be used in place of additional water at the point of placement. Ongoing liaison from this office will be required.

For slab on grade design, the modulus of subgrade reaction (k) can be taken as 20 MPa/m for the compacted stone layer over the compacted granular subbase.

The water-to-cement ratio and slump of concrete utilized in the floor slabs should be strictly controlled to minimize shrinkage of the slabs. Adequate joints should be provided in the floor slab to further control cracking. During placement of concrete at the construction site, testing should be performed on the concrete.

4.6 Foundation Backfill

In general, the existing natural soils excavated from the foundation area should be suitable for re-use as foundation wall backfill if the work is carried out during relatively dry weather. The materials to be re-used should be within three percent of optimum moisture for best compaction results. Materials should be stockpiled per their composition; i.e. sandy soils should not be mixed with clayey soils.

If the weather conditions are very wet during construction, then imported granular material such as OPSS Granular 'B' should be used. Site review by the geotechnical consultant may be advised.

The backfill must be brought up evenly on both sides of walls not designed to resist lateral earth pressures.

During construction, the fill surface around the perimeter of structures should be sloped in such a way that the surface runoff water does not accumulate around the structure.

4.7 Site Servicing

The subgrade soils beneath the water and sewer pipes which will service the site are generally expected to comprise sand. For services constructed on the natural soils or engineered fill, the bedding should conform to OPS Standards. The bedding course may be thickened if portions of the subgrade become wet during excavation. Bedding aggregate should be placed around the pipe to at least 300 mm (12 inch) above the pipe and be compacted to a minimum 95 percent SPMDD.

Water and sewer lines installed outside of heated areas should be provided with a minimum 1.2 m (4 ft.) of soil cover for frost protection.

The bases of excavations which cut into and terminate in competent sand are expected to remain stable for the short construction period. For bases terminated in the wet silty layers, localized improvement will be required. Base improvement may also be required if work is carried out in wet weather seasons. The extent of base improvement or stabilization is best determined in the field during construction, with consultation from a Geotechnical Engineer.

Test Pits TP1, TP2, TP3, and TP5 encountered groundwater below 2.3 m to 4.0 m bgs. If excavating penetrates below these levels, positive groundwater control and base stabilization will be required. Ongoing liaison from this office will be needed.

To minimize disturbance to the base, pipe laying should be carried out in short sections, with backfilling following closely after laying and no section of trench should be left open overnight.

The trenches above the specified pipe bedding should be backfilled with inorganic on-site soils placed in 300 mm thick lifts and uniformly compacted to at least 95% SPMDD. For trench backfill within 1 metre below the roadway subbase, the fill should be uniformly compacted to at least 98% SPMDD. A program of in situ density testing should be set up to ensure that satisfactory levels of compaction are achieved.

Requirements for backfill in service trenches, etc. should also have regard for OPS requirements. A summary of the general recommendations for trench backfill is presented on **Drawings 5** and **6**. A program of *in situ* density testing should be set up to ensure that satisfactory levels of compaction are achieved.

Based on the results of this investigation, the majority of the excavated sand material may be used for construction backfill provided that reasonable care is exercised in handling. In this regard, the material should be within 3 percent of the optimum moisture as determined in the Standard Proctor density test. Stockpiling of material for prolonged periods of time should be avoided. This is particularly important if construction is carried out in wet or otherwise adverse weather.

Soils excavated from below the stabilized groundwater table may be too wet for reuse as backfill unless adequate time is allowed for drying, or if the material is blended with approved dry fill; otherwise, it may be stockpiled onsite for reuse as landscape fill.

As noted previously, disposal of excavated materials off site should conform to current MECP guidelines.

4.8 Low Impact Development (LID)

It is assumed that stormwater management will be incorporated into the design of the proposed development.

LID stormwater management design requires the practical availability of unsaturated, sufficiently pervious soil with depth and aerial extent to accommodate the infiltration of stormwater run-off created by land development.

Based on the information collected at the test pit locations, and the above cited criteria, the sand material encountered at the test hole locations has potential for use in LID stormwater management design.

Three (3) grain size distribution analyses were carried out on samples obtained from the sand stratum in Test Pits TP3 and TP5 (0.7 m bgs). The results are presented in **Appendix B**.

For consideration in design, based on the grain size distribution, the estimated hydraulic conductivity (K) of the sand ranged between 1.0×10^{-2} and 2.2×10^{-2} cm/s. This corresponds with estimated infiltration rates of about 75 to 100 mm/h. Further information regarding LID stormwater management can be provided once more detailed design information becomes available. If LID is considered, it is recommended to install monitoring wells to establish the stabilized groundwater levels to assist with design.

It is understood that recommended factors of safety will be applied to the estimated parameters cited above for use in design.

4.9 Earthquake Design Considerations

The recommendations for the geotechnical aspects to determine the earthquake loading for design using the OBC 2012 are presented below.

The subsoil and groundwater information at this Site have been examined in relation to Section 4.1.8.4 of the OBC 2012. The subsoils at the Site generally consist of topsoil over sand deposits. It is anticipated that the proposed structures will be founded on the natural deposits, below any loose or soft zones.

Table 4.1.8.4.A. Site Classification for Seismic Site Response in OBC 2012 indicated that to determine the site classification, the average properties in the top 30 m (below the lowest basement level) are to be used. The test pits advanced at this Site were excavated to a maximum depth of 4.2 m below existing grade. Therefore, the Site Classification recommendation would be based on the available information as well as our interpretation of conditions below the test pits based on our knowledge of the soil conditions in the area.

Based on the above assumptions, interpretations in combination with the known local geological conditions, the Site Class for the proposed development is "D" as per Table 4.1.8.4.A, Site Classification for Seismic Site Response, OBC 2012. Additional depth drilling may be advised to determine if the soil conditions below the current depth of exploration can support a higher Site Classification.

4.10 Site Pavement Design

Areas to be paved should be stripped of all topsoil, organics and other obviously unsuitable material. The exposed subgrade must then be thoroughly proof-rolled. Any soft areas revealed by this or any other observations must be over-excavated and backfilled with approved material. All fill required to backfill service trenches or to raise the subgrade to design levels must conform to requirements outlined previously. Preferably, the natural inorganic excavated soils should be used to maintain uniform subgrade conditions, provided adequate compaction can be achieved.

Provided the preceding recommendations are followed, the pavement thickness design requirements given in the following table are recommended for the anticipated specified classification (local roads internal to the site) and anticipated subgrade conditions.

Table 1 – Recommended Pavement Structure Thicknesses

Pavement Layer	Compaction Requirements	Light Duty Pavement Structure (Cars Only)	Heavy Duty Pavement Structure (Cars and Trucks)
Asphaltic Concrete	92% MRD[1] or 97% BRD[1]	40 mm HL-3 50 mm HL-8	50 mm HL-3 60 mm HL-8
Granular 'A' (Base)	100% SPMDD[1]	150 mm	150 mm
Granular 'B' (Base)	100% SPMDD[1]	300 mm*	450 mm*

*Notes:
1) SPMDD denotes Standard Proctor Maximum Dry Density, MRD denotes Maximum Relative Density, BRD denotes Bulk Relative Density.
2) The subgrade must be compacted to 98% SPMDD.
3) The above recommendations are minimum requirements.
4) The existing natural sand may be used and form part of the granular subbase structure, subject to review and acceptance from a Geotechnical Engineer.

The recommended pavement structures provided in the above table are based on the existing subgrade soil properties determined from visual examination and textural classification of the soil samples. Consequently, the recommended pavement structures should be considered for preliminary design purposes only. Other granular configurations may also be possible provided the granular base equivalency (GBE) thickness is maintained. These recommendations on thickness design are not intended to support heavy and concentrated construction traffic, particularly where only a portion of the pavement section is installed.

If construction is undertaken under adverse weather conditions (i.e., wet or freezing conditions) subgrade preparation and granular sub-base requirements should be reviewed by the Geotechnical Engineer. If the sub-base is set on wet or dilatant silty soils, a geotextile will be required. A woven type geotextile such as Terrafix 200W or equivalent would be suitable for this application.

If only a portion of the pavement will be in place during construction, the granular subbase may have to be thickened. This is best determined in the field during the site servicing stage of construction, prior to road construction.

Samples of both the Granular 'A' and Granular 'B' aggregate should be checked for conformance to OPSS 1010 prior to utilization on Site, and during construction. The Granular 'B' subbase and the Granular 'A' base courses must be compacted to 100 percent SPMDD.

The asphaltic concrete paving materials should conform to the requirements of OPSS MUNI 1150. The asphalt should be placed in accordance with OPSS 310 and compacted to at least 97 percent of the Marshall mix design bulk relative density or 92% of maximum relative density. A tack coat should be applied between the surface and binder asphalt courses.

Good drainage provisions will optimize pavement performance. The finished pavement surface should be free of depressions and should be sloped (preferably at a minimum grade of two percent) to provide effective surface drainage toward catch basins. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. In low areas, sub-drains should be installed to intercept excess subsurface moisture and prevent subgrade softening, as shown on **Drawing 7**. This is particularly important in heavier traffic areas at the site entrances. The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed grading.

A program of in situ density testing must be carried out to verify that satisfactory levels of compaction are being achieved.

To minimize the effects of differential settlements of service trench fill, it is recommended that wherever practical, placement of binder asphalt be delayed for approximately six months after the granular sub-base is put down. The surface course asphalt should be delayed for a further one year. Prior to the surface asphalt being placed, it is recommended that a pavement evaluation be carried out on the base asphalt to identify repair areas or areas requiring remedial works prior to surface asphalt being placed.

4.11 Curbs and Sidewalks

It is recommended that the concrete for curb and gutter and sidewalks should be proportioned, mixed, placed, and cured in accordance with the requirements of OPSS 353 and OPSS 1350.

During cold weather, the freshly placed concrete must be covered with insulating blankets to protect against freezing. Three cylinders from each day's pour should be taken for compressive strength testing. Air entrainment, temperature, and slump tests should be made from the same batch of concrete from which test cylinders are made.

The subgrade for the sidewalks should comprise undisturbed natural competent soil of well-compacted fill. A minimum 150 mm thick layer of compacted Granular 'A' type aggregate should be placed beneath the sidewalk slabs. It is recommended that the Granular 'A' be compacted to a minimum 100 percent SPMDD, to provide adequate support for the concrete sidewalk. Construction traffic should be kept off the placed curbs and sidewalks as they are not designed to withstand heavy traffic load.

4.12 Inspection and Testing Requirements

An effective inspection and testing program is an essential part of construction monitoring. The Inspection and Testing Program typically includes the following items:

- Subgrade examination prior to engineered fill placement, footing base evaluation;
- Inspection and Materials testing during engineered fill placement (full-time supervision is recommended) and site servicing works, including soil sampling, laboratory testing (moisture contents and Standard Proctor density test on the pipe bedding, trench backfill and engineered fill material), monitoring of fill placement, and in situ density testing;
- Materials testing for concrete curbs and sidewalks.
- Inspection and Materials testing during paved area construction, including subgrade examination of the paved area subgrade soils following site servicing, laboratory testing (grain size analyses and Standard Proctor density tests on the Granular A and B material placed on site roadways), and *in situ* density testing;
- Inspection and Materials testing for base and surface asphalt, including laboratory testing on asphalt sampling to confirm conformance to project specifications and standards.

EXP would be pleased to prepare an inspection and testing work program prior to construction, incorporating the above items.

5. General Comments

The information presented in this report is based on a limited investigation designed to provide information to support an assessment of the current geotechnical conditions within the subject property. The conclusions and recommendations presented in this report reflect site conditions existing at the time of the investigation. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent. Should this occur, EXP Services Inc. should be contacted to assess the situation, and the need for additional testing and reporting. EXP has qualified personnel to provide assistance in regards to any future geotechnical and environmental issues related to this property.

Our undertaking at EXP, therefore, is to perform our work within limits prescribed by our clients, with the usual thoroughness and competence of the engineering profession.

The comments given in this report are intended only for the guidance of design engineers. The number of test holes required to determine the localized underground conditions between test holes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should in this light, decide on their own investigations, as well as their own interpretations of the factual test pit results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

EXP Services Inc. should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not afforded the privilege of making this review, EXP Services Inc. will assume no responsibility for interpretation of the recommendations in this report.

This report was prepared for the exclusive use of **Litera Properties Inc.** and may not be reproduced in whole or in part, without the prior written consent of EXP, or used or relied upon in whole or in part by other parties for any purposes whatsoever. Any use which a third party makes of this report, or any part thereof, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. 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 this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Drawings

Notes:
1. The boundaries and soil types have been established only at the test hole locations. Between test holes they are assumed and may be subject to considerable error.
2. Topsoil quantities should not be established from the information provided at the test hole locations.
3. Soil samples will be retained in storage for 3 months and discarded unless Client advises that an extended period is required.
4. The site plan has been reproduced from Google Earth and should be read in conjunction with EXP Report LON-21008023-A0.

Geotechnical Investigation

Proposed Residential Development

430 Carroll Street East, Strathroy, ON

-LEGEND-

TP1 - Approximate Test Pit Location

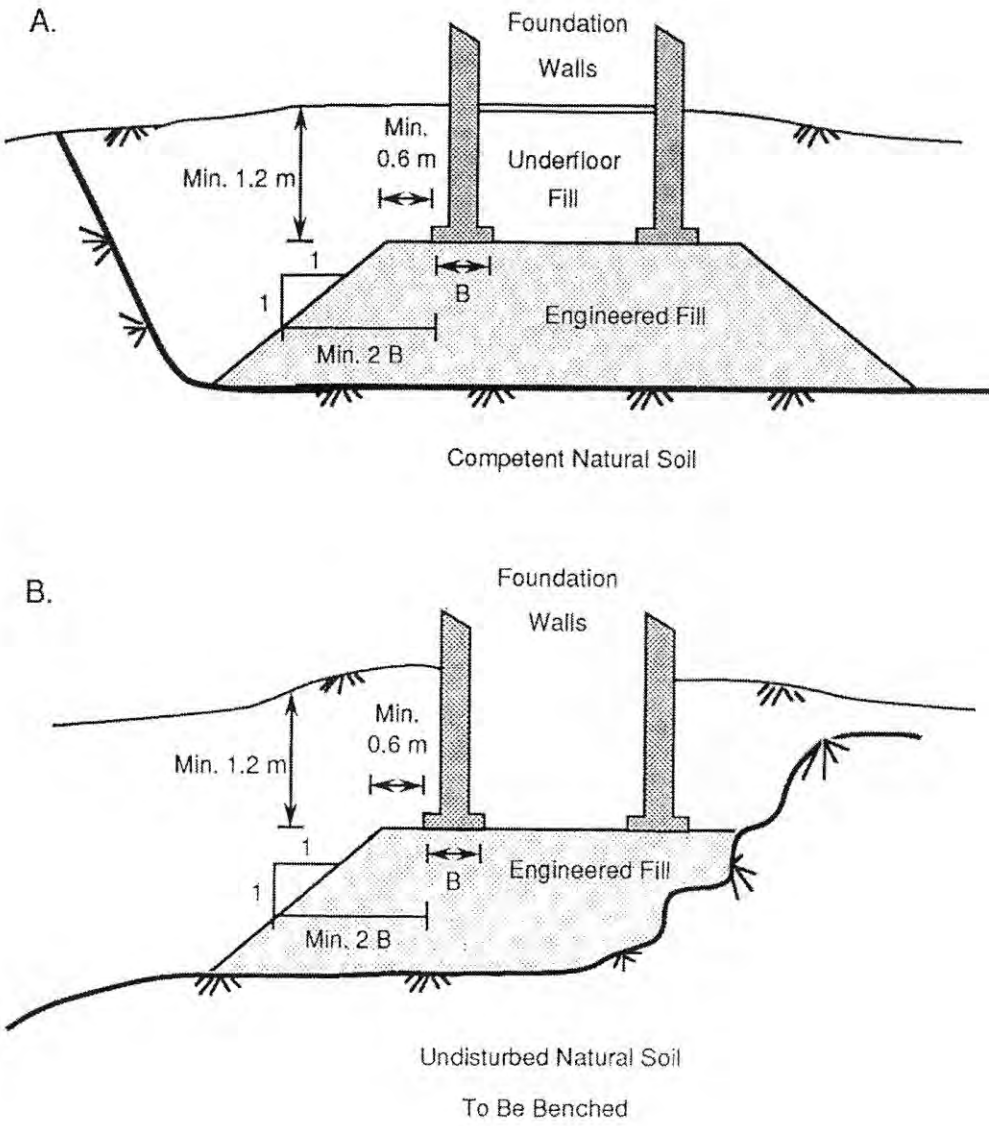
CLIENT	Litera Properties Inc.
TITLE	Test Pit Location Plan
DRAWN BY:	B.W.
REVIEWED BY:	B.W.
SCALE	NTS

EXP Services Inc.
15701 Robin's Hill Road
London, ON, N5V 0A5

DATE	PROJECT NO.	DWG.
May 2021	LON-21008023-A0	1

DRAWING 2 – GEOMETRIC REQUIREMENTS FOR FOUNDATIONS ON ENGINEERED FILL

Schematic (Not to Scale)



SECTION VIEW

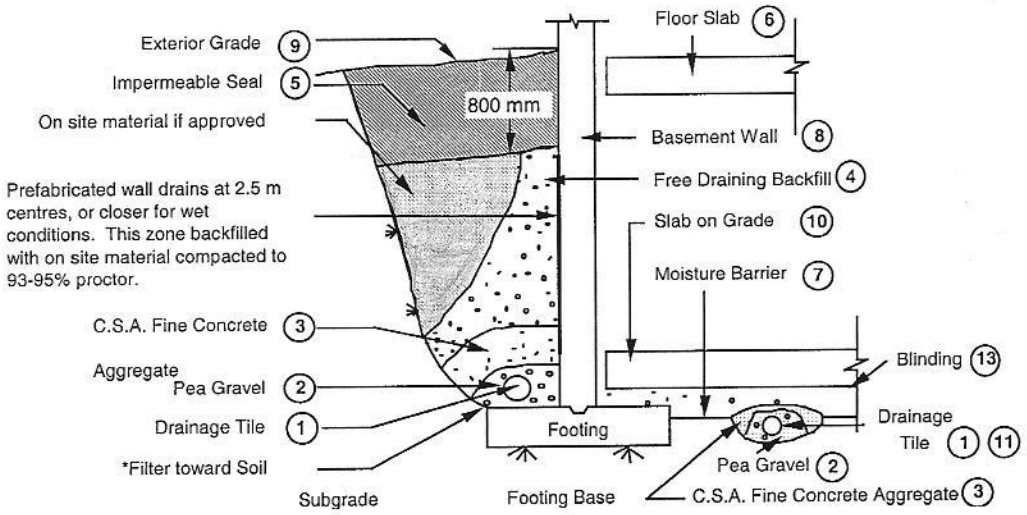
Section A – Typical Section of Slab-on-Grade Building
Section B – Typical Section of Building with Basement

Refer to Detailed Notes on following page.

NOTES FOR ENGINEERED FILL PLACMENT:

1. The area must be stripped of all topsoil contaminated fill material, and other unsuitable soils, and proof rolled. Soft spots must be dug out. The stripped natural subgrade must be examined and approved by an EXP Engineer prior to placement of engineered fill.
2. In areas where engineered fill is placed on a slope, the fill should be benched into the approved subgrade soils. EXP would be pleased to provide additional comments and recommendations in this regard, if required.
3. All excavations must be carried out in accordance with the Occupational Health and Safety Regulation of Ontario (Construction Projects - O.Reg. 213.91)
4. Material used for engineered fill must be free of topsoil, organics, frost and frozen material, and otherwise unsuitable or compressible soils, as determined by a Geotechnical Engineer. Any material proposed for use as engineered fill must be examined and approved by EXP, prior to use onsite. Clean compactable granular fill is preferred.
5. Approved engineered fill should be placed in maximum 300 mm thick lifts, and uniformly compacted to 100% Standard Proctor dry density throughout. For best compaction results, engineered fill should be within 3 percent of its optimum moisture content, as determined by the Standard Proctor density test. Imported fill should satisfy the MECP regulations and requirements.
6. Full time geotechnical monitoring, inspection and in situ density (compaction) testing by EXP is required during placement of the engineered fill.
7. Site grades should be maintained during area grading activities to promote drainage, and to minimize ponding of surface water on the engineered fill mat. Rutting by construction equipment should be kept to a minimum, where possible. Additional work to ensure suitability of engineered fill may be required if fill is placed in extreme (hot/cold) weather.
8. The fill must be placed such that the specified geometry is achieved. Refer to sketches (previous page) for minimum requirements. Proper environmental protection will be required, such as providing frost penetration during construction, and after the completion of the engineered fill mat.
9. An allowable bearing pressure of 75 kPa (1550 psf) may be used provided that all conditions outlined above, and in the Geotechnical Report are adhered to.
10. These guidelines are to be read in conjunction with the attached Geotechnical Report. (EXP Project No. LON-00017605-GE)
11. For foundations set on engineered fill, footing enhancement and/or concrete reinforcing steel placement is recommended. The footing geometry and extent of concrete reinforcing steel will depend on site specific conditions. In general, consideration may be given to having a minimum strip footing width of 500 mm (20 inches), containing nominal steel reinforcement. Alternatively, concrete reinforcement may be recommended in the top and bottom of the foundation wall strip. The final footing geometry and extent of reinforcement is best determined in the field, by a Geotechnical Engineer.

DRAWING 3 – BACKFILL AND BASEMENT DRAINAGE DETAIL (NOT TO SCALE)

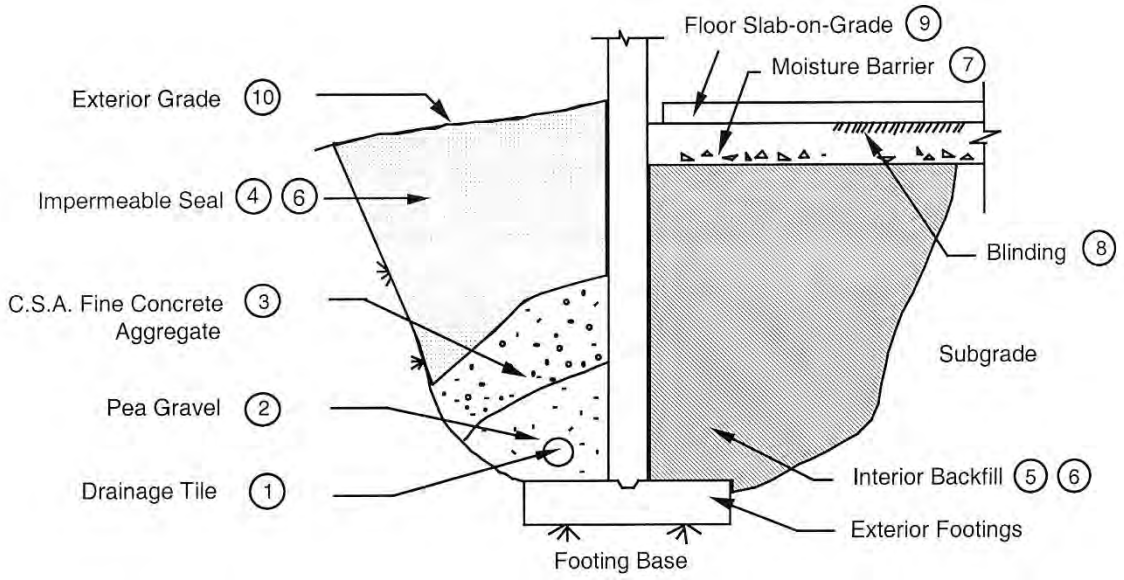


NOTES:

1. Drainage tile to consist of 100 mm (4 in.) diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be minimum of 150 mm (6 in.) below underside of floor slab.
2. Pea gravel 150 mm (6 in.) top and sides of drain. If drain is not on footing, place 100 mm (4 in.) of pea gravel below drain. 20 mm (3/4 in.) clear stone may be used provided if it is covered by an approved porous geotextile fabric membrane (Terrafix 270R or equivalent).
3. C.S.A. fine concrete aggregate to act as filter material. Minimum 300 mm (12 in.) top and side of drain. This may be replaced by an approved porous geotextile membrane (Terrafix 270R or equivalent).
4. Free-draining backfill - OPSS Granular B or equivalent compacted to 93 to 95 (maximum) percent Standard Proctor density. Do not compact closer than l.8 m (6 ft) from wall with heavy equipment. Use hand controlled light compaction equipment within 1.8 m (6 ft) of wall.
5. Impermeable backfill seal of compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to consist of compacted 20 mm (3/4 in.) clear, crushed stone or equivalent free-draining material. Layer to be 200 mm (8 in.) minimum thickness.
8. Basement walls to be damp-proofed.
9. Exterior grade to slope away from wall.
10. Slab on grade should not be structurally connected to wall or footing.
11. Underfloor drain invert to be at least 300 mm (12 in.) below underside of floor slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25 ft.) centres one way. Place drain on 100 mm (4 in.) of pea gravel with 150 mm (6 in.) of pea gravel top and sides. CSA fine concrete aggregate to be provided as filter material or an approved porous geotextile membrane (as in 2 above) may be used.
12. Do not connect the underfloor drains to perimeter drains.
13. If the 20 mm (3/4 in.) clear stone requires surface binding, use 6 mm (1/4 in.) clear stone chips.

Note: a) Underfloor drainage can be deleted where not required (see report).
b) Free draining backfill, item 4 may be replaced by wall drains, as indicated, if more economical.

DRAWING 4 – DRAINAGE AND BACKFILL RECOMMENDATIONS (NOT TO SCALE)

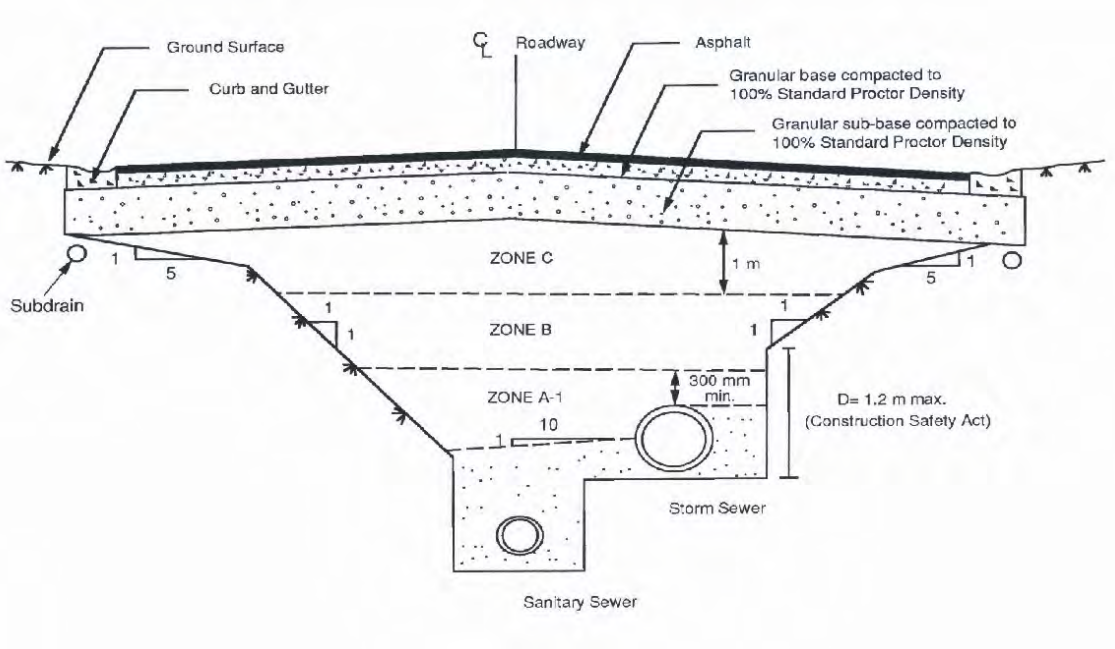


NOTES:

1. Drainage tile to consist of 100 mm (4 in.) diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be minimum of 150 mm (6 in.) below underside of interior floor slab.
2. Pea gravel 150 mm (6 in.) top and sides of drain. If drain is not on footing, place 100 mm (4 in.) of pea gravel below drain. 20 mm (3/4 in.) clear stone may be used provided if it is covered by an approved porous geotextile fabric membrane (Terrafix 270R or equivalent).
3. C.S.A. fine concrete aggregate to act as filter material. Minimum 300 mm (12 in.) top and side of drain. This may be replaced by an approved porous geotextile membrane (Terrafix 270R or equivalent).
4. Impermeable backfill seal of compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted. Compact backfill to 95 percent Standard Proctor Maximum Dry Density.
5. The interior fill may be any clean, inorganic soil which may be compacted to at least 95 percent Standard Proctor density in this confined space.
6. Do not use heavy compaction equipment within 450 mm (18 in.) of the wall. Do not fill or compact within 1.8 m (6 ft) of wall unless fill is placed on both sides simultaneously.
7. Moisture barrier to be at least 200 mm (8 in.) of compacted 20 mm (3/4 in.) clear, crushed stone or equivalent free-draining material.
8. If the 20 mm (3/4 in.) clear stone requires surface binding, use 60 mm (1/4 in.) clear stone chips.
9. Slab on grade should not be structurally connected to wall or footing.
10. Exterior grade to slope away from building.

This system is not normally required if the floor is at least 300 mm (1 ft.) above exterior grade.

DRAWING 5 – TYPICAL BACKFILL DETAIL
STORM AND SANITARY SEWER (COMMON TRENCH)



SECTION VIEW

NOTES:

ZONE A
Granular bedding satisfying current OPS Standards compacted to 95% Standard Proctor maximum dry density.

ZONE A-l
To be compacted to 95% Standard Proctor maximum dry density.

ZONE B
To be compacted to 95% Standard Proctor maximum dry density.

ZONE C
To be compacted to 98% Standard Proctor maximum dry density.

The excavations shown above are for Type 1 or 2 soils. Where excavations extend through Type 3 soils, the side walls should be sloped back at a maximum inclination of 1 horizontal to 1 vertical from the base (Reference O.Reg 219/31).

DRAWING 6 – TRENCH BACKFILL REQUIREMENTS

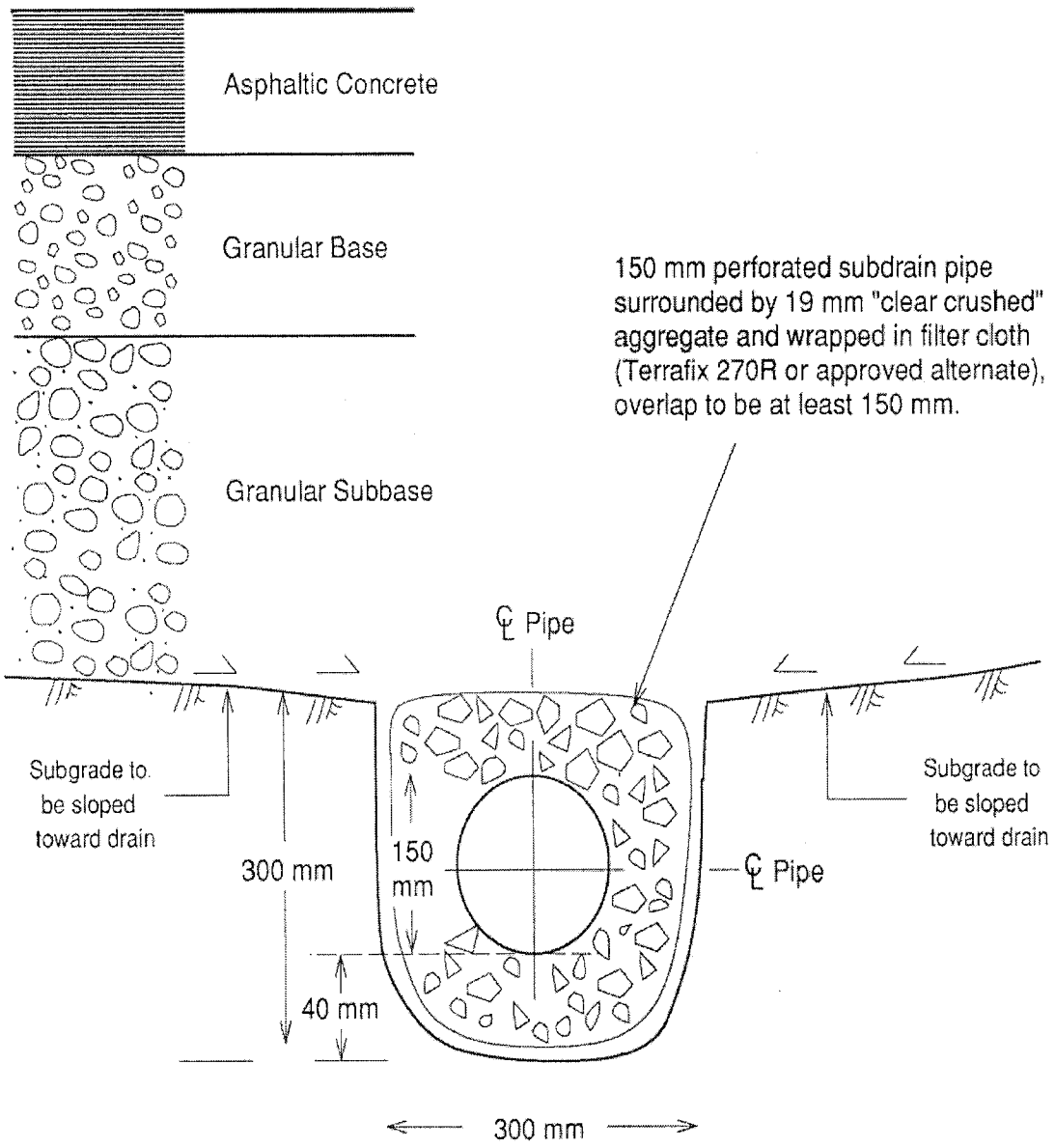
Requirements for backfill in service trenches, etc. should conform to current OPSS requirements. A summary of the general recommendations for trench backfill is presented on **Drawing 5**.

The bedding materials for the services designated as Zone A on the attached drawings should consist of approved granular material satisfying the current OPSS minimum standards and specifications. (Class B bedding should provide adequate support for the pipes). These materials should be uniformly compacted to 95 percent of standard Proctor dry density. Some problems may be encountered in maintaining alignment when bedding pipes in wet sandy soil. If Granular 'A' or other sandy material is used for bedding, they may become 'spongy' when saturated. If significant amounts of clear stone are used to stabilize the base, a geotextile should be incorporated to avoid problems with migration of fine grained materials and differential settlement under the pipes as the groundwater rises after backfilling. For minor local use of crushed stone without a geotextile filter, a graded HL3 stone is preferable.

The backfill in Zone B will consist of the native material. This material should be placed in loose lifts not exceeding 300 mm (12 inches) and be uniformly compacted to 95 percent of the standard Proctor maximum dry density. Material wetter than 5 percent above optimum must be allowed to dry sufficiently or should be discarded or used in landscaped areas.

The upper 1 meter of the general backfill (i.e. Zone C) should be placed in loose lifts not exceeding 300 mm (12 inches) and be uniformly compacted to at least 98 percent of the standard Proctor maximum dry density. To achieve satisfactory compaction, the fill material should be within 3 percent of standard Proctor optimum moisture content at placement.

DRAWING 7 – PAVEMENT SUBDRAIN DETAIL



NOTES:

1. All dimensions in millimetres.
2. All sub drains to be set on at least 1% grade draining to a positive outlet.
3. Subgrade soil conditions should be verified onsite, during subgrade preparation works, following site servicing installations.

Scale: NTS

Appendix A – Test Pit Summary

TEST PIT LOG

TP1
Sheet 1 of 1

CLIENT **Litera Property Inc.** PROJECT NO. **LON- 21008023-AO**

PROJECT **430 Caroll Street** DATUM

LOCATION **Strathroy, Ontario** DATES: Completed **May 11, 2021** Water Level

DEPTH (m bgs)	ELEVATION (~m)	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N VALUE (blows)	MOISTURE CONTENT (%)	SHEAR STRENGTH / Atterberg Limits and Moisture
0	99.07	**TOPSOIL** - 300 mm								
	98.77	**SAND** - light brown, medium grained, compact to dense				S1				
1										
2		water encountered at 2.3 m bgs								
3	95.77									
		End of Testpit at 3.3 m bgs								
4										
5										

SHEAR STRENGTH
✤ S Field Vane Test (#=Sensitivity)
▲ Penetrometer ■ Torvane
100 200 kPa

Atterberg Limits and Moisture
W_P W W_L
● SPT N Value × Dynamic Cone
10 20 30 40

NOTES

1) Testpit logs interpretation requires assistance by EXP before the use by others and must be read in conjunction with EXP Report LON-21008023-A0.
2) bgs denotes below ground surface.
3) Testpit encountered water measured near 2.3 m bgs upon the completion of excavation.

SAMPLE LEGEND
☒ AS Auger Sample ▨ SS Split Spoon ■ ST Shelby Tube
▯ Rock Core (eg. BQ, NQ, etc.) ▯ VN Vane Sample

OTHER TESTS

G Specific Gravity	C Consolidation
H Hydrometer	CD Consolidated Drained Triaxial
S Sieve Analysis	CU Consolidated Undrained Triaxial
γ Unit Weight	UU Unconsolidated Undrained Triaxial
P Field Permeability	UC Unconfined Compression
K Lab Permeability	DS Direct Shear

WATER LEVELS
▽ Apparent ▼ Measured ▲ Artesian (see Notes)

TEST PIT LOG

TP2
Sheet 1 of 1

CLIENT **Litera Property Inc.** PROJECT NO. **LON- 21008023-AO**

PROJECT **430 Caroll Street** DATUM

LOCATION **Strathroy, Ontario** DATES: Completed **May 11, 2021** Water Level

DEPTH (m bgs)	ELEVATION (~m)	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N VALUE (blows)	MOISTURE CONTENT (%)	SHEAR STRENGTH / Atterberg Limits and Moisture
0	100.69	**FILL** - Sand, fine to medium grained								
1	99.19	**SAND** - light brown, medium grained, compact to dense				S1				
2										
3										
4	96.59	wet sand observed at 3.8 m bgs								
5		End of Testpit at 4.1 m bgs								

SHEAR STRENGTH
S Field Vane Test (#=Sensitivity)
Penetrometer Torvane
100 200 kPa
Atterberg Limits and Moisture
W_P W W_L
SPT N Value Dynamic Cone
10 20 30 40

NOTES

1) Testpit logs interpretation requires assistance by EXP before the use by others and must be read in conjunction with EXP Report LON-21008023-A0.
2) bgs denotes below ground surface.

SAMPLE LEGEND
AS Auger Sample SS Split Spoon ST Shelby Tube
Rock Core (eg. BQ, NQ, etc.) VN Vane Sample

OTHER TESTS

G Specific Gravity	C Consolidation
H Hydrometer	CD Consolidated Drained Triaxial
S Sieve Analysis	CU Consolidated Undrained Triaxial
γ Unit Weight	UU Unconsolidated Undrained Triaxial
P Field Permeability	UC Unconfined Compression
K Lab Permeability	DS Direct Shear

WATER LEVELS
Apparent Measured Artesian (see Notes)

TEST PIT LOG

TP3
Sheet 1 of 1

CLIENT **Litera Property Inc.** PROJECT NO. **LON- 21008023-AO**

PROJECT **430 Caroll Street** DATUM

LOCATION **Strathroy, Ontario** DATES: Completed **May 11, 2021** Water Level

DEPTH (m bgs)	ELEVATION (~m)	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N VALUE (blows)	MOISTURE CONTENT (%)	SHEAR STRENGTH / Atterberg Limits and Moisture
0	100.05	**TOPSOIL** - 400 mm								
	99.65	**SAND** - light brown, medium grained, compact to dense								
1										
2										
		water encountered at 2.6 m bgs				S1				
3	96.75									
		End of Testpit at 3.3 m bgs								
4										
5										

SHEAR STRENGTH
S Field Vane Test (#=Sensitivity)
Penetrometer Torvane
100 200 kPa
Atterberg Limits and Moisture
W_P W W_L
SPT N Value Dynamic Cone
10 20 30 40

NOTES

1) Testpit logs interpretation requires assistance by EXP before the use by others and must be read in conjunction with EXP Report LON-21008023-A0.
2) bgs denotes below ground surface.
3) Testpit encountered water measured near 2.6 m bgs upon the completion of excavation.

SAMPLE LEGEND
AS Auger Sample SS Split Spoon ST Shelby Tube
Rock Core (eg. BQ, NQ, etc.) VN Vane Sample

OTHER TESTS

G Specific Gravity	C Consolidation
H Hydrometer	CD Consolidated Drained Triaxial
S Sieve Analysis	CU Consolidated Undrained Triaxial
γ Unit Weight	UU Unconsolidated Undrained Triaxial
P Field Permeability	UC Unconfined Compression
K Lab Permeability	DS Direct Shear

WATER LEVELS
Apparent Measured Artesian (see Notes)

TEST PIT LOG

TP4
Sheet 1 of 1

CLIENT **Litera Property Inc.** PROJECT NO. **LON- 21008023-AO**
PROJECT **430 Caroll Street** DATUM
LOCATION **Strathroy, Ontario** DATES: Completed **May 11, 2021** Water Level

DEPTH (m bgs)	ELEVATION (~m)	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N VALUE (blows)	MOISTURE CONTENT (%)	SHEAR STRENGTH / Atterberg Limits and Moisture
0	101.62	**TOPSOIL** - 500 mm								
	101.12	**CLAYEY SILT** - light brown, moist				S1				
1										
	99.82	**SAND** - light brown, medium grained, compact to dense				S2				
2										
3										
4	97.52	End of Testpit at 4.1 m bgs								
5										

SHEAR STRENGTH
✤ S Field Vane Test (#=Sensitivity)
▲ Penetrometer ■ Torvane
100 200 kPa
Atterberg Limits and Moisture
W_P W W_L
● SPT N Value × Dynamic Cone
10 20 30 40

NOTES

1) Testpit logs interpretation requires assistance by EXP before the use by others and must be read in conjunction with EXP Report LON-21008023-A0.
2) bgs denotes below ground surface.
3) Testpit dry upon the completion of excavation.

SAMPLE LEGEND
☒ AS Auger Sample ▨ SS Split Spoon ■ ST Shelby Tube
▯ Rock Core (eg. BQ, NQ, etc.) ▯ VN Vane Sample

OTHER TESTS

G Specific Gravity	C Consolidation
H Hydrometer	CD Consolidated Drained Triaxial
S Sieve Analysis	CU Consolidated Undrained Triaxial
γ Unit Weight	UU Unconsolidated Undrained Triaxial
P Field Permeability	UC Unconfined Compression
K Lab Permeability	DS Direct Shear

WATER LEVELS
▽ Apparent ▼ Measured ▲ Artesian (see Notes)

TEST PIT LOG

TP5
Sheet 1 of 1

CLIENT **Litera Property Inc.** PROJECT NO. **LON- 21008023-AO**

PROJECT **430 Caroll Street** DATUM

LOCATION **Strathroy, Ontario** DATES: Completed **May 11, 2021** Water Level

DEPTH (m bgs)	ELEVATION (~m)	STRATA DESCRIPTION	STRATA PLOT	WELL LOG	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N VALUE (blows)	MOISTURE CONTENT (%)	SHEAR STRENGTH / Atterberg Limits and Moisture
0	101.74	**TOPSOIL** - 300 mm								
	101.44	**SAND** - light brown, medium grained, compact to dense								
1										
2										
3		End of Testpit at 3.3 m bgs								
4	97.54	wet sand at 4.0 m bgs				S1				
5										

SHEAR STRENGTH
S Field Vane Test (#=Sensitivity)
Penetrometer Torvane
100 200 kPa
Atterberg Limits and Moisture
W_P W W_L
SPT N Value Dynamic Cone
10 20 30 40

NOTES

1) Testpit logs interpretation requires assistance by EXP before the use by others and must be read in conjunction with EXP Report LON-21008023-A0.
2) bgs denotes below ground surface.

SAMPLE LEGEND
AS Auger Sample SS Split Spoon ST Shelby Tube
Rock Core (eg. BQ, NQ, etc.) VN Vane Sample

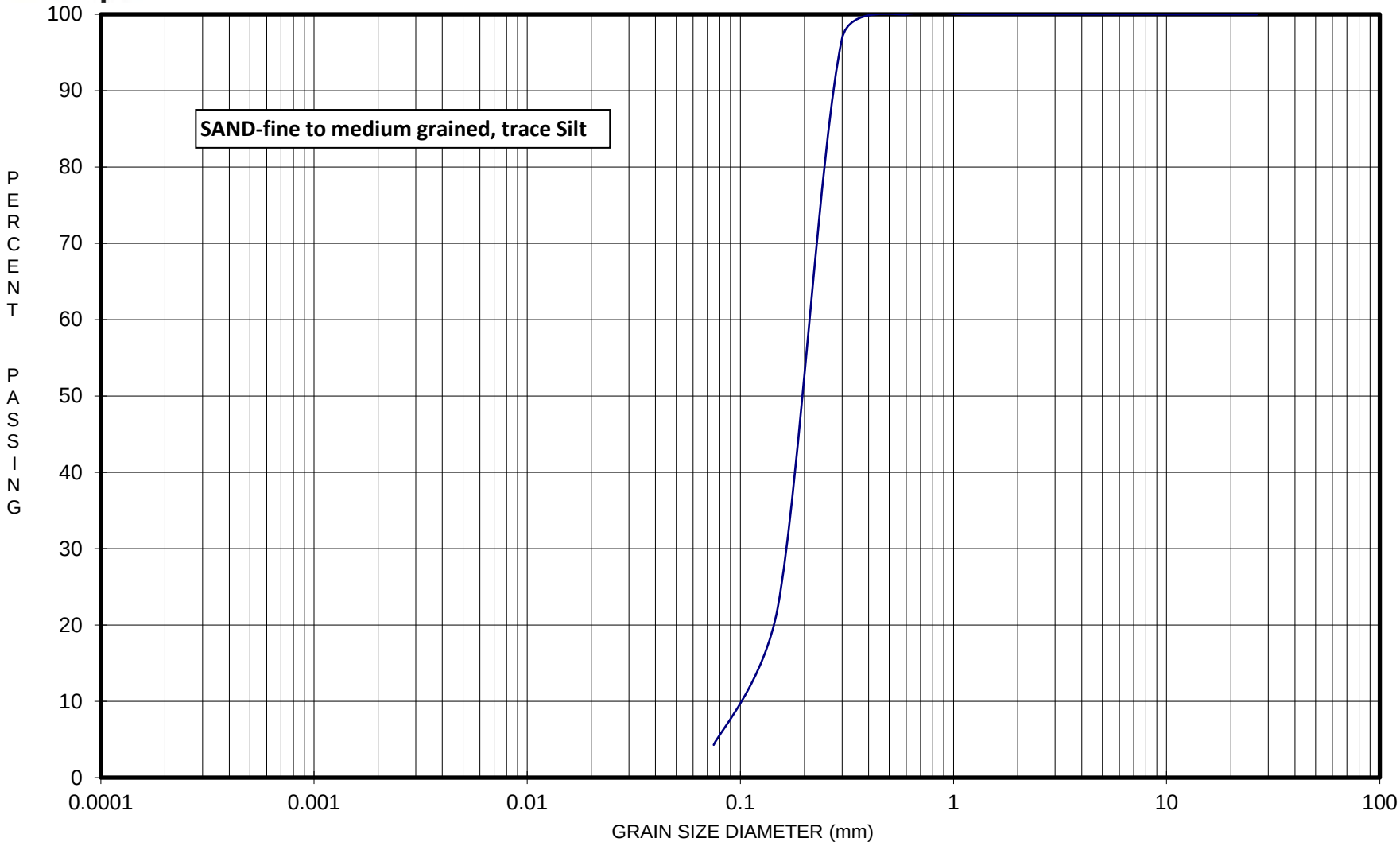
OTHER TESTS

G Specific Gravity	C Consolidation
H Hydrometer	CD Consolidated Drained Triaxial
S Sieve Analysis	CU Consolidated Undrained Triaxial
γ Unit Weight	UU Unconsolidated Undrained Triaxial
P Field Permeability	UC Unconfined Compression
K Lab Permeability	DS Direct Shear

WATER LEVELS
Apparent Measured Artesian (see Notes)

Appendix B – Grain Size Distribution Analyses

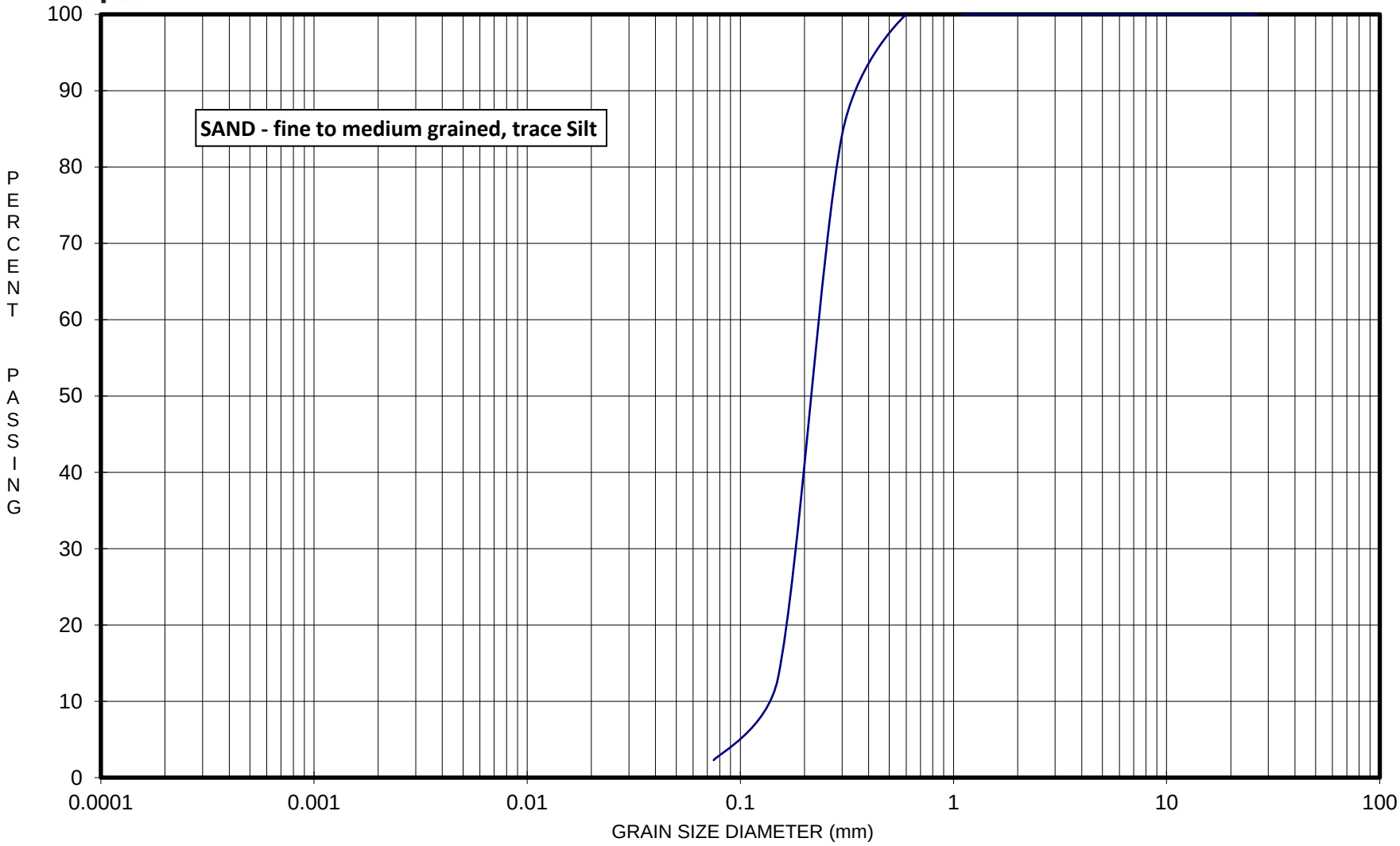
MECHANICAL GRAIN SIZE ANALYSIS



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT			SAND			GRAVEL		

MODIFIED M.I.T. CLASSIFICATION	**Sample Description: TP3 - S1 - 2.5m bgs**	**Project: LON-21008023-A0**	**Figure 1**

MECHANICAL GRAIN SIZE ANALYSIS



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE
	SILT			SAND			GRAVEL		

MODIFIED M.I.T. CLASSIFICATION	**Sample Description: TP5 - S1 - 4.0m bgs**	**Project: LON-21008023-A0**	**Figure 2**

Appendix C – Inspection and Testing Schedule

INSPECTION & TESTING SCHEDULE

The following program outlines suggested minimum testing requirements during backfilling of service trenches and construction of pavements. In adverse weather conditions (wet/freezing), increased testing will be required. The testing frequencies are general requirements and may be adjusted at the discretion of the engineer based on test results and prevailing construction conditions.

I TRENCH BACKFILL

ZONE A	- one in situ density test per 100 cubic meters or 50 linear metres of trench whichever is less - one laboratory grain size and Proctor density test per 50 density tests or 4000 cubic metres or on change of material (source, visual)
ZONE A1	- one in situ density test per 75 cubic metres of material or 25 linear metres of each lift of fill - one laboratory grain size and Proctor density test per each 50 density tests or 4000 cubic metres of material placed or as directed by the engineer
ZONES B & C	- one in situ density test per 150 cubic metres of material or 50 linear metres or each lift whichever is less - one laboratory grain size and Proctor density test per 50 density tests or 4000 cubic metres of material placed or as directed by the engineer

II PAVEMENT MATERIALS

GRANULAR SUBBASE	- one in situ density test per 50 linear metres of road - one laboratory grain size and standard Proctor test per 50 density tests or 4000 cubic metres or each change of material (visual, source), as determined by the engineer
GRANULAR BASE	- one in situ density test per 50 linear metres of road - one laboratory grain size and Proctor per 50 density tests or 8000 cubic metres or change in material (visual, source), as determined by the engineer - Benkelman beam testing at 10 metre intervals per lane, after final grading and compaction. Asphaltic concrete should not be placed until rebound criteria have been satisfied.
ASPHALTIC CONCRETE	- one in situ density test per 25 linear metres of roadway - one complete Marshall Compliance test including stability flow, etc. for each mix type to check mix acceptability. One extraction and gradation test per each day of paving to be compared to job mix formula

NOTES: Where testing indicates inadequate compaction, additional fill should not be placed until the area is recompacted and retested at the discretion of the engineer.

Appendix D – Limitations and Use of Report

LIMITATIONS AND USE OF REPORT

BASIS OF REPORT

This report ("Report") is based on site conditions known or inferred by the geotechnical investigation undertaken as of the date of the Report. Should changes occur which potentially impact the geotechnical condition of the site, or if construction is implemented more than one year following the date of the Report, the recommendations of EXP may require re-evaluation.

The Report is provided solely for the guidance of design engineers and on the assumption that the design will be in accordance with applicable codes and standards. Any changes in the design features which potentially impact the geotechnical analyses or issues concerning the geotechnical aspects of applicable codes and standards will necessitate a review of the design by EXP. Additional field work and reporting may also be required.

Where applicable, recommended field services are the minimum necessary to ascertain that construction is being carried out in general conformity with building code guidelines, generally accepted practices and EXP's recommendations. Any reduction in the level of services recommended will result in EXP providing qualified opinions regarding the adequacy of the work. EXP can assist design professionals or contractors retained by the Client to review applicable plans, drawings, and specifications as they relate to the Report or to conduct field reviews during construction.

Contractors contemplating work on the site are responsible for conducting an independent investigation and interpretation of the test pit results contained in the Report. The number of test pits necessary to determine the localized underground conditions as they impact construction costs, techniques, sequencing, equipment and scheduling may be greater than those carried out for the purpose of the Report.

Classification and identification of soils, rocks, geological units, contaminant materials, building envelopment assessments, and engineering estimates are based on investigations performed in accordance with the standard of care set out below and require the exercise of judgment. As a result, even comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations or building envelope descriptions involve an inherent risk that some conditions will not be detected. All documents or records summarizing investigations are based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated. Some conditions are subject to change over time. The Report presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, these should be disclosed to EXP to allow for additional or special investigations to be undertaken not otherwise within the scope of investigation conducted for the purpose of the Report.

RELIANCE ON INFORMATION PROVIDED

The evaluation and conclusions contained in the Report are based on conditions in evidence at the time of site inspections and information provided to EXP by the Client and others. The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose as communicated by the Client. EXP has relied in good faith upon such representations, information and instructions and accepts no responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of any misstatements, omissions, misrepresentation or fraudulent acts of persons providing information. Unless specifically stated otherwise, the applicability and reliability of the findings, recommendations, suggestions or opinions expressed in the Report are only valid to the extent that there has been no material alteration to or variation from any of the information provided to EXP.

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