COUNTERPOINT LAND DEVELOPMENT BY | DILLON CONSULTING

LRU LEASING INC.

FUNCTIONAL SERVICING REPORT

0 Mercer Street

OCTOBER 2025 – 24-8715

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1.0 INTRODUCTION

This Functional Servicing Report ('FSR') has been prepared to support a site-specific Zoning By-law Amendment ('ZBA') application for the site municipally known as 0 Mercer Street at the intersection of Mercer Street and Hanna Street East (referred to as the 'Site'). The report has been prepared on behalf of the applicant, LRU Leasing Inc. (or 'client') to outline the servicing strategy, including supporting studies and related information for the transportation, sanitary, stormwater management, and watermain servicing for the site.

The site exists in the broader context of the South Central Planning District, which features industrial uses. This area has been gradually transitioning to support residential uses in recent years. This planning application intends to serve as an appropriate medium-density transition from the existing single-detached neighborhood to the industrial uses to the north through the construction of two 4-storey residential buildings with 32 units each. To service the development, 80 parking spaces are proposed with one access driveway through Hanna Street East, and one access driveway through Mercer Street.

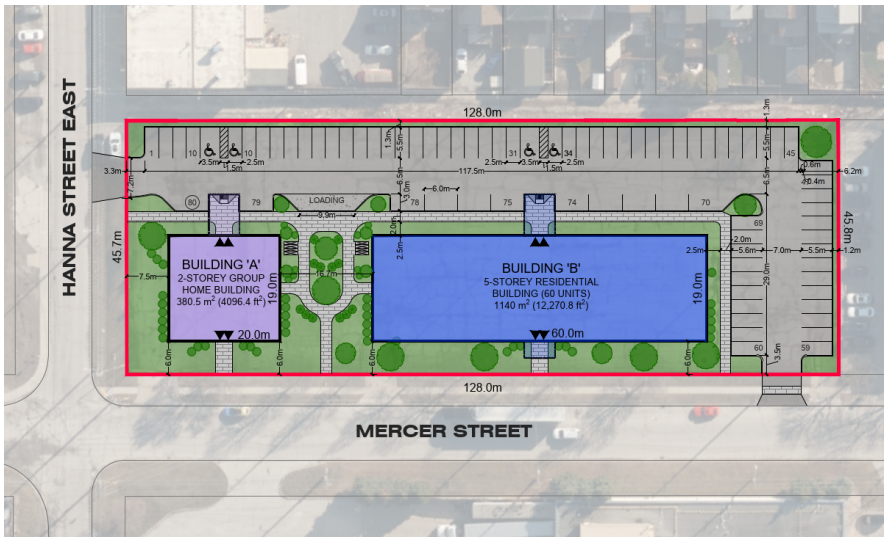

Figure 1: Site Layout and Location

1.1 REFERENCE DOCUMENTS

The following documents and drawings were referenced when completing this study:

- City of Windsor Development Manual (City of Windsor, 2015);
- City of Windsor Sewer Atlas (City of Windsor);
- MappMyCity Sewer Mapping (City of Windsor);
- Design Criteria for Environmental Compliance Approval (MECP, 2023); and
- Windsor/Essex Region Stormwater Management Standards Manual (WERSMSM, 2018).

2.0 TRANSPORTATION SERVICING

2.1 EXISTING CONDITIONS

The subject property is approximately 0.59 hectares in size. It is bounded by a commercial development to the south, residential dwellings and a commercial plaza to the east, Mercer Street to the west, and Hanna Street East to the north. The site currently consists of a large parking lot.

There are currently four driveway accesses to the property: three from Mercer Street and one from Hanna Street East. These existing driveway accesses will be removed to accommodate the proposed development.

2.2 PROPOSED ROADWAYS

The proposed development will have two access points: one from Mercer Street and another from Hanna Street East. The internal road network will consist of a parking lot with drive aisles 7 m and 6 m wide, providing a total of 80 parking spaces. Refer to **Appendix A**, **Figure 1.0** for the parking lot layout.

The pavement structure will be designed in accordance with geotechnical recommendations and finalized during detailed design.

3.0 SANITARY SERVICING

3.1 EXISTING CONDITIONS

Currently, there are no known sanitary services to the subject property. An existing oval-shaped (500x375 mm) combined sewer is located to the west along Mercer Street, and a 300 mm diameter combined sewer is located directly north of the development along Hanna Street East. Through discussions with the City of Windsor, it was determined that the existing oval-shaped combined sewer on Mercer Street will provide sanitary servicing for the proposed development.

An assessment of the existing combined sewer network along Mercer Street was completed between Manholes 3C506 and 3C508 to compare existing and proposed conditions. The evaluation was carried out using a sanitary sewer design sheet to estimate expected flows in the downstream municipal combined sewer under both the existing and proposed scenario.

Table 1 shows the design parameters used to assess the current condition of the existing combined sewer. The design criteria were established by the City of Windsor Development Manual (2015). While the manual recommends a residential population density of 50 persons per hectare for sanitary sewer design, a more conservative approach has been taken by applying a density of 3.5 persons per unit for single-detached and semi-detached dwellings. This ensures the assessment reflects the most stringent case scenario.

Table 1: Sanitary Design Criteria

CRITERIA	CITY OF WINDSOR DEVELOPMENT MANUAL
Hydraulic Sewer Sizing	Manning's Equation
Population Densities: • Commercial • Residential (Single Detached, Semi-Detached)	 74 people/ha (232 people) 3.5 people/unit (32 people)
Average Daily Sewage	0.0042 litres/second/capita
Peaking Factor	6 (population under 1,000)
Extraneous Flow	0.280 litres/ hectare/second
Manning's Roughness Coefficient 'n'	0.013
Minimum Sewer Size (mm)	150
Pipe Velocity (m/s) • Minimum • Maximum	 0.76 3.00
Minimum Slope (%) • 150mm • 200mm	 0.60 0.52
Sewer Surcharging	Maximum Hydraulic Grade Line

Figure 2 illustrates the drainage area considered for this assessment, shown in blue. The subject property is outlined in red for reference. Under existing conditions, the subject site is included within the drainage area but is assumed to have a contributing population of zero.

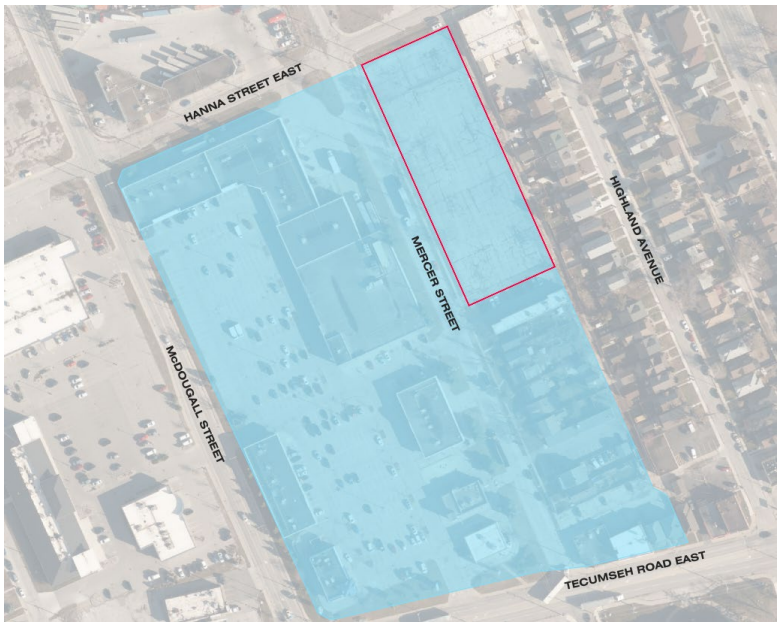

Figure 2: Sanitary Drainage Area Considered

Refer to **Appendix B** for the existing conditions calculations.

3.2 PROPOSED CONDITIONS

The same parameters were used to assess the proposed conditions, with the only difference being the addition of 60 residential units and the group home. This results in a total estimated population increase of 130 people. **Table 2** summarizes the assumed population densities and the resulting population for the new development.

Table 2: Population Density for Proposed Development

Unit Type	Population Density	Population
High Density Residential	2 people/unit	120 People
Group Home	10 people/unit	10 People

During dry weather conditions, the addition of flows from the proposed development results in a minor increase of 3.28 L/s, raising the total flow from 7.92 L/s to 11.20 L/s. Given that this total flow represents only approximately 37% of the pipe's full-flow capacity of 30.51 L/s, the sewer is confirmed to be operating well below capacity. As such, the hydraulic grade line remains below the pipe's obvert under proposed dry weather flow conditions.

Table 3 presents the expected peak flows resulting from the proposed development.

Table 3: Proposed Peak Sanitary Flows

Sanitary Drainage Area (Ha)	Population	Expected Peak Flow (L/s)
0.59	130	3.44

Refer to **Appendix B** for the proposed conditions calculations.

3.3 PROPOSED SANITARY SITE SERVICING

Refer to the attached **Figure 2.0** (in **Appendix A**) which illustrates the proposed servicing layout. The sanitary servicing for the proposed development is as follows:

- All sanitary flows from within the development will be conveyed via a proposed 200mm diameter sanitary internal network, which should connect to the springline of the existing oval 500mmx375mm combined sewer along Mercer Street.

The sanitary sewer functional design sheets are provided in **Appendix B**. Criteria used in flow calculations are listed in **Table 1**.

The existing invert elevations of the sanitary sewer along Mercer Street allows for adequate cover at the top end of the internal sewers. However, proposed inverts and ground elevations are subject to change during detailed design.

All serviced buildings where the bottom of the footings are below the sewer and the hydraulic grade line is less than 300 mm below the basement floor elevation, shall be equipped with a sewage ejector pump. It is recommended that all serviced buildings install sewage ejector pumps to provide a hydraulic break between the sewer and the building lot.

All existing inverts to be confirmed during detailed design. Redundant connections identified during detailed design, if any, to be abandoned in accordance with City of Windsor Engineering Best Practice BP1.3.3.

4.0 STORMWATER SERVICING

4.1 EXISTING CONDITIONS

An existing 1200 mm diameter storm sewer is located along Mercer Street to the west, and a 1500 mm diameter storm sewer is located directly north of the site along Hanna Street East. Through discussions with the City of Windsor, it was determined that the storm sewer on Mercer Street will provide storm servicing for the proposed development.

The site currently consists of a large parking lot with several catch basins, which are assumed to outlet to the existing storm sewer network on Mercer Street. However, the exact connection point to the Mercer Street storm sewer is to be confirmed during detailed design.

Although the site is near completely impervious under existing conditions, it was agreed with the City to apply a runoff coefficient of 0.5 and use the 2-year peak flow event to calculate the allowable release rate. A total Site catchment area of 0.59 ha is used for the pre-development condition analysis. Based on a review of the ERCA public interactive mapping, existing soil conditions on the site consist of Brookston Clay Loam which has a hydrologic soil group (HSG) D classification.

The existing conditions design inputs and calculations are presented in **Appendix C**.

4.2 DESIGN CRITERIA

The following storm sewer design criteria for this property are outlined in **Table 4** below. The design criteria were established by the City of Windsor Development Manual (2015).

Table 4: Storm Sewer Design Criteria

CRITERIA	CITY OF WINDSOR DEVELOPMENT MANUAL
Design Method	Rational Method
Standard Return Period	1 in 5 years Storm Event
Rainfall Intensity	i = a / (t+b)^c a = 1259.0 b = 8.80 c = 0.838
Minimum Cover Depth (m)	1.00
Minimum Sewer Size (mm)	300
Manning's Roughness Coefficient 'n'	0.013
Runoff Coefficient: Roofs Road Pavement Landscape	 0.95 0.90 0.20
Full Flow Velocity:	

CRITERIA	CITY OF WINDSOR DEVELOPMENT MANUAL
Minimum	0.76 metres per second
Maximum	3.00 metres per second
Min. Slope:	
300mm dia.	0.30%
375mm dia.	0.23%
450mm dia.	0.18%
600mm dia.	0.12%
Max. Inlet Time	20 minutes
Minimum Manhole Size	1200mm

4.3 STORMWATER QUANTITY CONTROL

Through communication with the City of Windsor, it was determined that the allowable storm flows for the site must be reduced by the estimated peak sanitary flows. This reduction is required because a Combined Sewer Overflow (CSO) is located directly downstream of the connection point and during heavy storm events, the sewer system is assumed to converge.

Based on this criteria, the allowable storm flows are to be reduced by the peak sanitary flow, which were determined to be 3.44L/s in **Section 3.2**, **Table 3**.

Table 5 summarizes the calculated allowable release rate and corresponding 100-year storage volume requirements, determined using the Modified Rational Method.

Table 5: Water Quantity Control Volume Requirements

Site Area (Ha)	Runoff Coefficient	Allowable Release Rate (L/s)	Reduced Allowable Release Rate (L/s)	100-yr Storage Requirements (m^3)
0.59	0.89	47.27	43.83	175

Quantity control for future development is expected to be achieved through a combination of parking lot surface storage, pipe storage, and an underground storage chamber. During the Urban Stress Test (UST), runoff shall be maintained on-site where no overland flow will spillover onto adjacent properties. Refer to **Appendix C** for preliminary stormwater storage calculations.

4.4 PROPOSED STORM SERVICING

Refer to the attached **Figure 2.0** (in **Appendix A**) which illustrates the proposed servicing plan. The stormwater servicing for the proposed development is as follows:

- The proposed building and parking lot will be serviced through a new storm sewer network constructed within the proposed development, which will outlet into the existing 1200mm dia. storm sewer located to the west of the property along Mercer Road.
- The proposed storm sewers have been sized to accommodate a 1:5-year storm event.

- The outflow from the site was restricted to the 2-year pre-development release rate, further reduced by the estimated sanitary peak flow. This represents a release rate of 43.8 L/s.
- Stormwater quantity control will be provided through a combination of surface storage, underground pipe storage, and an underground storage chamber, with a total storage requirement of approximately 175m^3.
- Major system overland flow depths are to be maintained below 0.30 m in depth during all storms, up to and including, the governing 100-year event. During the Urban Stress Test (UST) event, ponding depths within the parking lot must be maintained below proposed building entrances and fully contained on site.
- Stormwater quality control will be provided through an Oil and Grit Separator (OGS) unit. The specific size and configuration of the OGS unit will be determined during detailed design.
- The release rate into the receiving network will be controlled via a Tempest Inlet Control Device, the specific size and configuration of this unit will be determined during detailed design.

Refer to the storm sewer design sheets provided in **Appendix B**.

All existing inverts to be confirmed during detailed design. Redundant connections identified during detailed design, if any, to be abandoned in accordance with City of Windsor Engineering Best Practice BP1.3.3.

During detailed design, a Stormwater Management Report is required in accordance with the Windsor Essex Region Stormwater Management Standards Manual to confirm the required storage volumes necessary to restrict flows to pre-development conditions.

5.0 WATERMAIN SERVICING

5.1 EXISTING CONDITIONS

Currently, there are no known water services to the subject property. There is an existing 150 mm diameter watermain located along the east side of the Mercer Street right-of-way (ROW), and a 750 mm diameter trunk watermain located along the west side of the same ROW. Additionally, a 150 mm diameter watermain is located directly north of the site along Hanna Street East.

5.2 PROPOSED WATERMAIN SERVICING

Refer to the attached **Figure 2.0** (in **Appendix A**) which illustrates the proposed servicing plan. The watermain servicing for the proposed development is as follows:

- The existing 150mm diameter watermain within the right-of-way of Mercer Street will be used to service the proposed multi-unit residential building and group home.
- A 150mm diameter watermain will extend into the site and provide servicing to the proposed buildings as well as a fire hydrant located within 40m of the main entrances.

No pressure/flow testing has been completed for this development. During detailed design, pressure testing of the existing watermain on Mercer Street may be required.

The detailed design of the watermain is to be consistent with the requirements of Windsor Utility Commissions (W.U.C.) and the Ontario Building Code (OBC). The detailed design process will be coordinated with W.U.C.

Redundant connections identified during detailed design, if any, to be abandoned in accordance with City of Windsor Engineering Best Practice BP1.3.3.

6.0 UTILITIES

6.1 GAS

Existing Enbridge infrastructure is available in the area. Future coordination with Enbridge will be required during detailed design.

6.2 BELL

Existing Bell service is available to the east of the subject property along the alley way. Future coordination with Bell will be required during detailed design.

6.3 COGECO

Cogeco has aerial fibre located around the property and can provide fibre services to both buildings. Future coordination with Cogeco will be required during detailed design.

6.4 MNSI

MNSi has aerial plant in the area and can service the buildings with Fibre. Future coordination with MNSi will be required during detailed design.

6.5 ENWIN

Enwin hydro is located along Mercer Street and Hanna Street East. Future coordination with Enwin will be required during detailed design.

7.0 CONCLUSIONS

This FSR presents a site servicing strategy for the proposed development that addresses the requirements of the applicable regulatory agencies and provides the basis for detailed servicing design.

We trust this report sufficiently addresses the site servicing requirements and allows for approval of the Zoning Bylaw Amendment ('ZBA') application. Should there be any questions or comments, please feel free to contact the undersigned.

Sincerely,

Counterpoint Land Development by Dillon Consulting Limited

Kristine Wilkinson, P.Eng.
Project Engineer

Jaidy Wilson, EIT
Civil Designer

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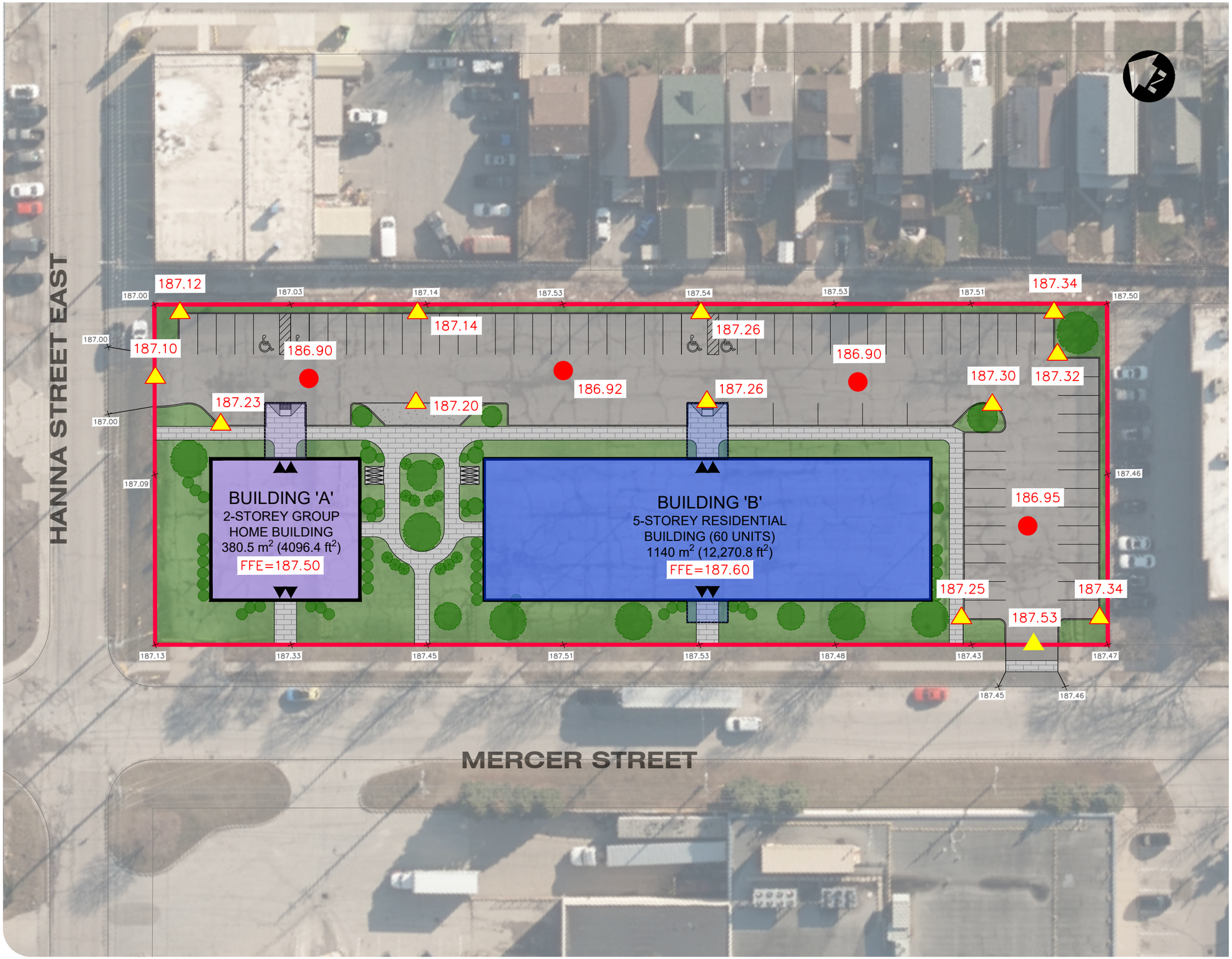
APPENDIX A

UTILITY AND GRADING PLANS



LRU LEASING INC.
MERCER STREET AT HANNA STREET EAST

FIGURE 1.0
SITE GRADING PLAN

LEGEND

- SUBJECT AREA (±0.59ha / 1.45ac)
- PROPOSED MULTIPLE RESIDENTIAL BUILDING (64 UNITS)
- PROPOSED SIDEWALK
- PROPOSED LANDSCAPE
- 187.34 PROPOSED GRADE
- PROPOSED HIGH POINT
- PROPOSED LOW POINT

SCALE: 1:500M (11x17)

MAP/DRAWING INFORMATION:
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CHECKED BY: KAW
DESIGNED BY: KAW

SOURCE: COUNTY OF ESSEX AERIAL PHOTOGRAPHY (2023)

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PROJECT: 24-48715
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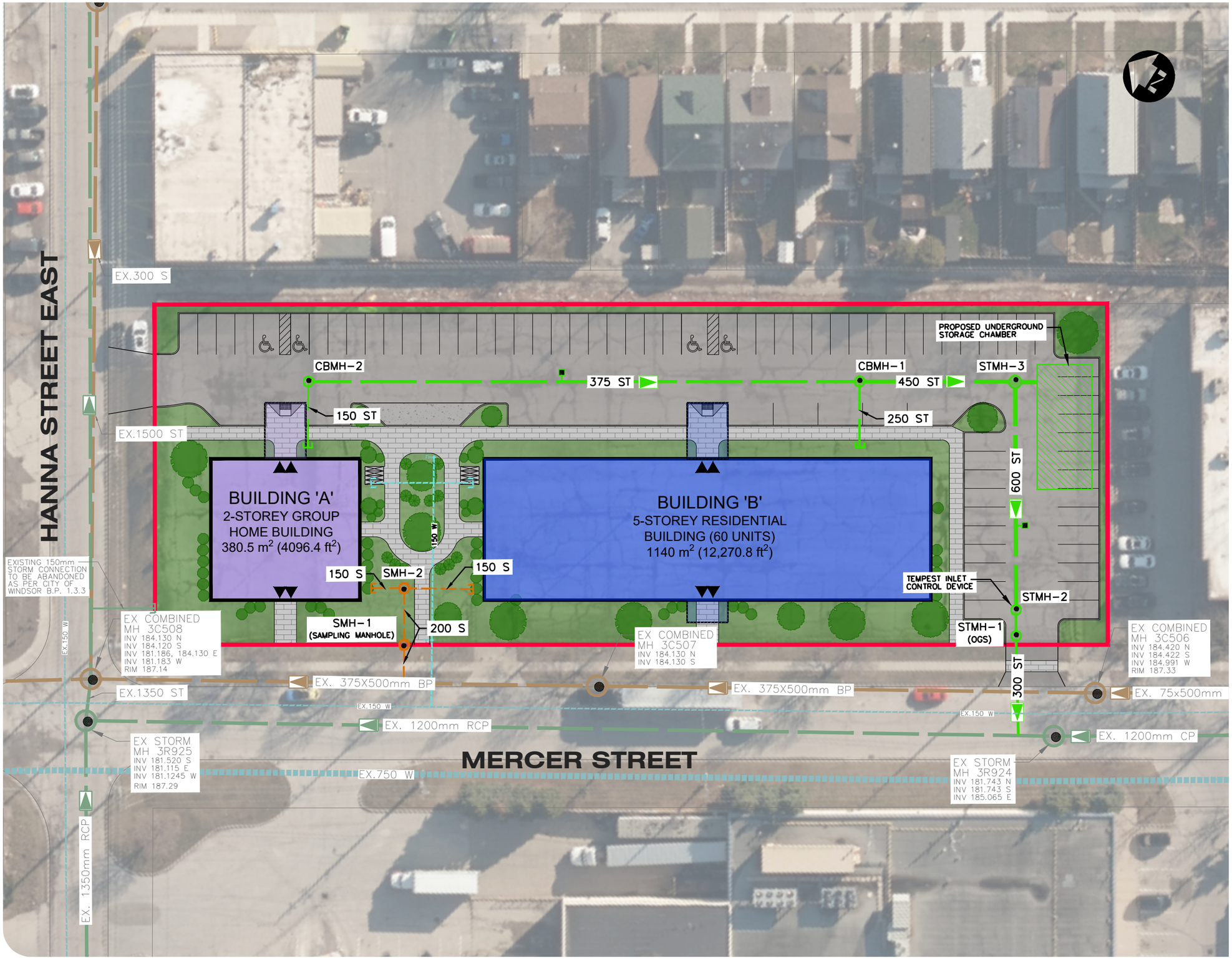
DATE: 10/22/2025



LRU LEASING INC.
MERCER STREET AT HANNA STREET EAST

FIGURE 2.0
SITE SERVICING PLAN

LEGEND

- SUBJECT AREA (±0.59ha / 1.45ac)
- PROPOSED MULTIPLE RESIDENTIAL BUILDING (64 UNITS)
- PROPOSED SIDEWALK
- PROPOSED LANDSCAPE
- PROPOSED WATERMAIN
- PROPOSED SANITARY SEWER AND MAINTENANCE HOLE
- PROPOSED STORM SEWER AND MAINTENANCE HOLE
- PROPOSED CATCH BASIN
- EXISTING STORM SEWER AND MAINTENANCE HOLE
- EXISTING COMBINED SEWER AND MAINTENANCE HOLE
- EXISTING WATERMAIN
- PROPOSED UNDERGROUND STORAGE CHAMBER

SCALE: 1:500M (11x17)

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PROJECT: 24-48715
STATUS: DRAFT
DATE: 10/22/2025

APPENDIX B

SANITARY SEWER AND STORM SEWER DESIGN SHEETS

EXISTING CONDITIONS ANALYSIS - MERCER STREET
SANITARY SEWER DESIGN SHEET

Project Name: Mercer Street at Hanna
Project No: 24-8715
City of Windsor

The Peaking Factor was derived:
Using Harmon Formula= N (Y or N)
From a Table= Y
Value from table= 6.000

Residential Average Daily Flow= 363 L/Cap.D
Peak Extraneous Flow= 0.280 L/Ha.S

Outlet Invert Elevation= 184.120
Mannings 'n'= 0.013
Total Area= 4.530

Basement Floor Elevation =
or
Hydraulic Grade Line Cover =

Ground Elevation at Outlet = 187.297

Location			Flow Characteristics							Sewer Design/Profile											Cover		
	LOCATION		INDIVIDUAL		CUMULATIVE		PEAKING	POP FLOW	PEAK EXTR.	PEAK DESIGN			MAJOR	MINOR	Wall								
ROAD/STN	FROM MH	TO MH	POP	AREA (ha.)	POP	AREA (ha.)	FACTOR M	Q(p) (L/s)	FLOW Q(i) (L/s)	FLOW Q(d) (L/s)	CAPACITY (L/s)	LENGTH (m)	AXIS (a) (mm)	AXIS (b) (mm)	Thickness (mm)	SLOPE (%)	UPPER INVERT (m)	LOWER INVERT (m)	FALL (m)	VELOCITY (m/s)	DROP IN LOWER MANHOLE (m)	Ground Elevation Upper MH	Cover @ Up MH (m)	Cover @ Low MH (m)
Mercer Street	E 3C506	E 3C507	264	3.66	264	3.66	6.000	6.653	1.026	**7.68**	**166.51**	67.8	500	375	16	0.43	184.420	184.130	0.290	1.13	0.000	187.367	2.431	2.714
Mercer Street	E 3C507	E 3C508	0	0.87	264	4.53	6.000	6.653	1.268	**7.92**	**30.51**	69.7	500	375	16	0.01	184.130	184.120	0.010	0.21		187.360	2.714	2.661

PROPOSED CONDITIONS ANALYSIS - MERCER STREET
SANITARY SEWER DESIGN SHEET

Project Name: Mercer Street at Hanna
Project No: 24-8715
City of Windsor

The Peaking Factor was derived:
Using Harmon Formula= N (Y or N)
From a Table= Y
Value from table= 6.000

Residential Average Daily Flow= 363 L/Cap.D
Peak Extraneous Flow= 0.280 L/Ha.S

Outlet Invert Elevation= 184.120
Mannings 'n'= 0.013
Total Area= 4.530

Basement Floor Elevation =
or
Hydraulic Grade Line Cover =

Ground Elevation at Outlet = 187.297

Location			Flow Characteristics								Sewer Design/Profile											Cover		
	LOCATION		INDIVIDUAL		CUMULATIVE		PEAKING	POP FLOW	PEAK EXTR.	PEAK DESIGN			MAJOR	MINOR	Wall									
ROAD/STN	FROM MH	TO MH	POP	AREA (ha.)	POP	AREA (ha.)	FACTOR M	Q(p) (L/s)	FLOW Q(i) (L/s)	FLOW Q(d) (L/s)	CAPACITY (L/s)	LENGTH (m)	AXIS (a) (mm)	AXIS (b) (mm)	Thickness (mm)	SLOPE (%)	UPPER INVERT (m)	LOWER INVERT (m)	FALL (m)	VELOCITY (m/s)	DROP IN LOWER MANHOLE (m)	Ground Elevation Upper MH	Cover @ Up MH (m)	Cover @ Low MH (m)
Mercer Street	E 3C506	E 3C507	264	3.66	264	3.66	6.000	6.653	1.026	**7.68**	**166.51**	67.8	500	375	16	0.43	184.420	184.130	0.290	1.13	0.000	187.367	2.431	2.714
Mercer Street	E 3C507	E 3C508	130	0.87	394	4.53	6.000	9.929	1.268	**11.20**	**30.51**	69.7	500	375	16	0.01	184.130	184.120	0.010	0.21		187.360	2.714	2.661

MERCER STREET AT HANNAH
SANITARY SEWER DESIGN SHEET

Project Name: Mercer Street at Hanna
Project No: 24-8715
City of Windsor

The Peaking Factor was derived:
Using Harmon Formula= N (Y or N)
From a Table= Y
Value from table= 6

Residential Average Daily Flow= 363 L/Cap.D
Peak Extraneous Flow= 0.280 L/Ha.S

Outlet Invert Elevation= 184.295
Mannings 'n'= 0.013
Total Area= 0.586

Basement Floor Elevation =
or
Hydraulic Grade Line Cover =

Ground Elevation at Outlet = 187.300

Location			Flow Characteristics								Sewer Design/Profile										Cover		
	LOCATION		INDIVIDUAL		CUMULATIVE		PEAKING	POP FLOW	PEAK EXTR.	PEAK DESIGN				Wall									
ROAD/STN	FROM MH	TO MH	POP	AREA (ha.)	POP	AREA (ha.)	FACTOR M	Q(p) (L/s)	FLOW Q(i) (L/s)	FLOW Q(d) (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE DIA. (mm)	Thickness (mm)	SLOPE (%)	UPPER INVERT (m)	LOWER INVERT (m)	FALL (m)	VELOCITY (m/s)	DROP IN LOWER MANHOLE (m)	Ground Elevation Upper MH	Cover @ Up MH (m)	Cover @ Low MH (m)
Building 'A'	Stub	SMH-2	10	0.04	10	0.04	6.000	0.252	0.011	**0.26**	**15.23**	4.5	150	5	1.00	185.025	184.981	0.045	0.86	0.419	187.580	2.400	2.490
Building 'B'	Stub	SMH-2	120	0.11	120	0.11	6.000	3.024	0.032	**3.06**	**15.23**	9.2	150	5	1.00	185.115	185.023	0.092	0.86	0.461	187.670	2.400	2.448
	SMH-2	SMH-1	0	0.43	130	0.59	6.000	3.276	0.164	**3.44**	**23.65**	7.6	200	6	0.52	184.562	184.522	0.040	0.75	0.200	187.625	2.857	2.782
	SMH-1	Mainline	0	0.00	130	0.59	6.000	3.276	0.164	**3.44**	**23.65**	5.2	200	6	0.52	184.322	184.295	0.027	0.75		187.510	2.982	2.799

MERCER STREET AT HANNA
STORM SEWER DESIGN SHEET

Intensity Option # 1

Project Name: Mercer Street at Hanna
Project Number: 24-8715

1) Intensity (i) = a/(t+b)^c **2) Intensity (i) = a*t^b** **3) Insert Intensity**

Based on 1:5 Year Storm Event
Windsor, Ontario

a= 1259.000 **a=** **i=**
b= 8.800 **b=**
c= 0.838

Manning's n = 0.013

Total Area (ha)= 0.59 Outlet Invert Elevation= 182.185 Ground Elevation @ Outlet = 187.45

Location			Sewer Design / Profile																	Cover		
Road /Stations	From MH	To MH	Area (ha)	Run. Coef.	2.78AC	Accum. 2.78AC	T of In (min)	T of F (min)	T of Conc. (min)	Intensity (mm/hr)	Exp. Flow (L/s)	Capacity (L/s)	Velocity (m/s)	Wall Thickness (mm)	Length (m)	Pipe Dia. (mm)	Slope (%)	Invert Up MH	Invert Low MH	Fall (m)	Drop Across Low MH (m)	Ground Elev Up MH	Cover @ Up MH (m)	Cover @ Low MH (m)
	Building 'A'	CBMH-2	0.04	0.95	0.10	0.10	15.0	0.17	15.00	88.40	**8.88**	**15.23**	0.86	13	8.9	150	1.00	185.573	185.484	0.09	0.750	187.400	1.66	1.25
	CBMH-2	CBMH-1	0.30	0.80	0.66	0.76		1.62	15.17	87.87	**66.56**	**84.09**	0.76	41	74.0	375	0.23	184.734	184.564	0.17	0.075	186.900	1.75	1.94
	Building 'B'	CBMH-1	0.11	0.95	0.30	0.30	15.0	0.12	15.00	88.40	**26.62**	**59.47**	1.21	20	8.8	250	1.00	185.327	185.239	0.09	0.750	187.400	1.80	1.41
	CBMH-1	STMH-3	0.04	0.90	0.11	1.17		0.45	16.79	83.18	**97.23**	**124.27**	0.78	42	20.9	450	0.19	184.489	184.449	0.04	0.150	186.920	1.94	2.37
	Underground Storage	STMH-3	0.00	1.00	0.00	0.00	15.0	0.07	15.00	88.40	**0.00**	**212.70**	0.75	49	2.9	600	0.12	184.303	184.299	0.00		187.320	2.37	2.36
	STMH-3	STMH-2	0.09	0.80	0.20	1.36		0.68	17.24	81.99	**111.89**	**212.70**	0.75	49	30.7	600	0.12	184.299	184.262	0.04	0.025	187.310	2.36	2.49
	STMH-2	STMH-1	0.01	0.60	0.01	1.38		0.08	17.92	80.23	**110.34**	**53.84**	0.76	34	3.5	300	0.31	184.237	184.227	0.01	2.000	187.400	2.83	2.96
	STMH-1	Mainline	0.00	0.00	0.00	1.38		0.29	17.99	80.04	**110.08**	**53.84**	0.76	34	13.4	300	0.31	182.227	182.185	0.04		187.520	4.96	4.93

APPENDIX C

STORMWATER MANAGEMENT CALCULATIONS

DILLON CONSULTING	Stormwater Management Calculations	Project:	Mercer Street at Hanna	No.:	24-8715	
	Rational Method Calculations	By:	JW	Date:	10/22/2025	Page:
		Checked:	KAW	Scenario:	Existing	1

Calculation of existing runoff rate is undertaken using the Rational Method: **Q = CIA / 360**

Where: Q = Peak flow rate (litres/second)
C = Runoff coefficient
I = Rainfall intensity (mm/hour)
A = Catchment area (hectares)

Project Area **0.59** hectares

Composite Runoff Coefficient

Land Use	Area (m^2)	C
Parking Lot	5,859	0.50
Composite Runoff Coefficient	5,859	0.50

Time of Concentration

Method	Up EL (m)	Down EL (m)	Length (m)	Slope (%)	Area (ha)	C	Min Inlet Time (min)
	187.57	187.00	43.85	1.30	0.59	0.50	20
Bransby Williams						t_c (min) =	20.0
Airport						t_c (min) =	N/A

Rainfall intensity calculated in accordance with Sault Ste. Marie IDF Parameters:

$$I = \frac{A}{(B + t_c)^C}$$

(if only two paramters are provided, enter B as "0" and C as positive number)

Where: A, B, and C = IDF Parameters From Local Municipality Guidelines
I = Rainfall intensity (mm/hour)
T = Time of concentration (hours)

Return Period (Years)	2	5	10	25	50	100
A	854.0	1259.0	1511.0	1851.0	2114.0	2375.0
B	7.0	8.8	9.5	10.2	10.6	11.0
C	0.818	0.838	0.845	0.852	0.858	0.861
T (mins) **	20.0	20.0	20.0	20.0	20.0	20.0
I (mm/hr)	57.6	75.3	86.5	101.5	112.3	123.5
Q (L/s)	**47.27**	**61.81**	**71.00**	**83.26**	**92.12**	**101.29**
Q (m_3/s)	0.047	0.062	0.071	0.083	0.092	0.101

DILLON CONSULTING	Stormwater Management Calculations	Project:	Mercer Street at Hanna	No.:	24-8715	
	Rational Method Calculations	By:	JW	Date:	10/22/2025	Page:
		Checked:	KAW	Scenario:	Proposed	2

Calculation of existing runoff rate is undertaken using the Rational Method: **Q = CIA / 360**

Where: Q = Peak flow rate (litres/second)
C = Runoff coefficient
I = Rainfall intensity (mm/hour)
A = Catchment area (hectares)

$$100-year\ C\ Value = \frac{Storage\ Depth\ (from\ Section\ 3.3.2.1\ WERSMSM)}{108mm\ (100\ Year\ 24\ hour\ Rainfall)}$$

Project Area **0.59** hectares

$$Storage\ Depth = 72 + 0.33x\ (Hydrological\ Soil\ Group\ D)$$

Composite Runoff Coefficient		
Land Use	Area (m^2)	C
Roofs	1,520.57	0.95
Road Pavement/Sidewalks	2,753.76	0.90
Landscape	1,585.05	0.20
Composite Runoff Coefficient	5,859.38	0.72
100 - Year C Value		0.89

Storage	100-yr C
95.879	0.888

$$I = \frac{A}{(B + t_c)^C}$$

Rainfall intensity calculated in accordance with Windsor A. IDF Parameters:
(if only two paramters are provided, enter B as "0" and C as positive number)

Where: A, B, and C = IDF Parameters From Local Municipality Guidelines
I = Rainfall intensity (mm/hour)
T = Time of concentration (Minutes)

Return Period (Years)	2	5	10	25	50	100
A	854.0	1259.0	1511.0	1851.0	2114.0	2375.0
B	7.0	8.8	9.5	10.2	10.6	11.0
C	0.82	0.84	0.85	0.85	0.86	0.86
T (mins)	15.0	15.0	15.0	15.0	15.0	15.0
I (mm/hr)	68.1	88.4	101.3	118.4	130.9	143.7
Total Q (L/s)	**80.3**	**104.2**	**119.4**	**153.5**	**185.1**	**207.8**
Total Q (m_3/s)	0.080	0.104	0.119	0.154	0.185	0.208

DILLON CONSULTING	Stormwater Management Calculations	Project: Mercer Street at Hanna	No.: 24-8715	
	Required Storage Volume	By: JW	Date: 10/22/2025	Page:
		Checked: KAW	Scenario: Proposed	3

Catchment ID
1:5 Year Modified Rational

start time	0
increment	2

Catchment Parameters

Area	0.59	ha
Runoff C	0.72	
AxC	0.42	
*target**	43.83	L/s
Sreq'd	**55**	m^3

* Reduced by the estimated peak sanitary flows

time (min)	Intensity (mm/hr)	Flow (m^3/s)	Vol in (m^3)	target (m^3/s)	vol out (m^3)	net (m^3)
0	203.49	0.240	0.00	0.044	0	0.00
2	171.40	0.202	24.24	0.044	5	18.98
4	148.66	0.175	42.05	0.044	11	31.53
6	131.63	0.155	55.85	0.044	16	40.08
8	118.36	0.140	66.97	0.044	21	45.93
10	107.72	0.127	76.18	0.044	26	49.88
12	98.97	0.117	83.99	0.044	32	52.43
14	91.64	0.108	90.73	0.044	37	53.92
16	85.40	0.101	96.64	0.044	42	54.56
18	80.03	0.094	101.88	0.044	47	54.54
20	75.35	0.089	106.57	0.044	53	53.98
22	71.22	0.084	110.82	0.044	58	52.96
24	67.57	0.080	114.68	0.044	63	51.57
26	64.30	0.076	118.23	0.044	68	49.85
28	61.35	0.072	121.50	0.044	74	47.86
30	58.69	0.069	124.53	0.044	79	45.63
32	56.27	0.066	127.35	0.044	84	43.20
34	54.06	0.064	129.99	0.044	89	40.58
36	52.03	0.061	132.47	0.044	95	37.80
38	50.16	0.059	134.80	0.044	100	34.87
40	48.43	0.057	137.01	0.044	105	31.82
42	46.83	0.055	139.10	0.044	110	28.65
44	45.34	0.053	141.08	0.044	116	25.37
46	43.95	0.052	142.97	0.044	121	22.00
48	42.65	0.050	144.77	0.044	126	18.54
50	41.43	0.049	146.49	0.044	131	15.00
52	40.28	0.047	148.14	0.044	137	11.39
54	39.20	0.046	149.72	0.044	142	7.71
56	38.19	0.045	151.24	0.044	147	3.97
58	37.23	0.044	152.70	0.044	153	0.18
60	36.32	0.043	154.11	0.044	158	-3.68
62	35.46	0.042	155.47	0.044	163	-7.58
64	34.64	0.041	156.78	0.044	168	-11.52
66	33.86	0.040	158.05	0.044	174	-15.52
68	33.12	0.039	159.28	0.044	179	-19.55
70	32.41	0.038	160.47	0.044	184	-23.62
72	31.74	0.037	161.62	0.044	189	-27.72
74	31.10	0.037	162.74	0.044	195	-31.86
76	30.48	0.036	163.83	0.044	200	-36.03
78	29.89	0.035	164.89	0.044	205	-40.23
80	29.33	0.035	165.92	0.044	210	-44.46
82	28.78	0.034	166.92	0.044	216	-48.72
84	28.26	0.033	167.90	0.044	221	-53.00
86	27.76	0.033	168.86	0.044	226	-57.31
88	27.28	0.032	169.79	0.044	231	-61.64
90	26.82	0.032	170.69	0.044	237	-65.99
92	26.37	0.031	171.58	0.044	242	-70.36
94	25.94	0.031	172.45	0.044	247	-74.75
96	25.52	0.030	173.30	0.044	252	-79.16
98	25.12	0.030	174.13	0.044	258	-83.59
100	24.74	0.029	174.94	0.044	263	-88.04

Catchment ID
1:100 Year Modified Rational

start time	0
increment	2

Catchment Parameters

Area	0.59	ha
Runoff C	0.89	
AxC	0.52	
*target**	43.83	L/s
Sreq'd	**175**	m^3

time (min)	Intensity (mm/hr)	Flow (m^3/s)	Vol in (m^3)	target (m^3/s)	vol out (m^3)	net (m^3)
0	301.3176	0.436	0.00	0.044	0	0.00
2	260.9507	0.377	45.28	0.044	5	40.02
4	230.7008	0.334	80.07	0.044	11	69.55
6	207.1319	0.300	107.83	0.044	16	92.05
8	188.2161	0.272	130.65	0.044	21	109.61
10	172.6763	0.250	149.82	0.044	26	123.53
12	159.6673	0.231	166.24	0.044	32	134.69
14	148.6063	0.215	180.52	0.044	37	143.70
16	139.0783	0.201	193.08	0.044	42	151.00
18	130.7793	0.189	204.25	0.044	47	156.91
20	123.4813	0.179	214.28	0.044	53	161.68
22	117.0100	0.169	223.36	0.044	58	165.50
24	111.2298	0.161	231.62	0.044	63	168.51
26	106.0332	0.153	239.20	0.044	68	170.83
28	101.3344	0.147	246.19	0.044	74	172.55
30	97.0637	0.140	252.66	0.044	79	173.76
32	93.1638	0.135	258.67	0.044	84	174.52
34	89.5875	0.130	264.29	0.044	89	174.88
36	86.2953	0.125	269.55	0.044	95	174.88
38	83.2539	0.120	274.50	0.044	100	174.57
40	80.4351	0.116	279.16	0.044	105	173.97
42	77.8148	0.113	283.57	0.044	110	173.12
44	75.3722	0.109	287.75	0.044	116	172.04
46	73.09	0.106	291.72	0.044	121	170.75
48	70.95	0.103	295.50	0.044	126	169.27
50	68.94	0.100	299.10	0.044	131	167.61
52	67.06	0.097	302.54	0.044	137	165.79
54	65.27	0.094	305.84	0.044	142	163.83
56	63.59	0.092	309.00	0.044	147	161.73
58	62.00	0.090	312.03	0.044	153	159.50
60	60.50	0.087	314.94	0.044	158	157.16
62	59.07	0.085	317.75	0.044	163	154.70
64	57.71	0.083	320.45	0.044	168	152.15
66	56.42	0.082	323.06	0.044	174	149.50
68	55.18	0.080	325.59	0.044	179	146.76
70	54.01	0.078	328.02	0.044	184	143.94
72	52.89	0.076	330.39	0.044	189	141.04
74	51.81	0.075	332.67	0.044	195	138.07
76	50.79	0.073	334.89	0.044	200	135.03
78	49.80	0.072	337.04	0.044	205	131.92
80	48.86	0.071	339.13	0.044	210	128.75
82	47.95	0.069	341.17	0.044	216	125.52
84	47.08	0.068	343.14	0.044	221	122.24
86	46.24	0.067	345.07	0.044	226	118.90
88	45.44	0.066	346.94	0.044	231	115.52
90	44.66	0.065	348.77	0.044	237	112.09
92	43.91	0.064	350.55	0.044	242	108.61
94	43.19	0.062	352.29	0.044	247	105.09
96	42.50	0.061	353.99	0.044	252	101.53
98	41.83	0.060	355.64	0.044	258	97.93
100	41.18	0.060	357.27	0.044	263	94.29