MTE Consultants
123 St. George St., London, Ontario N6A 3A1

February 6, 2024

MTE File No.: 43729-100

Development Services
City of London
300 Dufferin Avenue
London, ON N6A 4L9

Attention: Development Services

RE: Preliminary Site Servicing and Stormwater Management Brief
Residential Development, 1806 Avalon Street

This report has been prepared to outline site servicing and Stormwater Management (SWM) strategies based on City of London (City) requirements and existing infrastructure in the vicinity of the subject lands at 1806 Avalon Street.

INTRODUCTION

MTE was retained by 2126983 Ontario Inc. to complete a preliminary Site Servicing Brief in support of a of a Zoning By-law Amendment (ZBA) of the above noted property. The total size of the property located at 1806 Avalon Street is approximately 1.022 ha.

The lands subject to the future ZBA application (the 'Site') is currently vacant and is bounded by existing residential development and existing Avalon Street to the east, existing commercial development to the west and to the south and Canadian Pacific Railway (CPR) drainage ditch to the north.

As presented on the preliminary site plan (provided in **Appendix A**) prepared by MTE the proposed development comprises of sixteen condo units, Avalon Street extension, a future internal street, visitors parking and SWM dry pond. As shown on attached plan, the existing two houses Unit 17 (Mn. No. 1808) and Unit 18 (Mn. No. 1804) on Avalon Road are part of the site plan. Relevant record information is presented in **Appendix B**.

WATER DISTRIBUTION

Water supply for the site is available via the capped municipal 200mmØ watermain on Avalon Street. Based on the design hydraulic grade line (HGL) for the area (301.8masl) and the range of existing elevations across the site (265-267masl), the expected static pressure for the site will be approximately around 339 kPa to 360 kPa which falls within the City's preferred operating range for domestic uses (275-550 kPa).

It is proposed to service the development with 200mmØ watermains to the location of proposed hydrants and reduce the watermains to 100mmØ past the hydrants. Proposed water servicing is presented in **Figure 1**.

Domestic Water

Based on the conceptual layout of 16 townhouse units, the average daily demand rate of 255 l/person/day (0.003 l/s/person), and peak hour demand factor (7.8), the peak hour flow rate of 0.90 l/s was calculated for the development lands.

Water Quality

Based on the WaterCAD water supply model simulation of 14 days (336 hours), the highest water age in the model pipes and nodes (junctions) is approximately 14.5 hours.

Fire Flow

There is an existing fire hydrant on the southeast corner of Avalon Street and Beatrice Street. Two additional hydrants are proposed in the development to provide fire protection.

An Ontario Building Code (OBC) fire flow analysis was performed and resulted in the required fire flow of 4,500 l/min or 75 l/s based on the 5-unit townhouse in the south portion of the development.

A WaterCAD water supply model was completed to confirm that adequate firefighting can be provided for the proposed development considering onsite fire hydrants. Simple modeling was performed considering onsite fire hydrant, a HGL of 301.8m and the OBC required fire flow of 75 l/s. Preliminary modeling results confirm that is feasible to provide onsite fire fighting for each proposed building while residual pressure exceeds required minimum residual pressure of 275 kPa and velocity is at the City's maximum allowable fire flow velocity of 2.4m/s.

Therefore, no concerns with meeting fire flow demands for the proposed development are anticipated. Detailed modeling results including modeling schematic and proposed water distribution system layout are presented in **Appendix C**.

SANITARY SERVICING

Existing Sanitary Servicing

The closest sanitary sewer available is on Avalon Street just east of the site. This 200mmØ sanitary sewer has been analyzed to determine if capacity exists to accept the proposed development lands.

Proposed Sanitary Sewer Servicing

Per the *2018 Infrastructure Renewal Program Contract No.14, Sanitary Drainage Design Sheet Avalon Street* and *Sanitary Drainage Plan Avalon Street* by R.V. Anderson Limited, dated November 2017, the subject development was included in the sanitary design sheet as the "future development" with the area of 1.01 ha and estimated population of 100 with the total flow of 3.37 l/s. Based on the proposed 16 townhouse units, population of 39 people and area of 10226 m^2, the peak sanitary flow of 0.6 l/s is expected. Therefore, the expected flows are lower than estimated flows in the Avalon Street design sheets. The receiving sewer will have enough capacity to convey the proposed development sanitary flows. See **Table 1** for proposed sanitary flows.

Table 1 – Proposed Sanitary Contribution to 200mm Sanitary Sewer

Hectares	Total Population	Peking Factor	Infiltration (l/s)	Sewage (l/s)	Total (l/s)
1.02	39	4.77	0.1	0.50	0.60

Downstream Sanitary Capacity Review

Based on the as-built drawings provided by the City (drawing 29410), the current 200mm sanitary sewer on Avalon Street has a slope of 0.57%. This calculates to a capacity of 24.76L/s.

Table 2 – Existing Sanitary Sewer Capacity

Pipe Size (mm)	Manning Coefficient	Slope (%)	Capacity (L/s)	Velocity (L/s)
200	0.13	0.57	24.76	0.79

As shown in **Table 2,** the existing 200mm sanitary sewer east of the proposed development has adequate capacity (24.76L/s) to receive flows from the proposed development as well as the existing developments that it services.

Proposed sanitary servicing is shown on **Figure 1.** Sanitary Calculation is presented in **Appendix D**.

STORMWATER MANAGEMENT AND STORM SERVICING

The preliminary Stormwater Management (SWM) strategy and storm servicing prepared in support of the proposed ZBA applications is presented below. More detailed information will be prepared during the detailed design stage of the site plan approval process.

Site SWM Criteria

The subject land preliminary SWM criteria for the proposed development was determined based on the following:

- Record of Site Plan Consultation (City File Number SPC23-019) with City of London, dated August 10, 2023 (RPAC)
- 2018 Infrastructure Renewal Program- Contract No.14 (R.V. Anderson Associates Limited, 2017), Project No.153120
- Pottersburg Creek and Crumlin Drain Subwatershed Study, 1995
- City of London Design Specifications and Requirements Manual, March 2022 (DS & RM).

Water Quality Treatment

- As per section 6.2.1.3 of the City of London Design Specifications and Requirements Manual the proposed development has less than 30 proposed at-grade parking spaces therefore, no water quality controls are required for the development.
- As a best management practice measure, the proposed dry SWM pond (grass) will provide significant water quality control.

Water Quantity Control

- RPAC states the following: “As per the City of London’s Design Requirements for Permanent Private Systems, the proposed application falls within case 3b, therefore the following design criteria should be implemented:
  - ensure that the peak flow from the site does not exceed pre-development conditions; and,
  - the major flows are to be controlled on site up to the 100-year event and the site grading is to safely convey up to the 250-year storm event;”
- 2018 Infrastructure Renewal Program - Contract No.14 (R.V. Anderson Associates Limited, 2017), Project No.153120, Drawing DA-3 shows that 0.8 ha of the subject site at a runoff coefficient of 0.20 is considered for the Avalon Street storm sewer design. As shown in the storm sewer design sheet (Drawing DA-4) the minor storm flows of 33.6 L/s from the subject to the 375mm storm sewer on Avalon Street is allocated for the subject site. In addition, MTE’s review of drawings DA-3 and DA-4 indicates that there is a surplus capacity in the existing Avalon Street storm sewers of approximately 15 L/s.

Existing Conditions

Presently, the majority of the 1.02 ha site is comprised of natural grass, and brushes/wooded area. The existing gravel extension of Avalon Street, two single lot developments (Unit 17 [Mn. No. 1808], and Unit 18 [Mn. No. 1804] are part of the existing conditions.

Under the existing conditions, most of the site drains toward the low point to the north and further to the exiting CPR ditch. The external flows (if any) from the neighboring commercial area will be assessed during the detailed design. The existing flow path is to remain the same for the post-development conditions.

The existing conditions are presented in **Figure 2**, attached to this report. The pre-development flows provided in **Appendix E** are calculated using the Rational Method. These calculations show that the pre-development runoff coefficient was estimated to be 0.24 while the 100-year and 2-year pre-development flows are calculated to be 90.11 L/s and 51.83 L/s, respectively.

Proposed Conditions and Storm Servicing

The proposed development comprises sixteen condo units, the Avalon Street extension, a future internal street, visitors parking and a SWM dry pond. As shown on the attached site plan, the existing two houses, Unit 17 (Mn. No. 1808) and Unit 18 (Mn. No. 1804), on Avalon Road are part of the site plan.

As shown on the attached post development conditions **Figure 3**, the post development area (1.02 Ha) has a runoff coefficient 0.48. The total area breakdown is presented in the SWM calculations, provided in **Appendix E.**

The preliminary storm servicing layout including surface drainage is presented in **Figure 3.** The detailed storm servicing will be provided during the detailed design. The exiting external drainage flow (if any) will be maintained for the post-development conditions. The site major flow outlet location to the exiting CPR ditch is matching the pre-development conditions.

Preliminary SWM Strategy

The preliminary SWM strategy was considered to mitigate negative impacts (increased storm runoff and amount of total suspended solids) caused by the proposed development. The preliminary SWM strategy (outlined in **Figure 3)** is as following:

- Runoff from minor storm events will be collected by the proposed local storm sewers and conveyed to the proposed SWM pond for quantity control. The storm flows exciding the 5-year storm are to be conveyed overland to the SWM pond.
- The proposed SWM pond was intended to be a dry pond having infiltration component. However, the potential infiltration is to be confirmed by a Geotechnical Report and/or a Hydrogeological Assessment report prepared (types of soil present at the site, measured infiltration rate and groundwater elevations).
- The orifice is to be sized so that the maximum allowed storm flow to the 375mm Avalon Street storm sewer does not exceed flows of **33.6 L/s,** allocated for the site (refer to '2018 Infrastructure Renewal Program - Contract No.14' [drawings DA-3 and DA-4] by R.V. Anderson Associates Limited, provided in **Appendix B)**.
- MTE's review of R.V. Anderson drawings DA-3 and DA-4 indicates that there is a surplus capacity in the existing Avalon Street storm sewers of approximately 15 L/s. It should be discussed with the City of London (during the detailed design) if the available surplus capacity can be utilized for the subject site.
- The controlled flows are to be conveyed to the 375mm Avalon Street storm sewer.
- The pre-development calculations provided in **Appendix E** show that the 100-year flow from the subject site to the existing CPR ditch is 90.11 L/s. Therefore, we believe that the allowable flow from the site should be 56.4 L/s (90.11 L/S - 33.6 L/s [allowable flows to Avalon Street storm sewer]). However, allowable flows from the subject site to the CPR ditch during the 100-year storm are to be confirmed with the City during the detailed design.
- The 250-year storm flows will be safely conveyed to the existing CPR ditch, matching existing conditions.

The presented preliminary storm servicing schematic in **Figure 3** was prepared for general presentation purposes. Detailed storm servicing drawings and calculations will be provided during the detailed design (SPA process).

SWM Quantity Control

Based on the proposed development concept, the post-development runoff coefficient was measured to be 0.48. As shown in **Figure 2**, the significant grass area is proposed for the post-development conditions so the calculated runoff coefficient of 0.48 is less than the usual for medium density development.

Runoff from minor storm events will be collected by proposed local storm sewers and conveyed to the proposed SWM pond for quantity control. The storm flows exciding 5-yer storm are to be conveyed overland to the SWM pond.

The preliminary storage assessment was computed using the rational method. Based on MTE conceptual SWM calculations, approximately 185 m ^{3} of storage is required to control storm flows from the proposed development to 33.6 L/s. MTE believes this is the conservative approach, considering only allowable outflow of 33.6 L/s to the 375mm Avalon Street storm

sewer (refer to '2018 Infrastructure Renewal Program - Contract No.14', Project No.153120, by R.V. Anderson Associates Limited, 2017). Hence, surface outflow from the proposed SWM pond was not considered for the 100-year storm event.

The potential use of the allowable surface flow of 56.4 L/s to the existing CPR ditch and utilization of the surplus capacity of approximately 15 L/s in the Avalon Street storm sewer will be discussed with the City of London during the detailed design.

Based on review of conceptual SWM pond layout and preliminary SWM calculations provided in **Appendix E**, it is feasible to provide the required storage of 185 m^3, within the proposed SWM pond.

Detailed SWM strategy and modeling will be provided during the SPA process.

Infiltration and Low Impact Development (LID)

LID application is to be considered during the detailed design. However, any LID application is to be confirmed by a Geotechnical Report (or a Hydrogeological Assessment report) during the detailed design.

CONCLUSIONS

Based on the preliminary information and analysis, it is feasible to provide water, sanitary and stormwater servicing for the proposed development in accordance with the City of London, UTRCA and MECP requirements. In addition, preliminary SWM analysis indicates that it is feasible to provide the required quantity SWM for the proposed development.

Please contact us should you have any comments or questions,

Yours Truly,

MTE Consultants Inc.

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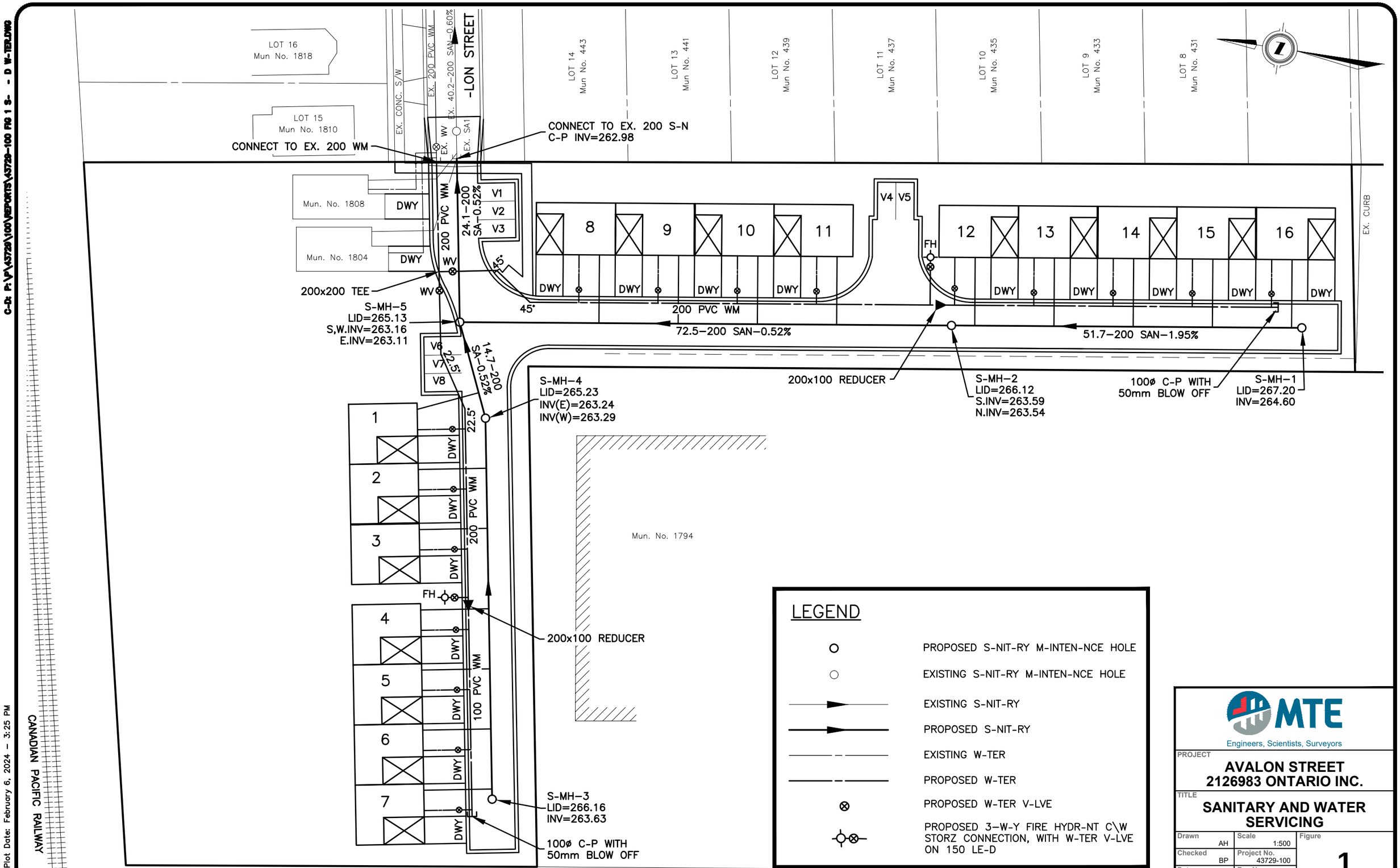
\\mte85.local\mte\Proj_Mgmt\43729\100\Reports\MTE Reports\43729-100 Preliminary FSR.docx

Figures



LEGEND

- PROPOSED S-NIT-RY M-INTEN-NCE HOLE
- EXISTING S-NIT-RY M-INTEN-NCE HOLE
- EXISTING S-NIT-RY
- PROPOSED S-NIT-RY
- EXISTING W-TER
- PROPOSED W-TER
- PROPOSED W-TER V-LVE
- PROPOSED 3–W-Y FIRE HYDR-NT C\W STORZ CONNECTION, WITH W-TER V-LVE ON 150 LE-D

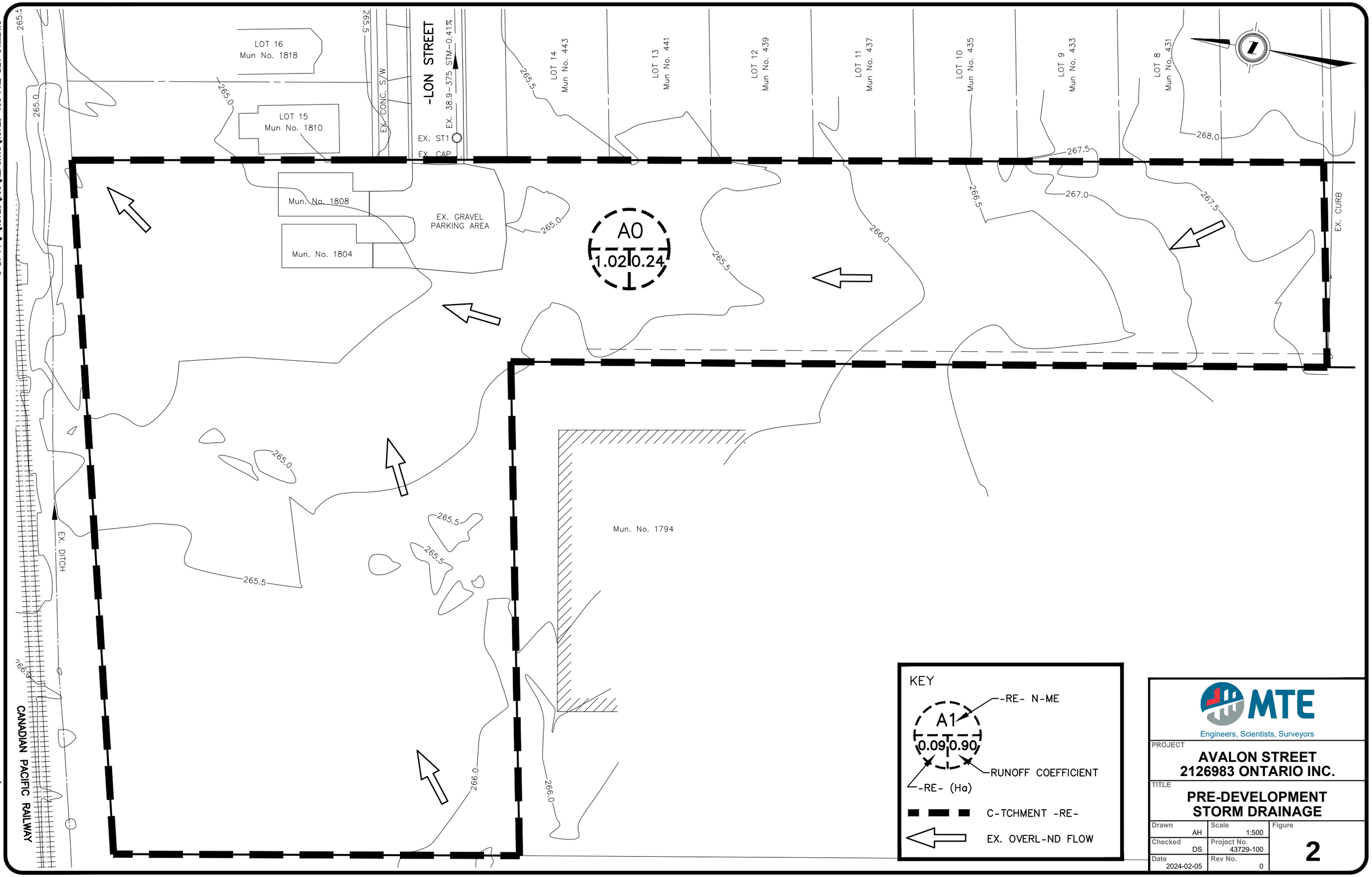
MTE
Engineers, Scientists, Surveyors

PROJECT
AVALON STREET
2126983 ONTARIO INC.

TITLE
SANITARY AND WATER SERVICING

Drawn: AH	Scale: 1:500	Figure: 1
Checked: BP	Project No.: 43729-100	
Date: 2024-02-05	Rev No.: 0	

C-Dr: P:\V\43729\100\REPORTS\43729-100 PRE-DEV STM.DWG



KEY

MTE
Engineers, Scientists, Surveyors

PROJECT
AVALON STREET
2126983 ONTARIO INC.

TITLE
PRE-DEVELOPMENT STORM DRAINAGE

Drawn: AH	Scale: 1:500	Figure: 2
Checked: DS	Project No.: 43729-100	
Date: 2024-02-05	Rev No.: 0	

Plot Date: February 5, 2024 - 1:25 PM

C-Dr: P:\V\43729\100\REPORTS\43729-100 PRE-DEV STM.DWG

Plot Date: February 6, 2024 - 1:44 PM

-LON STREET

EX. CONC. S/W

EX. 38.9-375 STM-0.41%

EX. ST1

EX. CAP

LOT 16
Mun No. 1818

LOT 15
Mun No. 1810

LOT 14
Mun No. 443

LOT 13
Mun No. 441

LOT 12
Mun No. 439

LOT 11
Mun No. 437

LOT 10
Mun No. 435

LOT 9
Mun No. 433

LOT 8
Mun No. 431

Mun. No. 1808

Mun. No. 1804

Mun. No. 1794

A1
1.02 0.48

V1
V2
V3

V4 V5

V6
V7
V8

DWY

8 9 10 11

12 13 14 15 16

1 2 3 4 5 6 7

PROPOSED
SWM
DRY POND

EX. DITCH

CANADIAN PACIFIC RAILWAY

EX. CURB

265.0 265.5 266.0 267.0 267.5 268.0

KEY

A1
0.09 0.90

-RE- N-ME

RUNOFF COEFFICIENT

-RE- (Ha)

C-TCHMENT -RE-

MINOR FLOW
DR-IN-GE DIRECTION

M-JOR OVERL-ND
FLOW ROUTE

MTE
Engineers, Scientists, Surveyors

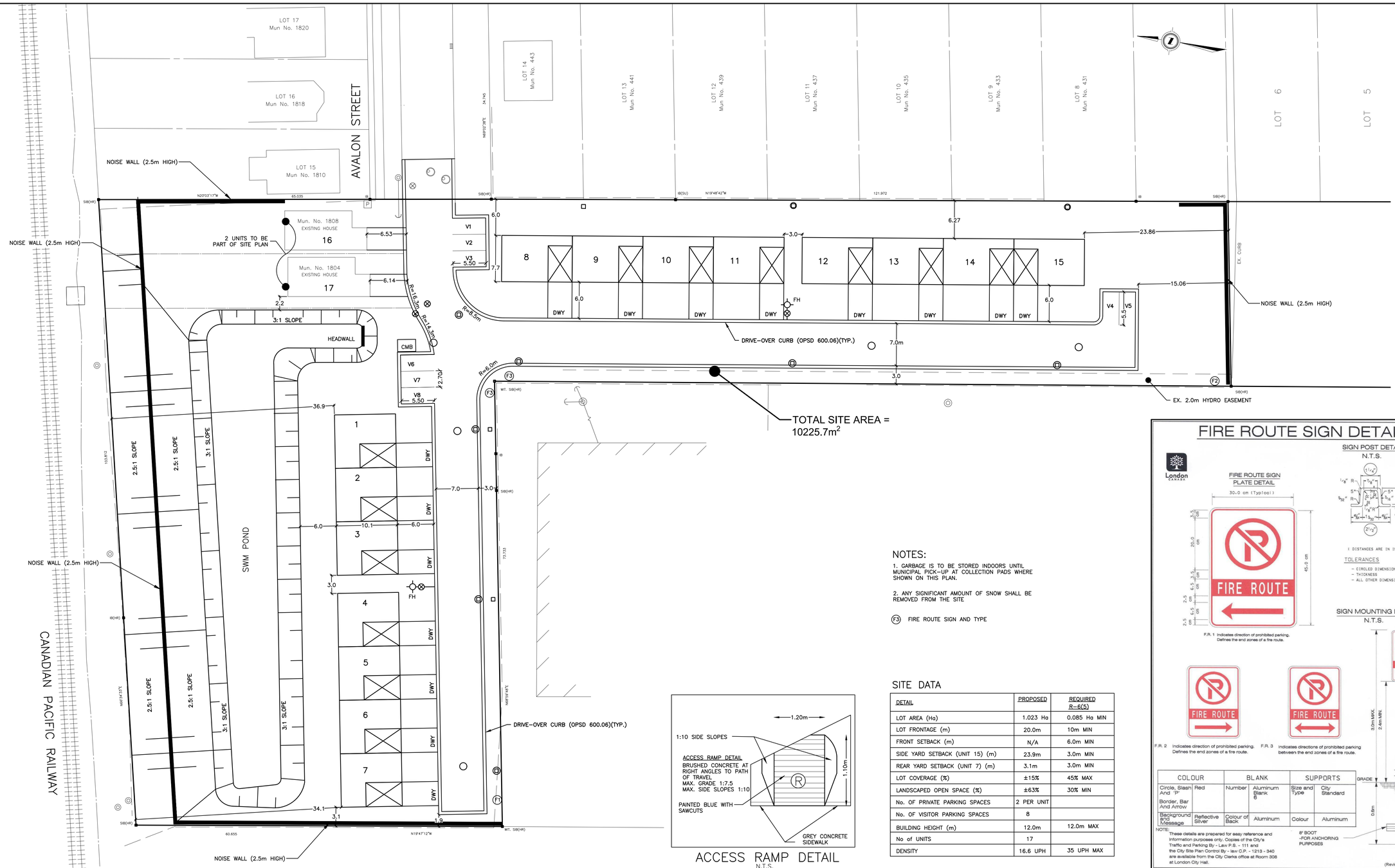
PROJECT
AVALON STREET
2126983 ONTARIO INC.

TITLE
POST-DEVELOPMENT STORM DRAINAGE

Drawn	Scale	Figure
AH	1:500	3
Checked	Project No.	
DS	43729-100	
Date	Rev No.	
2024-02-05	0	

Appendix A

Site Plan



NOTES:

1. GARBAGE IS TO BE STORED INDOORS UNTIL MUNICIPAL PICK-UP AT COLLECTION PADS WHERE SHOWN ON THIS PLAN.

2. ANY SIGNIFICANT AMOUNT OF SNOW SHALL BE REMOVED FROM THE SITE

(F3) FIRE ROUTE SIGN AND TYPE

SITE DATA

DETAIL	PROPOSED	REQUIRED R-6(5)
LOT AREA (Ha)	1.023 Ha	0.085 Ha MIN
LOT FRONTAGE (m)	20.0m	10m MIN
FRONT SETBACK (m)	N/A	6.0m MIN
SIDE YARD SETBACK (UNIT 15) (m)	23.9m	3.0m MIN
REAR YARD SETBACK (UNIT 7) (m)	3.1m	3.0m MIN
LOT COVERAGE (%)	±15%	45% MAX
LANDSCAPED OPEN SPACE (%)	±63%	30% MIN
No. OF PRIVATE PARKING SPACES	2 PER UNIT	
No. OF VISITOR PARKING SPACES	8	
BUILDING HEIGHT (m)	12.0m	12.0m MAX
No of UNITS	17	
DENSITY	16.6 UPH	35 UPH MAX

ACCESS RAMP DETAIL
N.T.S.

FIRE ROUTE SIGN DETAILS

FIRE ROUTE SIGN
PLATE DETAIL

SIGN POST DETAIL
N.T.S.

(DISTANCES ARE IN INCHES)

TOLERANCES
- CIRCLED DIMENSIONS +/-1/16"
- THICKNESS +/- 0.015"
- ALL OTHER DIMENSIONS +/-1/8"

F.R. 1 Indicates direction of prohibited parking. Defines the end zones of a fire route.

SIGN MOUNTING DETAIL
N.T.S.

F.R. 2 Indicates direction of prohibited parking. Defines the end zones of a fire route.

F.R. 3 Indicates directions of prohibited parking between the end zones of a fire route.

COLOUR		BLANK		SUPPORTS	
Circle, Slash And 'P' Border, Bar And Arrow	Red	Number	Aluminum Blank 6	Size and Type	City Standard
Background and Message	Reflective Silver	Colour of Back	Aluminum	Colour	Aluminum

NOTE:
These details are prepared for easy reference and information purposes only. Copies of the City's Traffic and Parking By - Law P.S. - 111 and the City Site Plan Control By - law C.P. -1213 - 340 are available from the City Clerks office at Room 308 at London City Hall.

(Revised - February 2014)

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	No.	REVISIONS	DATE	CONSULTANT
DESIGN IRA				
DRAWN BY IRA				
CHECKED KAM				
APPROVED KAM				
DATE APR. 2020				

CONSULTANT OR DIVISION

MTE

ENGINEER'S STAMP

SCALE

HORIZONTAL
SCALE - 1 : 300
1m 0 2m

1806 AVALON STREET
2126983 ONTARIO INC.

SITE PLAN

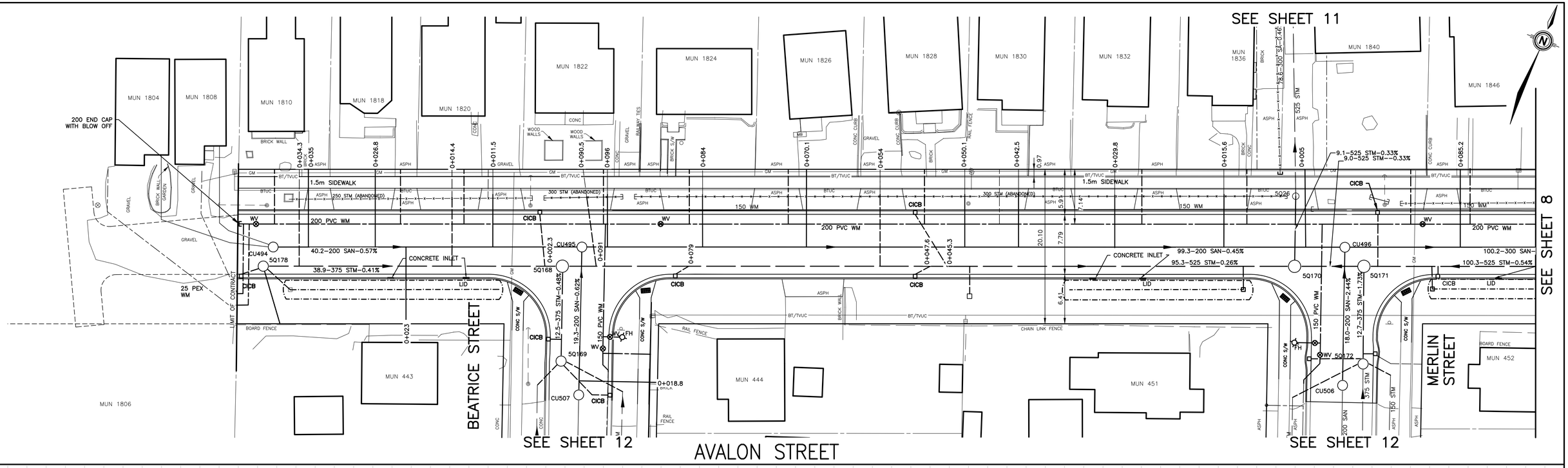
PROJECT No.
43729-100

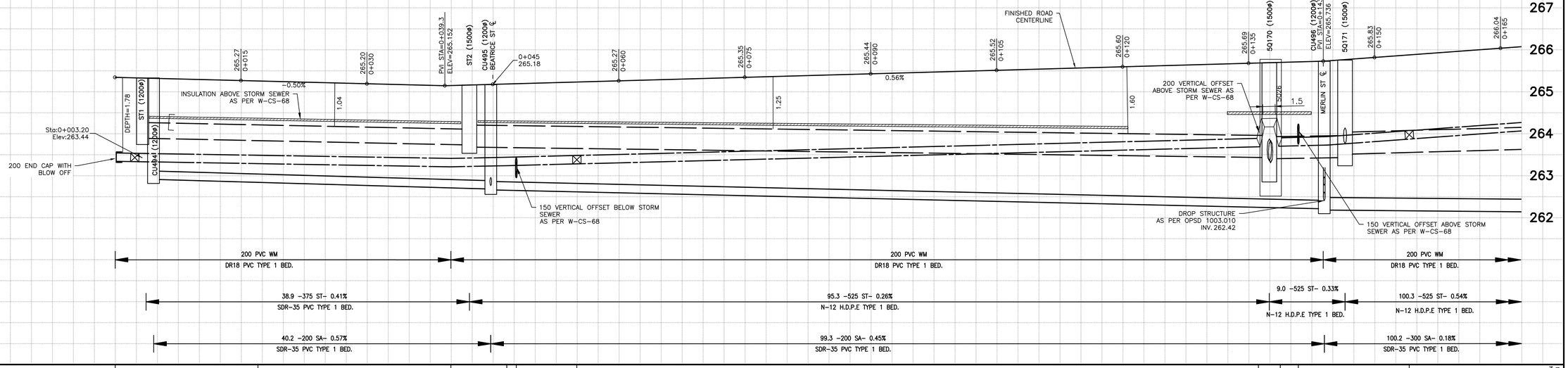
SHEET No.
1

PLAN FILE No.

Appendix B

Relevant Record Information





EXISTING SERVICES	DRAWING #, SOURCE	DATE
SANITARY SEWER	R.C. DUNN & ASSOCIATES LIMITED	MAR 1952
STORM SEWER	R.C. DUNN & ASSOCIATES LIMITED	MAR 1952
BEATRICE SANITARY SEWER	6933	MAR 1966
BEATRICE STORM SEWER	6933,6934	MAR 1966
MERLIN SANITARY SEWER	14,112	JUNE 1991
MERLIN STORM SEWER	14,112	JUNE 1991

CONSTRUCTED SERVICES	COMPLETION
WMs, APPURTENANCES & WSs	JUNE 2019
STORM SEWER, PDC'S & CB'S	JULY 2019
SAN PDC'S	JUNE 2019
CONCRETE C & G	AUG 2019
CONCRETE SW	AUG 2019
GRANULAR BASE	AUG 2019
BASE ASPHALT	AUG 2019
TOP ASPHALT	2020

DETAILS	
DESIGN	AIM
DRAWN BY	BC
CHECKED	RJM
APPROVED	DME
DATE	2019/10/16
153120.DWG	

No.	REVISIONS	DATE	CONSULTANT
00	ISSUED FOR TENDER	2019/01/16	R.V. ANDERSON
01	AS CONSTRUCTED	2019/10/16	R.V. ANDERSON

CONSULTANT OR DIVISION

arva | R.V. Anderson Associates Limited
engineering • environment • infrastructure

LICENSED PROFESSIONAL ENGINEER D. M. EVANS 100126,2019 PROVINCE OF ONTARIO

London CANADA

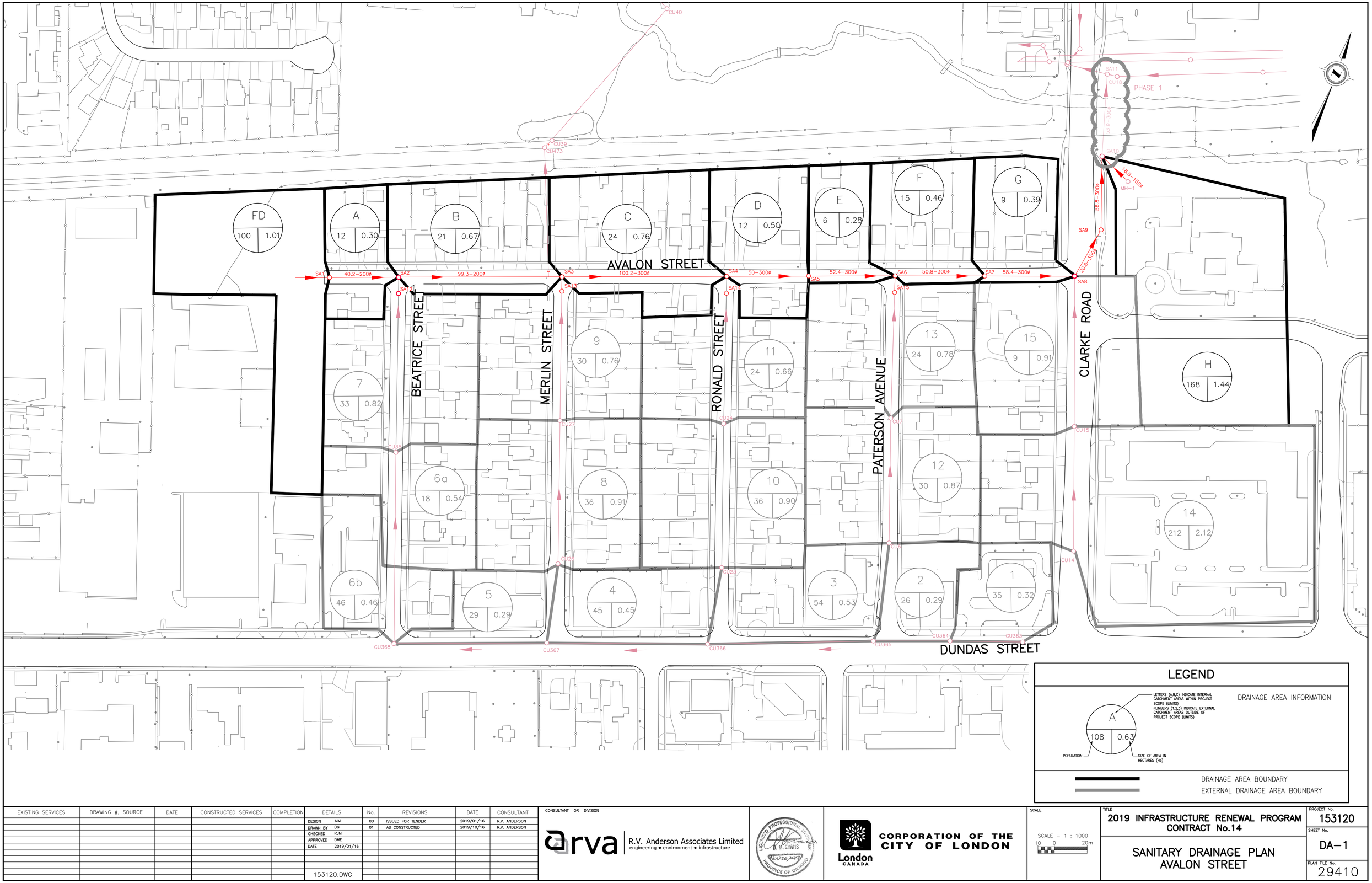
CORPORATION OF THE CITY OF LONDON

SCALE
HORIZ. SCALE – 1 : 250
2,5 0 5m
VERT. SCALE – 1 : 50
0,5 0 1m

TITLE
2019 INFRASTRUCTURE RENEWAL PROGRAM
CONTRACT No.14

AVALON STREET
FROM 45m WEST OF BEATRICE STREET TO 20m EAST OF MERLIN STREET

PROJECT No. 153120
SHEET No. 7 OF 23
PLAN FILE No. 29393



LEGEND

LETTERS (A,B,C) INDICATE INTERNAL CATCHMENT AREAS WITHIN PROJECT SCOPE (LIMITS).
NUMBERS (1,2,3) INDICATE EXTERNAL CATCHMENT AREAS OUTSIDE OF PROJECT SCOPE (LIMITS)

DRAINAGE AREA INFORMATION

A
108 (POPULATION) 0.63 (SIZE OF AREA IN HECTARES (Ha))

DRAINAGE AREA BOUNDARY

EXTERNAL DRAINAGE AREA BOUNDARY

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	AIM
DRAWN BY	DG
CHECKED	RJM
APPROVED	DME
DATE	2019/01/16
	153120.DWG

No.	REVISIONS	DATE	CONSULTANT
00	ISSUED FOR TENDER	2019/01/16	R.V. ANDERSON
01	AS CONSTRUCTED	2019/10/16	R.V. ANDERSON

CONSULTANT OR DIVISION

arva | R.V. Anderson Associates Limited
engineering • environment • infrastructure

LICENSED PROFESSIONAL ENGINEER D. M. EVANS NOV 26, 1987 PROVINCE OF ONTARIO

London CANADA

CORPORATION OF THE CITY OF LONDON

SCALE

SCALE – 1 : 1000
10 0 20m

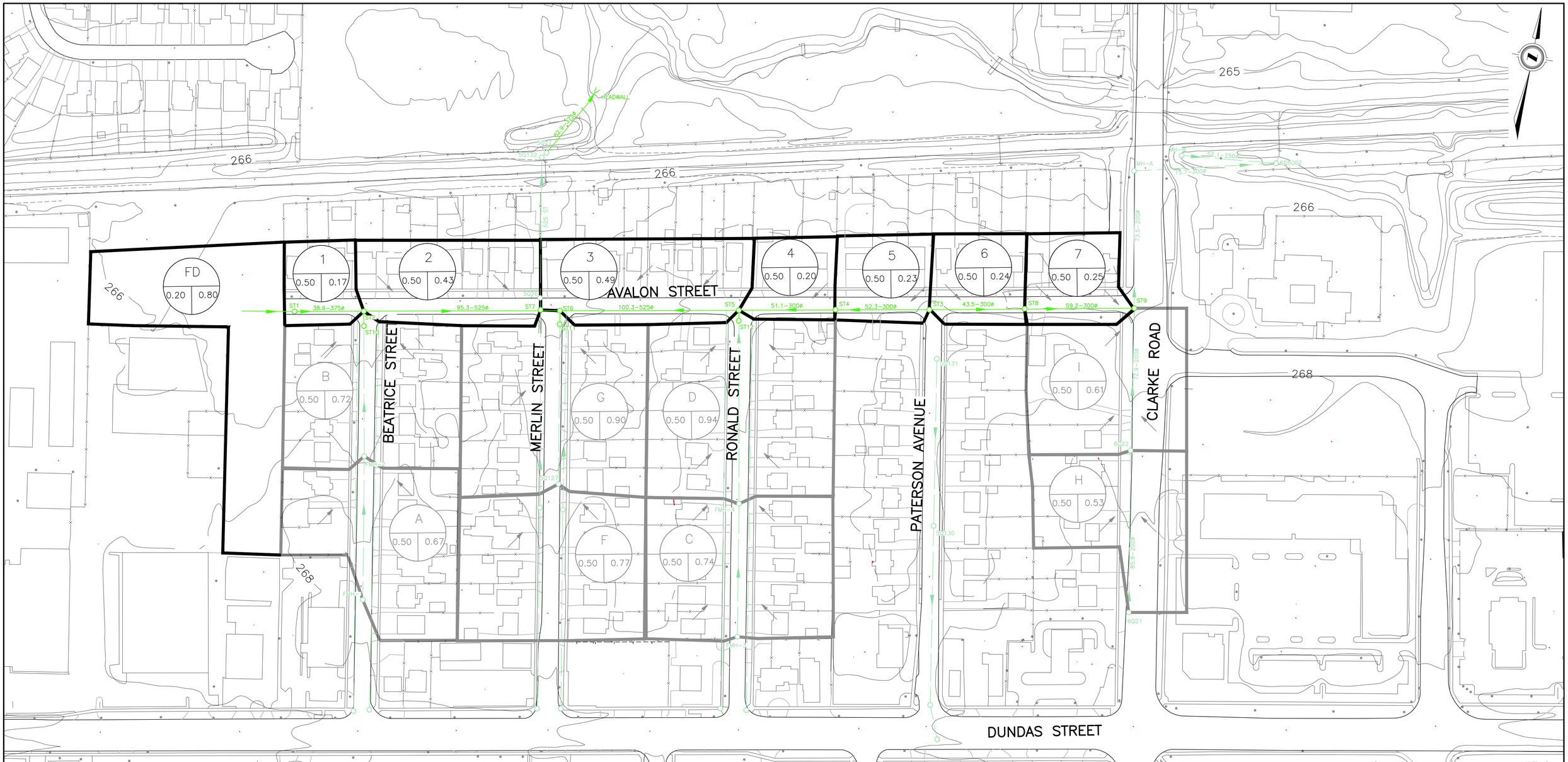
TITLE
2019 INFRASTRUCTURE RENEWAL PROGRAM
CONTRACT No.14

SANITARY DRAINAGE PLAN
AVALON STREET

PROJECT No. 153120

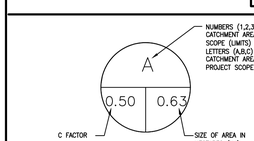
SHEET No. DA–1

PLAN FILE No. 29410



NOTE:
FMH = CONCEPTUAL MANHOLE LOCATION WHEN STREET IS REBUILT IN FUTURE.

LEGEND



NUMBERS (1,2,3) INDICATE INTERNAL CATCHMENT AREAS WITHIN PROJECT SCOPE (LIMITS)
LETTERS (A,B,C) INDICATE EXTERNAL CATCHMENT AREAS OUTSIDE OF PROJECT SCOPE (LIMITS)

DRAINAGE AREA INFORMATION

STORM RUNOFF
DRAINAGE AREA BOUNDARY
EXTERNAL DRAINAGE AREA BOUNDARY

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	AIM
DRAWN BY	DG
CHECKED	RJM
APPROVED	DME
DATE	2019/01/16
	153120.DWG

No.	REVISIONS	DATE	CONSULTANT
00	ISSUED FOR TENDER	2019/01/16	R.V. ANDERSON
01	AS CONSTRUCTED	2019/10/16	R.V. ANDERSON

CONSULTANT OR DIVISION

arva | R.V. Anderson Associates Limited
engineering • environment • infrastructure

LICENSED PROFESSIONAL ENGINEER D. M. EVANS NOVEMBER 26, 2019 PROVINCE OF ONTARIO

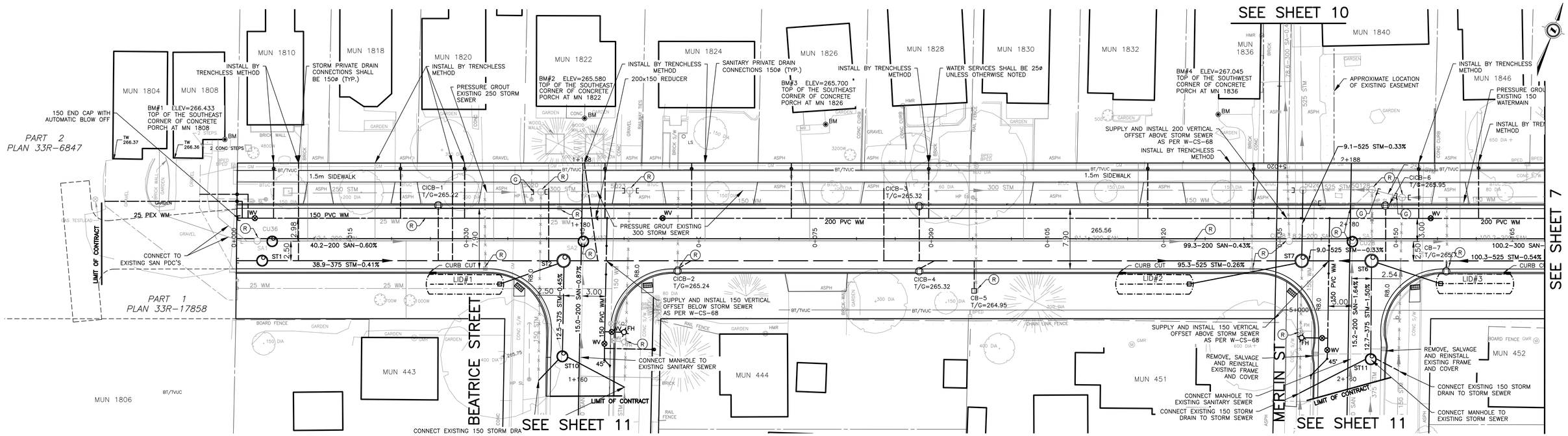
London CANADA
CORPORATION OF THE CITY OF LONDON

SCALE
SCALE – 1 : 1000
10 0 20m

TITLE
2019 INFRASTRUCTURE RENEWAL PROGRAM
CONTRACT No.14

STORM DRAINAGE PLAN

PROJECT No. 153120
SHEET No. DA–3
PLAN FILE No. 29412



EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

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DESIGN	RB
DRAWN BY	GG
CHECKED	RJM
APPROVED	DME
DATE	2017/11/30
153120.DWG	

No.	REVISIONS	DATE	CONSULTANT
00	ISSUED FOR TENDER	2017/11/30	R.V. ANDERSON

CONSULTANT OR DIVISION

R.V. Anderson Associates Limited
engineering • environment • infrastructure

ENGINEER'S STAMP

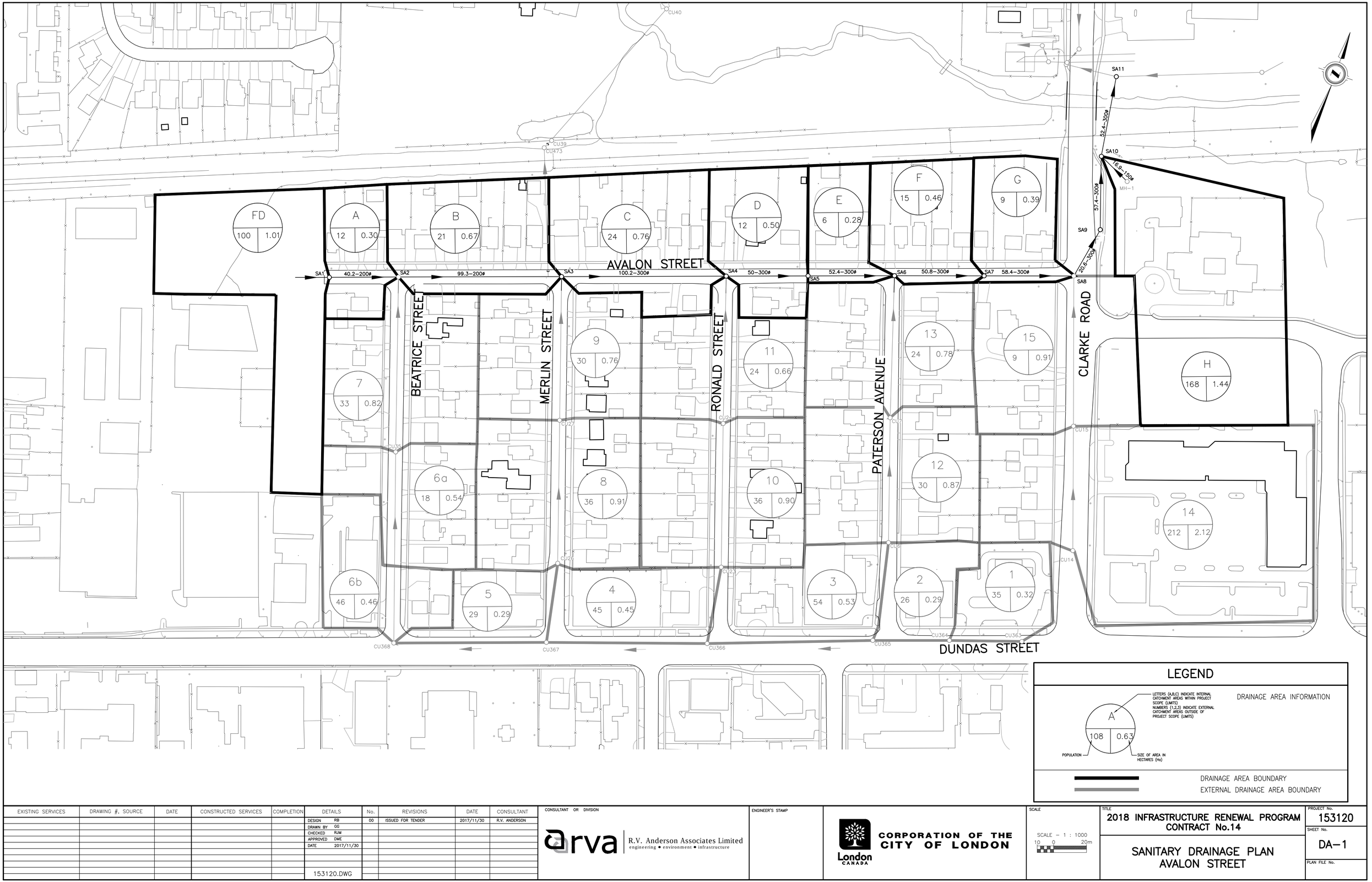
CORPORATION OF THE CITY OF LONDON
London CANADA

SCALE
HORIZ. SCALE – 1 : 250
2,5 0 5m
VERT. SCALE – 1 : 50
0,5 0 1m

TITLE
2018 INFRASTRUCTURE RENEWAL PROGRAM
CONTRACT No.14

AVALON STREET
FROM 45m WEST OF BEATRICE STREET TO 20m EAST OF MERLIN STREET

PROJECT No. 153120
SHEET No. 6 OF 22
PLAN FILE No.



LEGEND

DRAINAGE AREA INFORMATION

DRAINAGE AREA BOUNDARY

EXTERNAL DRAINAGE AREA BOUNDARY

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	RB
DRAWN BY	GG
CHECKED	RJM
APPROVED	DME
DATE	2017/11/30
	153120.DWG

No.	REVISIONS	DATE	CONSULTANT
00	ISSUED FOR TENDER	2017/11/30	R.V. ANDERSON

CONSULTANT OR DIVISION

arva | R.V. Anderson Associates Limited
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ENGINEER'S STAMP

CORPORATION OF THE CITY OF LONDON
London CANADA

SCALE

SCALE – 1 : 1000
10 0 20m

TITLE

2018 INFRASTRUCTURE RENEWAL PROGRAM
CONTRACT No.14

SANITARY DRAINAGE PLAN
AVALON STREET

PROJECT No. 153120

SHEET No. DA–1

PLAN FILE No.

SANITARY SEWER DESIGN SHEET

PARAMETERS	
POPULATION DENSITY (POP / UNIT) =	3
INFILTRATION (L/HA/DAY) =	172800
SEWAGE FLOW (L/CAP/DAY) =	250

PROJECT: Contract No.14 - 2018 Infrastructure Renewal Program
AVALON STREET RECONSTRUCTION

LOCATION				AREAS (ha)		POPULATION					FLOW (L/s)			SEWER DATA							PROFILE					
AREA NO.	STREET	FROM MANHOLE	TO MANHOLE	AREA (ha)	TOTAL (ha)	PER ha	POP. PER UNIT	NO. OF UNITS	DELTA POP	TOTAL POP	INFILT.	SEWAGE	TOTAL	n	NOM. DIA. (mm)	ACTUAL DIA. (mm)	SLOPE (%)	CAP. (L/s)	VEL. (full) (m/s)	PIPE Mat'L	LENGTH (m)	DROP IN MH	FALL IN SEWER	INVERT US	INVERT DS	PEAK FACTOR
FD	Future Development		SA1	1.01	1.01				100	100	2.020	1.351	3.37													4.24
A	Avalon Street	SA1	SA2	0.30	1.31		3.0	4	12.0	112.0	2.620	1.508	4.13	0.013	200	203.20	0.60	*26.5*	*0.82*	PVC	40.20	-	0.24	262.93	262.69	4.23
1	Dundas Street (Existing)	CU363	CU364	0.32	0.32		3.0	-	35.0	35.0	0.640	0.484	1.12	0.013	200	204.00	-	-	-	CONC	-	-	-	-	-	4.34
2	Dundas Street (Existing)	CU364	CU365	0.29	0.61		3.0	-	26.0	61.0	1.220	0.834	2.05	0.013	200	204.00	-	-	-	CONC	-	-	-	-	-	4.30
3	Dundas Street (Existing)	CU365	CU366	0.53	1.14		4.0	-	54.0	115.0	2.280	1.547	3.83	0.013	200	204.00	-	-	-	CONC	-	-	-	-	-	4.23
4	Dundas Street (Existing)	CU366	CU367	0.45	1.59		5.0	-	45.0	160.0	3.180	2.130	5.31	0.013	200	204.00	-	-	-	CONC	-	-	-	-	-	4.18
5	Dundas Street (Existing)	CU367	CU368	0.29	1.88		6.0	-	29.0	189.0	3.760	2.501	6.26	0.013	200	204.00	-	-	-	CONC	-	-	-	-	-	4.16
6a	Beatrice Street (Existing)	CU368	CU35	0.54	2.42		3.0	6	18.0	207.0	4.840	2.729	7.57	0.013	200	204.00	-	-	-	CONC	-	-	-	-	-	4.14
6b	Beatrice Street (Existing)	CU368	CU35	0.46	2.88		3.0	-	46.0	253.0	5.760	3.309	9.07	0.013	200	204.00	-	-	-	CONC	-	-	-	-	-	4.11
7	Beatrice Street (Existing)	CU35	SA2	0.82	3.70		3.0	11	33.0	286.0	7.400	3.721	11.12	0.013	200	204.00	0.87	*32.3*	*0.99*	CONC	106.30	-	0.92	263.69	262.77	4.09
B	Avalon Street	SA2	SA3	0.67	5.68		3.0	7	21.0	419.0	11.360	5.351	16.71	0.013	200	203.20	0.43	*22.4*	*0.69*	PVC	99.30	0.025	0.43	262.67	262.24	4.01
8	Merlin Street (Existing)	CU26	CU27	0.91	0.91		3.0	12	36.0	36.0	1.820	0.497	2.32	0.013	200	204.00	1.21	*38.0*	*1.16*	CONC	87.43	0.050	1.06	265.62	264.56	4.34
9	Merlin Street (Existing)	CU27	SA3	0.76	1.67		3.0	10	30.0	66.0	3.340	0.901	4.24	0.013	200	204.00	1.64	*44.3*	*1.35*	CONC	87.30	0.050	1.43	264.53	263.10	4.29
C	Avalon Street	SA3	SA4	0.76	8.11		3.0	8	24.0	509.0	16.220	6.432	22.65	0.013	300	304.80	0.20	*45.1*	*0.62*	PVC	100.20	0.025	0.20	262.21	262.01	3.97
10	Ronald Street (Existing)	CU23	CU24	0.90	0.90		3.0	12	36.0	36.0	1.800	0.497	2.30	0.013	200	204.00	0.38	*21.3*	*0.65*	CONC	87.43	0.050	0.33	265.33	265.00	4.34
11	Ronald Street (Existing)	CU24	SA4	0.66	1.56		3.0	8	24.0	60.0	3.120	0.821	3.94	0.013	200	204.00	0.72	*29.2*	*0.89*	CONC	89.52	0.050	0.64	264.95	264.31	4.30
D	Avalon Street	SA4	SA5	0.50	10.17		3.0	4	12.0	581.00	20.340	7.286	27.63	0.013	300	304.80	0.20	*45.1*	*0.62*	PVC	50.00	0.025	0.10	261.99	261.89	3.94
E	Avalon Street	SA5	SA6	0.28	10.45		3.0	2	6.0	587.00	20.900	7.356	28.26	0.013	300	304.80	0.21	*46.2*	*0.63*	PVC	52.40	0.025	0.11	261.87	261.75	3.94
12	Paterson Avenue (Existing)	CU6	CU7	0.87	0.87		3.0	10	30.0	30.0	1.740	0.416	2.16	0.013	200	204.00	0.47	*23.7*	*0.73*	CONC	75.93	0.050	0.36	266.15	265.79	4.35
13	Paterson Avenue (Existing)	CU7	SA6	0.78	1.65		3.0	8	24.0	54.0	3.300	0.740	4.04	0.013	200	204.00	0.59	*26.4*	*0.81*	CONC	86.35	0.050	0.51	265.74	265.23	4.31
F	Avalon Street	SA6	SA7	0.46	12.56		3.0	5	15.0	656.00	25.120	8.165	33.29	0.013	300	304.80	0.20	*45.1*	*0.62*	PVC	50.78	0.025	0.10	261.73	261.63	3.91
G	Avalon Street	SA7	SA8	0.39	12.95		3.0	3	9.0	665.00	25.900	8.270	34.17	0.013	300	304.80	0.20	*45.1*	*0.62*	PVC	58.38	0.025	0.12	261.60	261.48	3.91
14	Clarke Road (Existing)	CU14	CU15	2.12	2.12		3.0	-	212.0	212.0	4.240	2.793	7.03	0.013	200	204.00	0.66	*28.1*	*0.86*	CONC	75.40	0.050	0.50	266.50	266.00	4.14
15	Clarke Road (Existing)	CU15	SA8	0.91	3.03		3.0	3	9.0	221.0	6.060	2.906	8.97	0.013	200	204.00	1.74	*45.6*	*1.40*	CONC	92.72	0.150	1.61	265.85	264.24	4.13
-	Clarke Road	SA8	SA9		15.98					886.0	31.960	10.810	42.77	0.013	300	304.80	0.19	*44.0*	*0.60*	PVC	20.60	0.025	0.04	261.46	261.42	3.83
-	Clarke Road	SA9	SA10		15.98					886.0	31.960	10.810	42.77	0.013	300	304.80	0.19	*44.0*	*0.60*	PVC	57.37	0.025	0.11	261.39	261.28	3.83
H	Clarke Road	MH-1	SA10	1.44	1.44		-	-	168.0	168.0	2.880	2.232	5.11	0.013	150	152.40	16.90	*65.3*	*3.58*	PVC	57.37	0.025	9.70	261.26	251.56	4.17
-	Clarke Road	SA10	SA11		17.42		-	-	-	1054.0	34.840	12.698	47.54	0.013	300	304.80	0.23	*48.4*	*0.66*	PVC	52.43	0.025	0.12	261.26	261.14	3.79

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	RB
DRAWN BY	GG
CHECKED	RJM
APPROVED	DME
DATE	2017/11/30
	153120.DWG

No.	REVISIONS	DATE	CONSULTANT
00	ISSUED FOR TENDER	2017/11/30	R.V. ANDERSON

CONSULTANT OR DIVISION
arva | R.V. Anderson Associates Limited
engineering • environment • infrastructure

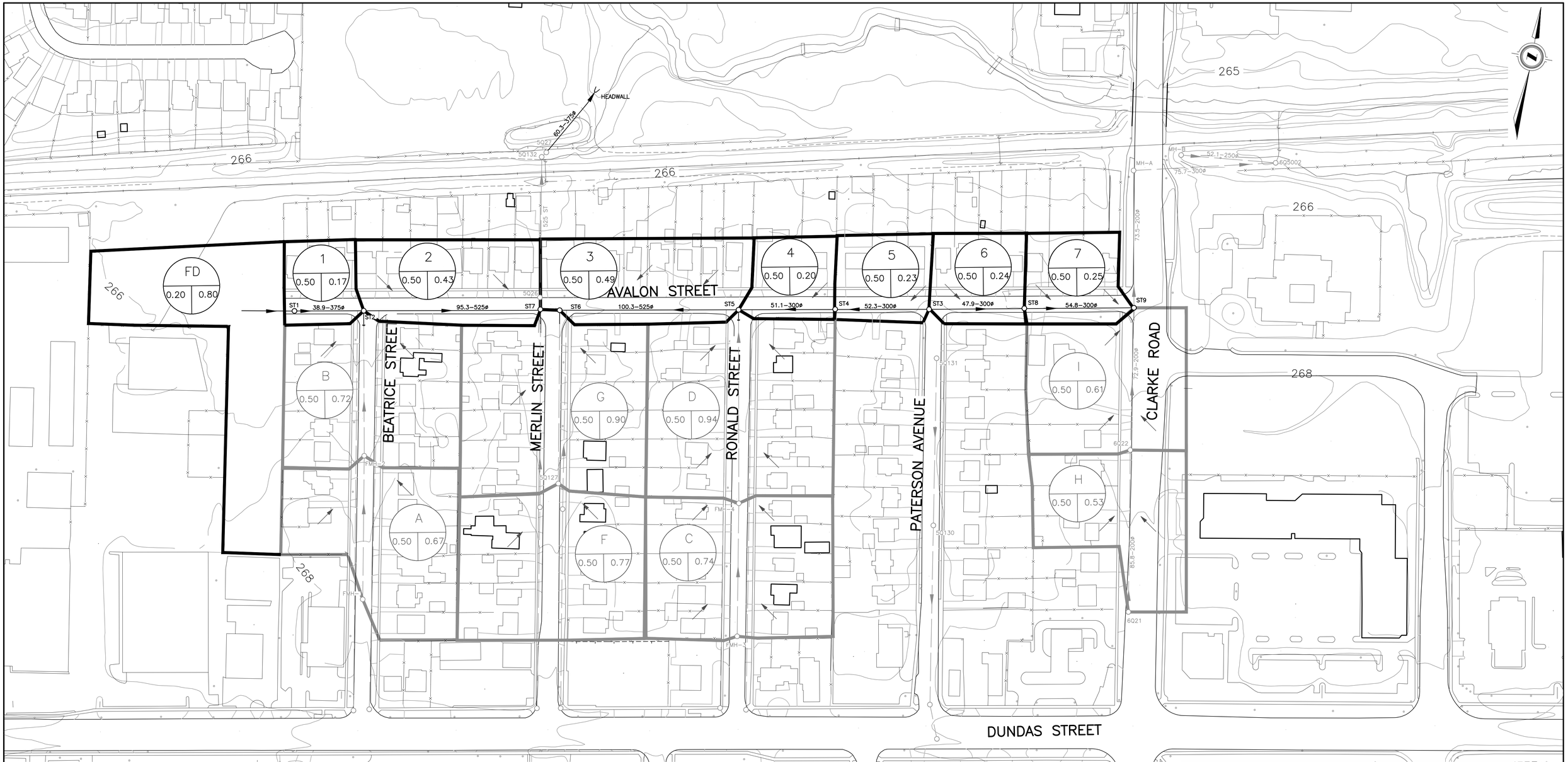
ENGINEER'S STAMP

London CANADA
CORPORATION OF THE CITY OF LONDON

SCALE

TITLE
2018 INFRASTRUCTURERENEWAL PROGRAM
CONTRACT No.14
SANITARY DRAINAGE DESIGN SHEET
AVALON STREET

PROJECT No. 153120
SHEET No. DA–2
PLAN FILE No.



NOTE:
FMH = CONCEPTUAL MANHOLE LOCATION WHEN STREET IS REBUILT IN FUTURE.

LEGEND

NUMBERS (1,2,3) INDICATE INTERNAL CATCHMENT AREAS WITHIN PROJECT SCOPE (LIMITS)
LETTERS (A,B,C) INDICATE EXTERNAL CATCHMENT AREAS OUTSIDE OF PROJECT SCOPE (LIMITS)

A
0.50 | 0.63
C FACTOR — SIZE OF AREA IN HECTARES (ha)

DRAINAGE AREA INFORMATION

STORM RUNOFF
DRAINAGE AREA BOUNDARY
EXTERNAL DRAINAGE AREA BOUNDARY

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	RB
DRAWN BY	GG
CHECKED	RJM
APPROVED	DME
DATE	2017/11/30
	153120.DWG

No.	REVISIONS	DATE	CONSULTANT
00	ISSUED FOR TENDER	2017/11/30	R.V. ANDERSON

CONSULTANT OR DIVISION

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ENGINEER'S STAMP

CORPORATION OF THE CITY OF LONDON
London CANADA

SCALE
SCALE – 1 : 1000
10 0 20m

TITLE
2018 INFRASTRUCTURE RENEWAL PROGRAM
CONTRACT No.14

PRE–DEVELOPMENT CONDITIONS
AVALON STREET

PROJECT No. 153120
SHEET No. DA–3
PLAN FILE No.

STORM SEWER DESIGN SHEET

PARAMETERS	
DESIGN FREQUENCY (YEARS) =	2
DESIGN (n) =	0.013
TIME OF CONCENTRATION (MIN) =	19

33.6 L/s allocated for the Site

Approx. 15 L/s of extra capacity (the worst case)

PROJECT: Contract No.14 - 2018 Infrastructure Renewal Program
AVALON STREET RECONSTRUCTION

LOCATION				AREA (A)		TOTAL 2.78(AxC)				RAINFALL INTENSITY			PIPE SELECTION								PROFILE			
AREA No.	STREET	FROM MANHOLE	TO MANHOLE	A (ha)	TOTAL (ha)	C	SECT.	LAT.	SEWER	SECT. (min)	ACCUM. (min)	I (mm/hr)	Q (l/s)	n	D (mm)	S (m/m)	Capacity (full) (l/s)	V (full) (m/s)	Pipe L (m)	Time of Flow (min)	DROP IN M.H	FALL IN SEWER	INVRT U.S.	ELEV D.S.
												2 YR												
FD	Future Development	-	ST1	0.80	0.80	0.20	0.44		0.44	-	19.00	*75.6*	33.6	0.013	375	0.40	*110.9*	*1.00*	20.9	0.35	-	-	-	-
1	Avalon Street	ST1	ST2	0.17	0.97	0.50	0.24		0.68	0.35	19.35	*74.7*	50.9	0.013	375	0.41	*112.3*	*1.02*	38.9	0.64	-	0.16	263.90	263.74
A	Beatrice Street	FMH-1	FMH-2	0.67	0.67	0.50	0.93		0.93	-	19.00	*75.6*	70.4	0.013	300	0.70	*80.9*	*1.14*	76.4	1.11				
B	Beatrice Street	FMH-2	ST2	0.72	1.39	0.50	1.00		1.93	1.11	20.11	*72.7*	140.5	0.013	375	0.45	*117.6*	*1.06*	69.7	1.09				
2	Avalon Street	ST2	ST7	0.43	2.79	0.50	0.60		3.21	0.64	19.98	*73.0*	234.4	0.013	525	0.26	*219.3*	*1.01*	95.3	1.57	0.050	0.25	263.69	263.44
5	Avalon Street	ST3	ST4	0.23	0.23	0.50	0.32		0.32	-	19.00	*75.6*	24.2	0.013	300	0.82	*87.6*	*1.24*	52.3	0.70	0.050	0.43	265.24	264.81
4	Avalon Street	ST4	ST5	0.20	0.43	0.50	0.28		0.28	0.70	19.70	*73.8*	20.5	0.013	300	0.95	*94.3*	*1.33*	50.5	0.63	0.050	0.48	264.76	264.28
C	Ronald Street	FMH-3	FMH-4	0.74	0.74	0.50	1.03		1.03	-	19.00	*75.6*	77.8	0.013	300	0.70	*80.9*	*1.14*	70.7	1.03				
D	Ronald Street	FMH-4	ST5	0.94	1.68	0.50	1.31		2.34	1.03	20.03	*72.9*	170.2	0.013	450	0.45	*191.3*	*1.20*	103.4	1.43				
3	Avalon Street	ST5	ST6	0.49	2.60	0.50	0.68		3.34	1.43	21.14	*70.3*	234.5	0.013	525	0.54	*316.0*	*1.46*	100.3	1.15	0.220	0.54	264.06	263.52
F	Merlin Street	-	5Q127	0.77	0.77	0.50	1.07		1.07	-	19.00	*75.6*	80.9	0.013	300	1.30	*110.3*	*1.56*	82.0	0.88				
G	Merlin Street	5Q127	ST6	0.90	1.67	0.50	1.25		2.32	0.88	19.88	*73.3*	170.1	0.013	375	1.50	*214.7*	*1.94*	63.5	0.54				
	Avalon Street	ST6	ST7		4.27	0.50			5.66	1.15	22.28	*67.7*	382.9	0.013	525	0.33	*247.1*	*1.14*	9.0	0.13	0.050	0.03	263.47	263.44
-	Easement	ST7	5Q26	-	7.06	0.50	-		8.87	1.57	21.55	*69.3*	614.5	0.013	525	0.33	*247.1*	*1.14*	9.1	0.13	0.050	0.03	263.39	263.36
-	Easement (existing)	5Q26	5Q132	-	7.06	0.50	-		8.87	0.13	21.69	*69.0*	611.8	0.013	525	1.01	*432.2*	*2.00*	70.1	0.59	0.050	0.71	263.31	262.60
-	Easement (existing)	5Q132	5Q27	-	7.06	0.50	-		8.87	0.59	22.27	*67.8*	601.2	0.013	525	0.29	*231.6*	*1.07*	2.8	0.04	0.010	0.01	262.59	262.59
	Easement	5Q27	Headwall		7.06	0.50			8.87	0.04	22.31	*67.7*	600.3	0.013	375	1.54	*217.6*	*1.97*	60.3	0.51	0.010	0.93	262.58	261.65
												-												
H	Clarke Road	6Q21	6Q22	0.53	0.53	0.50	0.74		0.74	-	19.00	*75.6*	55.7	0.013	200	2.33	*50.1*	*1.59*	85.8	0.90				
I	Clarke Road	6Q22	ST9	0.61	1.14	0.50	0.85		1.58	0.90	19.90	*73.3*	116.2	0.013	200	2.03	*46.7*	*1.49*	72.9	0.82				
6	Avalon Street	ST3	ST8	0.24	0.24	0.50	0.33		0.33	-	19.00	*75.6*	25.2	0.013	300	0.54	*71.1*	*1.01*	47.9	0.79	-	0.26	265.48	265.22
7	Avalon Street	ST8	ST9	0.25	0.49	0.50	0.35		0.68	0.79	19.79	*73.5*	50.1	0.013	300	0.53	*70.4*	*1.00*	54.8	0.92	0.050	0.29	265.17	264.88
	Clarke Road	ST9	MH-A		1.63	0.50			2.27	0.92	20.81	*71.0*	160.9	0.013	200	2.38	*73.5*	*1.61*	73.5	0.76	0.030	1.75	264.85	263.10
-	CP Rail R.O.W	MH-A	6Q5002		1.63	0.50			2.27	0.76	21.57	*69.3*	157.0	0.013	300	0.95	*94.3*	*1.33*	75.7	0.95	0.020			
												-												

EXISTING SERVICES	DRAWING #, SOURCE	DATE	CONSTRUCTED SERVICES	COMPLETION

DETAILS	
DESIGN	RB
DRAWN BY	GG
CHECKED	RJM
APPROVED	DME
DATE	2017/11/30
	153120.DWG

No.	REVISIONS	DATE	CONSULTANT
00	ISSUED FOR TENDER	2017/11/30	R.V. ANDERSON

CONSULTANT OR DIVISION

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London CANADA

SCALE

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CONTRACT No.14

PRE-DEVELOPMENT CONDITIONS
AVALON STREET

PROJECT No. 153120
SHEET No. DA-4
PLAN FILE No.

Appendix C

Preliminary Water Servicing

MTE Consultants
123 St. George St., London, Ontario N6A 3A1

DATE: February 5, 2024
JOB N0.:

Client: 2126983 Ontario Inc.
Project: **1806 Avalon Street VLC**
Location: **London, ON**

Water Demand Calculation

			Medium-Density Residential			Demand Summary		
Proposed Building	Approximate Elevation (mASL)	Node	Units	Population	Avg. Day Demand (l/s)	Avg. Day (l/s)	Max Day (l/s)	Max Hour (l/s)
Units 1-3	265.89	J-4	3	7	0.02	0.02	0.07	0.16
Units 4-7	266.3	J-5	4	10	0.03	0.03	0.10	0.23
Units 8-11	266.12	J-2	4	10	0.03	0.03	0.10	0.23
Units 12-16	267.2	J-3	5	12	0.04	0.04	0.12	0.28
Total			16	39	0.12	0.12	0.40	0.90

City of London Design Specifications and Requirments Manual

Average Domestic Flow =	**255**	**l/cap/day or**	**0.003 l/cap/s**
Max Day Factor =	3.5		
Peak Hour Factor =	7.8		
Medium-Density =	2.4	ppu	

Boundary Condition Information from City of London

Pressure Zone/District	Boundary Condition
Low Level Gravity Based System	301.8m

1806 Avalon Street VLC
FIRE FLOW ANALYSIS
London, Ontario

Project Number: 43729-100
Date: February 5, 2024
Design By: BP

File: Q:\43729\100\WaterCAD\43729-100 Avalon StreetFire Flow Analysis.xlsx

Step 1: Determining Water Supply Coefficient

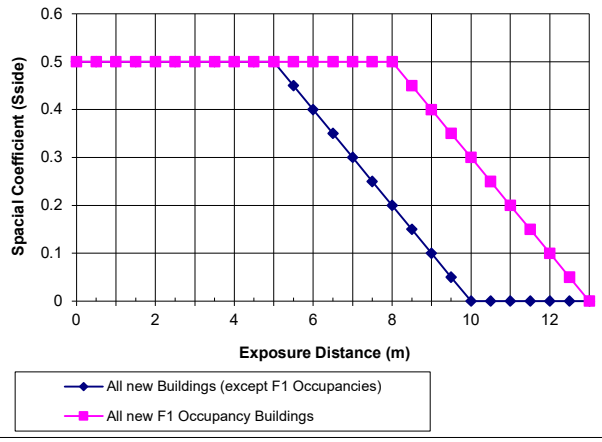
	Table 1 from OBC 2012 A3.2.5.7												
	Type of Construction	Classification by group or division in Accordance with Table 3.1.2.1 of the Ontario Building Code											
		A2	B1	B2	B3	C	D	A4	F3	A1	A3	E	F2	F1
1	Building is of Noncombustible construction with fire separation and fire-resistance ratings provided in accordance with Subsection 3.2.2 of the OBC, including loadbearing walls, columns and arches						10	12		14		17		23
2	Building is of Noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6 of the OBC. Floor assemblies are fire separations but no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.						16	19		22		27		37
3	Building is of Combustible Construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2 of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire resistance rating where permitted in subsection 3.2.2 of the OBC						18	22		25		31		41
4	Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.						23	28		32		39		53

Type of Construction	Building Classification	Water Supply Coefficient (K)
4	C	**23**

Step 2: Determine the Spacial Coefficient

	Distance	S_{side}
Exposure Distance 1 (m)	2.60	0.50
Exposure Distance 2 (m)	6.30	0.37
Exposure Distance 3 (m)	12.70	0.00
Exposure Distance 4 (m)	16.50	0.00
Exposure Distance 5 (m)		
	S_{tot}	**1.87**

Figure 1 - Spatial Coefficient vs Exposure Distance



Step 3: Determine Volume of Building

Building Length(m)	Building Width (m)	Building Height to the underside of roof deck (m)	Volume (m^3)
58.43	7.66	8.00	3580.59

Number of Stories	2

Step 4: Calculate Minimum Water Supply

$$Q = KVS_{tot}$$

Minimum Water Supply (L)	154001.19

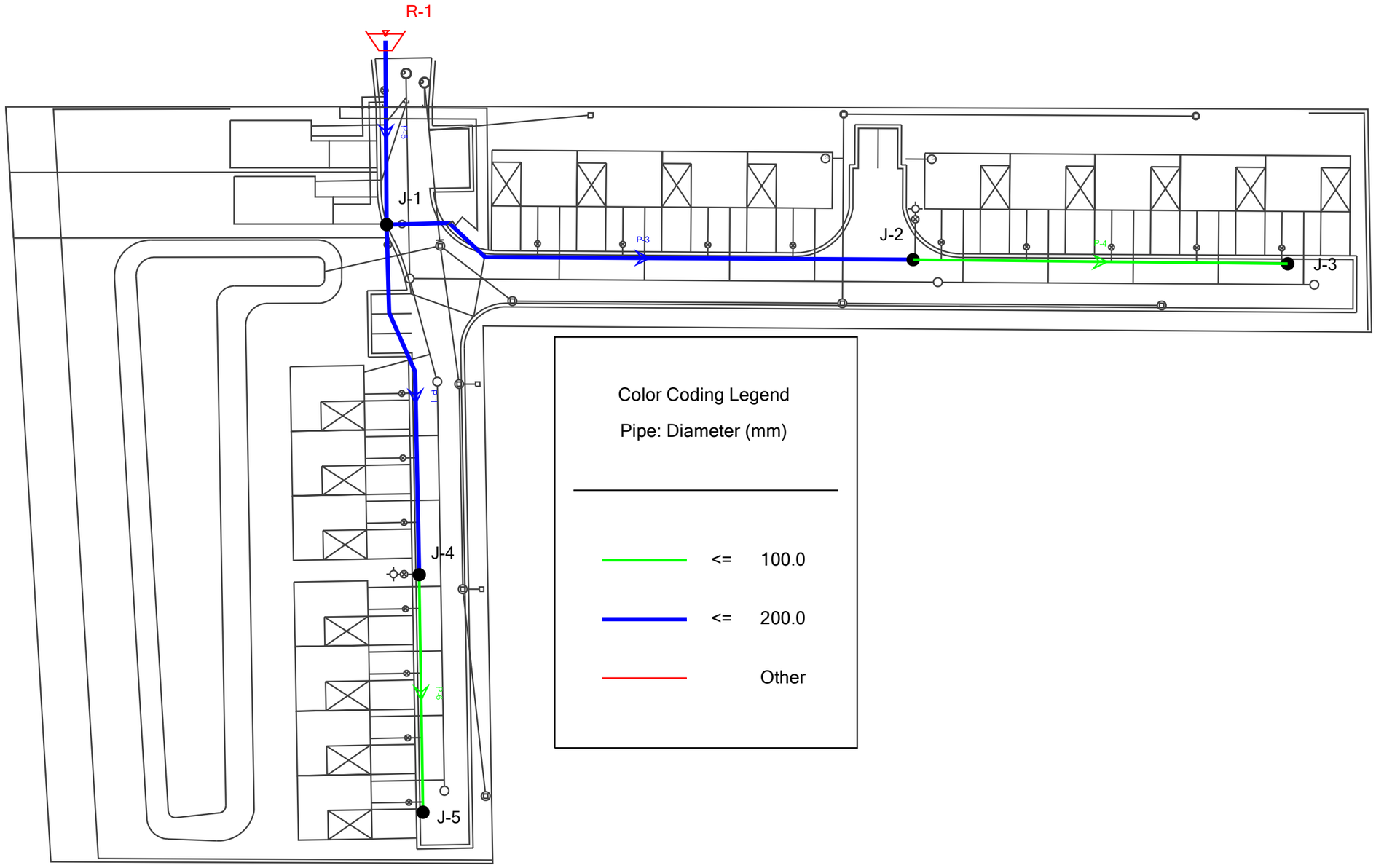
Step 5: Calculate Minimum Supply Flow Rate

Table 2 from OBC 2012 A3.2.5.7 Minimum Water Supply Flow Rates			
Building Code, Part 3 Buildings	**Required Minimum Water Supply Flow Rate (L/min)**		
One Storey Building with building area not exceeding 600 m2 (excluding F1 occupancy)	1800		
All Other Buildings	if Q> and	Q<=	
		108000	2700
	108000	135000	3600
	135000	162000	4500
	162000	190000	5400
	190000	270000	6300
	270000		9000

Minimum Water Supply Flow Rate (L/min)	4500

Step 6: Is a private fire reservoir required? **No**

Scenario: Maximum Day + Fire Flow



Average Day Demand Scenario

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Age (Calculated) (hours)
J-1	265.00	0.00	301.80	360	(N/A)
J-4	265.89	0.02	301.80	351	(N/A)
J-2	266.12	0.03	301.80	349	(N/A)
J-5	266.00	0.03	301.80	350	(N/A)
J-3	267.20	0.04	301.80	339	(N/A)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Age (Calculated) (hours)
P-4	51	J-2	J-3	100.0	100.0	0.04	0.01	(N/A)
P-5	25	R-1	J-1	200.0	110.0	0.12	0.00	(N/A)
P-6	33	J-4	J-5	100.0	100.0	0.03	0.00	(N/A)
P-3	74	J-1	J-2	200.0	110.0	0.07	0.00	(N/A)
P-1	49	J-1	J-4	200.0	110.0	0.05	0.00	(N/A)

Max Day Demand + Fire Flow Scenario

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Age (Calculated) (hours)
J-1	265.00	0.00	301.80	360	(N/A)
J-4	265.89	0.07	301.80	351	(N/A)
J-2	266.12	0.11	301.80	349	(N/A)
J-5	266.00	0.11	301.80	350	(N/A)
J-3	267.20	0.14	301.80	339	(N/A)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Age (Calculated) (hours)
P-4	51	J-2	J-3	100.0	100.0	0.14	0.02	(N/A)
P-5	25	R-1	J-1	200.0	110.0	0.42	0.01	(N/A)
P-6	33	J-4	J-5	100.0	100.0	0.11	0.01	(N/A)
P-3	74	J-1	J-2	200.0	110.0	0.25	0.01	(N/A)
P-1	49	J-1	J-4	200.0	110.0	0.18	0.01	(N/A)

Fire Flow Report - Time: 0.00 hours

Label	Satisfies Fire Flow Constraints?	Flow (Total Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Pressure (Calculated Residual) (kPa)	Demand (L/s)	Velocity of Maximum Pipe (m/s)	Pipe w/ Maximum Velocity
J-1	True	75.00	75.00	75.00	351	0.00	2.40	P-5
J-2	True	75.11	75.00	75.11	313	0.11	2.40	P-5
J-3	True	0.24	1.00	1.14	338	0.14	0.15	P-4
J-4	True	75.07	75.00	75.07	324	0.07	2.40	P-5
J-5	True	0.20	1.00	1.10	350	0.11	0.14	P-6

Peak Hour Demand Scenario

Junction Table - Time: 0.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Age (Calculated) (hours)
J-1	265.00	0.00	301.80	360	(N/A)
J-4	265.89	0.16	301.80	351	(N/A)
J-2	266.12	0.23	301.80	349	(N/A)
J-5	266.00	0.23	301.80	350	(N/A)
J-3	267.20	0.31	301.80	339	(N/A)

Pipe Table - Time: 0.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Age (Calculated) (hours)
P-4	51	J-2	J-3	100.0	100.0	0.31	0.04	(N/A)
P-5	25	R-1	J-1	200.0	110.0	0.94	0.03	(N/A)
P-6	33	J-4	J-5	100.0	100.0	0.23	0.03	(N/A)
P-3	74	J-1	J-2	200.0	110.0	0.55	0.02	(N/A)
P-1	49	J-1	J-4	200.0	110.0	0.39	0.01	(N/A)

Water Age Analysis

Junction Table - Time: 336.00 hours

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)	Age (Calculated) (hours)
J-1	265.00	0.00	301.80	360	2.498
J-4	265.89	0.02	301.80	351	11.019
J-2	266.12	0.03	301.80	349	11.742
J-5	266.00	0.03	301.80	350	13.391
J-3	267.20	0.04	301.80	339	14.547

Pipe Table - Time: 336.00 hours

Label	Length (Scaled) (m)	Start Node	Stop Node	Diameter (mm)	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Age (Calculated) (hours)
P-4	51	J-2	J-3	100.0	100.0	0.04	0.01	13.094
P-5	25	R-1	J-1	200.0	110.0	0.12	0.00	1.199
P-6	33	J-4	J-5	100.0	100.0	0.03	0.00	12.155
P-3	74	J-1	J-2	200.0	110.0	0.07	0.00	7.070
P-1	49	J-1	J-4	200.0	110.0	0.05	0.00	6.708

Appendix D

Preliminary Sanitary Servicing

MTE Consultants
123 St. George St., London, Ontario N6A 3A1

DATE: February 6, 2024
JOB N0.:

Client: 2126983 Ontario Inc.
Project: **1806 Avalon Street VLC**
Location: **London, ON**

Sanitary Flow Calculation

Building	Units	Area (ha)	Population	Harmon Peaking Factor	Infiltration (l/s)	Peak Flow (l/s)
Proposed Townhouses	16	1.023	39	4.77	0.10	0.60

City of London Design Specifications and Requirments Manual

Medium Density Residential: 2.4 people/unit
Average Flow Rate: 230 l/capita/day 0.002662037 l/cap/s
Infiltration Rate: 0.1 l/ha/s
Peaking factor: Harmon Formula

$$M = 1.1 * (1 + \frac{14}{(4 + P^{1/2})})$$

where P is tributary population in thousands

M is the peaking factor
1.1 is the uncertainty factor

Peak Domestic Sewage Flows: $Q(d) = PM + IA$

Appendix E

Preliminary SWM Calculations

MTE Consultants
123 St. George St., London, Ontario N6A 3A1

SWM Calculations

DATE:	February 6, 2024
JOB NO.:	43729-100
Client:	**2126983 Ontario Inc. (Darryl Neville)**
Project:	**1806 Avalon Street Residential Development**
Location:	**London, ON**

PRE-DEVELOPMENT

	Area (m^2)	C	A*C
Total Area:	10226.00		
Impervious Areas:	600.00	0.9	540
Pervious Areas:	9626.00	0.2	1925.2
Totals:	10226.00		2465.2
C_{eq} = Sum(A*C)/Sum(A) =	0.24		

5 Year Pre-Develeopment Area (A1) Flows

C =	0.24	
Time to concentration t_c =	19.00	min
Intensity, i (@ t_c) =	75.62	mm/hr
Pre Development Flow, Q_r = 2.78*C*i*A =	51.83	l/s

100 Year Pre-Develeopment Area (A1) Flows

C =	0.24	
Time to concentration t_c =	19.00	min
Intensity, i (@ t_c) =	131.48	mm/hr
Pre Development Flow, Q_r = 2.78*C*i*A =	90.11	l/s

ALLOWABLE BLOCK 133 FLOWS TO EXISING 375mm SEWER ON AVALON STREET

Total Area:	0.8**	Ha
C' Coefficient =	0.2**	
Total Allocated Flows to 375mm Avalon Street Storm Sewer =	33.6**	l/s

** Refer to 2018 Infrastructure Renewal Program Contract No.14, Sanitary Drainage Design Sheet Avalon Street and Sanitary Drainage Plan Avalon Street by R.V. Anderson Limited, dated November 2017.

POST-DEVELOPMENT

	Area (m^2)	C	A*C
Total Area:	10226.00		
Impervious Areas:	4096.00	0.9	3686.4
Pervious Areas:	6130.00	0.2	1226
Totals:	10226.00		4912.4
C_{eq} = Sum(A*C)/Sum(A) =	0.48		

CITY OF LONDON - 3 HOUR CHICAGO RAINFALL DISTRIBUTION PARAMETERS*

Return Period (years)	A,B,C Parameters		
	A	B	C
2	754.360	6.011	0.810
5	1183.740	7.641	0.838
10	1574.382	9.052	0.860
25	2019.372	9.824	0.875
50	2270.665	9.984	0.876
100	2619.363	10.500	0.884
250	3048.220	10.030	0.888

*Intensity i=A/(t+B)^C (mm/hr)

* Refer to the City of London Design Specification & Requirments Manual (DS&RM), Section 6.

SWM QUANTITY CONTROLS

RAINFALL DATA

Rainfall Data - London Rainfall Intensity Duration

MINOR (5 Year) FLOWS

Duration (min.)	Intensity "i" (mm/hr)
5	141.24
10	106.82
15	86.67
30	56.60
60	34.64
120	20.34
180	14.73

MAJOR (100 Year) FLOWS

Duration (min.)	Intensity "i" (mm/hr)
5	232.24
10	181.39
15	149.56
30	99.36
60	60.87
120	35.32
180	25.28

STORAGE CALCULATIONS

Inflow, Q_i 2.78*C*i*A (l/s)	Volume In Qt*t*60/1000 (m^3)	Orifice Restrictor Outflow, Q_o (l/s)	Surface Outflow Q_o (l/s)	Allowable Release, Q_o (l/s)	Volume Out Q_o*t*60/1000 (m^3)	Difference/ Storage (m^3)
192.89	57.87	33.00	0.00	33.00	9.90	47.97
145.88	87.53	33.00	0.00	33.00	19.80	67.73
118.36	106.52	33.00	0.00	33.00	29.70	76.82
77.30	139.14	33.00	0.00	33.00	59.40	79.74
47.30	170.29	33.00	0.00	33.00	118.80	51.49
27.78	200.04	33.00	0.00	33.00	237.60	-37.56
20.12	217.26	33.00	0.00	33.00	356.40	-139.14
					Max. Storage Volume (m^3) =	79.74

*Inflow, Q_i 2.78*C*i*A (l/s)	Volume In Qt*t*60/1000 (m^3)	Orifice Restrictor Outflow, Q_o (l/s)	Surface Outflow Q_o (l/s)	Allowable Release, Q_o (l/s)	Volume Out Q_o*t*60/1000 (m^3)	Difference/ Storage (m^3)
317.16	95.15	33.00	0.00	33.00	9.90	85.25
247.71	148.63	33.00	0.00	33.00	19.80	128.83
204.25	183.82	33.00	0.00	33.00	29.70	154.12
135.69	244.24	33.00	0.00	33.00	59.40	184.84
83.13	299.25	33.00	0.00	33.00	118.80	180.45
48.23	347.27	33.00	0.00	33.00	237.60	109.67
34.52	372.85	33.00	0.00	33.00	356.40	16.45
					Max. Storage Volume (m^3) =	184.84

THE PROPOSED SWM POND VOLUME EXCEEDS MAX. STORAGE REQUREMENTS. THEREFORE QUNTITY CONTROL REQUIREMENTS ARE SATISFIED.