COUNTERPOINT LAND DEVELOPMENT BY | DILLON CONSULTING

ASTORIA INC.

FUNCTIONAL SERVICING REPORT

Residential Development at 3771, 3783, 3793 Howard Avenue, Windsor, Ontario

NOVEMBER 2025 – 24-8888

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TABLES

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1.0 INTRODUCTION

Dillon Consulting Limited (Dillon) was retained by Astoria Inc. to develop a functional servicing strategy for a proposed residential development located at 3771, 3783, and 3793 Howard Avenue, in the City of Windsor. These lands are herein referred to as the 'Subject Site' throughout this document. This document outlines the servicing strategy, including supporting studies and related information for the transportation, sanitary, stormwater management, and watermain servicing for the property.

The proposed development area is approximately 1.57 ha (3.88 acres) and zoned as Residential District 1.1 (RD1.1) and Holding Residential District 1.1 (HRD1.1). The property is bounded by the existing residential land uses. The Subject Site is composed of three individual parcels each containing a single detached residential dwelling.

When developed, the Subject Site will consist of two (2) 6-storey multiple dwelling buildings with a total of 162 residential units and four (4) low-density townhome buildings with total of 16 residential units. There are a total of 178 dwelling units proposed. Refer to **Figure 1.0** in **Appendix A**.

1.1 REFERENCE DOCUMENTS

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

- The Corporation of The City of Windsor – Development Manual (May 2015);
- My Sewers Windsor – Interactive Mapping – City of Windsor;
- Windsor/Essex Region Stormwater Management Standards Manual (WERSMSM, 2024);
- Design Guidelines for Sewage Works (MOE, 2008);
- Design Guidelines for Drinking-Water Systems (MOE, 2008);
- Record Drawings – S-1317 – 1994 Local Improvement Programme, Proposed Howard Ave./South Cameron Blvd. Sanitary Sewers, and Howard Ave Watermain (City of Windsor, 1994); and
- As-Built Drawings – Lily-Mac Residential Development (Dillon Consulting Limited, 2021).
- Howard/South Cameron Intersection – Stormwater Drainage Design and Analysis Memo (Dillon, 2024).
- Howard Avenue Future Development Area Storm and Sanitary Servicing Feasibility Study (Dillon, 2020).

2.0 TRANSPORTATION SERVICING

2.1 EXISTING CONDITIONS

The property is bounded by residential land uses. Howard Avenue abuts the Subject Site to the east and connects to Cabana Road East to the south.

2.2 PROPOSED ROADWAYS

The proposed primary access point to this residential development will be from Howard Avenue. The existing driveways will be removed, and a new driveway will be installed to accommodate the site layout. The boulevard area will be restored to the City of Windsor standards.

The pavement structure of the proposed development will be consistent with the geotechnical report recommendations.

A Traffic Impact Study (TIS) for the proposed development has being completed and will be submitted under separate cover. Any identified upgrades that may be required to the existing road network will be incorporated during the Site Plan Control process.

3.0 SANITARY SERVICING

3.1 EXISTING SERVICING AND ESTIMATED FLOWS

There is an existing 250mm diameter sanitary sewer main available along Howard Avenue flowing northerly into the existing 525 mm diameter sanitary trunk sewer via an existing sanitary manhole '8S3506'. The existing residential dwellings are being serviced by 150mm diameter private drain connections to the Howard Avenue sewer main.

3.2 DESIGN CRITERIA

The following sanitary sewer design criteria for the site is outlined in **Table 1**. The design criteria were established by the City of Windsor's Development Manual and Design Guidelines for the Sewage Works (MOE, 2008).

Table 1: Sanitary Sewer Design Criteria

Criteria	City of Windsor Development Standards Manual
Hydraulic Sewer Sizing	Manning's Equation
Population Densities For: Multi-Storey Residential Townhomes	 2 persons/unit 2 persons/unit
Average Domestic Flow	0.0042 L/s/day (363 L/s)
Peaking Factor	Based on Table from the development manual
Extraneous Flow	0.156 litres per hectare per second
Full Flow Velocity: Minimum Maximum	 0.75 metres per second 3.0 metres per second
Manning's Roughness Coefficient 'n'	0.013 (Smooth Wall Pipe)
Minimum Pipe Size	250 mm diameter
Pipe Material	PVC DR35 – sanitary sewer PVC DR28 – sanitary private services HDPE – sewers 450 mm diameter or larger

3.3 PROPOSED SERVICING AND ESTIMATED FLOWS

It is proposed that the sanitary flows from the Subject Site will be conveyed to the 250mm diameter sanitary main via internal sewer network which ultimately discharges into the existing 525mm diameter trunk sewer along Howard Avenue. Refer to **Figure 1.0** (in **Appendix A**).

The invert elevations, estimated from sewer atlas and as-built drawings for the existing sewers, allows for 2.4m cover at the most upstream of the internal sewers.

Due to increase in density, a Sanitary Sewer analysis was completed to evaluate the sanitary sewer system from the property to the trunk outlet sewer located at Howard Avenue. Based on the City of Windsor's Development Manual and Design Guidelines for Sewage Works (MOE, 2008), the population density for townhomes and multiple dwelling residential developments is 2 persons/unit. The total design flow from the Subject Site is calculated as **8.85 l/s**. This analysis demonstrates that there is sufficient capacity in the existing sanitary system to accommodate the new flows from the proposed residential development. Refer to **Figure 3.0** (in **Appendix A**).

The future detailed design of sanitary sewers and services are to be consistent with the requirements of the City of Windsor and the Ontario Building Code (OBC).

4.0 STORMWATER SERVICING

4.1 BACKGROUND INFORMATION

The proposed development lands currently consist of single detached homes. The surface runoff from the Subject Site is being collected into roadside catch basins which discharge into the existing 600 mm diameter Howard Avenue storm sewer which ultimately outlets to the roadside drain on South Cameron Boulevard.

The Storm and Sanitary Infrastructure Capacity Analysis (Dillon, 2020) was completed for the future development lands along Howard Avenue. The allowable release rate for development lands was determined at 35 l/s/ha for all events up to and including 1:100-year storm event. Refer to **Appendix B.**

4.2 STORMWATER MANAGEMENT DESIGN CRITERIA

The following storm sewer design criteria for this property are outlined in **Table 2**. The design criteria were established by the Windsor/Essex Region Stormwater Management Standards Manual (WERSMS 2024).

Table 2: Storm Sewer Design Criteria

Criteria	Windsor/Essex Region Stormwater Management Standards Manual
Stormwater Runoff	Hydrodynamic Model
Hydraulic Sewer Sizing	Rational Method or Hydrodynamic Model
Sewer Sizing Rainfall Event	5-Year as per WERSMS 2024
Minimum Cover Depth (m)	1.07
Velocity: Minimum Maximum	 0.80 metres per second 3.0 metres per second
Manning's Roughness Coefficient 'n'	0.013 (Smooth Wall Pipe)
Inlet Times: Residential	 Per WERSMS
Runoff Coefficients: Asphalt Covered Area Grass/Landscaping Building Area	 0.95 0.20 0.95

4.3 PROPOSED STORMWATER SERVICING

The proposed storm sewers will be designed using the Rational Method to a 5-year return period in accordance with the WERSMSM and the criteria in **Table 2** to convey the proposed surface runoff to an existing 600mm diameter storm sewer on Howard Avenue. The storm sewers will be sized to have sufficient conveyance for the 1:5-year design event peak flows.

The required on-site stormwater storage will be provided by surface storage in parking lots and underground storage chambers. The peak discharges from the proposed storm sewers to the existing storm sewers on Howards Avenue will be controlled by the orifice plate. Water quality treatment will be provided by OGS unit that has sufficient capacity to accommodate the flows from the Subject Site. Refer to **Figure 2.0** (in **Appendix A**) for conceptual grading plan for the proposed development.

5.0 WATERMAIN SERVICING

5.1 EXISTING CONDITIONS

The existing single detached homes are currently serviced by private connections through an existing 150 mm diameter watermain available on the east side of Howard Avenue. There is an existing 750 mm diameter feedermain along Howard Avenue.

5.2 PROPOSED SERVICING

Refer to **Figure 1.0** in **Appendix A**, which illustrates the proposed watermain servicing. The watermain servicing for the proposed development is as follows:

- The internal development will be serviced by a new 150 mm diameter watermain; and
- The new watermain will connect to the existing 150mm diameter watermain located along Howard Avenue.

The detailed design of the watermain service will be consistent with the requirements of the City of Windsor. Placement of hydrants for adequate fire protection will be completed during detailed design. No pressure/flow testing has yet been completed for this development.

6.0 UTILITIES

6.1 GAS

Existing natural gas service is available along Howard Avenue. Coordination with Enbridge will be held during the Site Plan Control stage to confirm loading and supply points to the proposed buildings.

6.2 BELL

Bell has aerial and buried services available along Howard Avenue. During the Site Plan Control stage, additional consultation will be held with the utility owner to confirm site and internal servicing requirements.

6.3 COGECO

Cogeco has aerial services available along Howard Avenue. During the Site Plan Control stage, additional consultation will be held with the utility owner to confirm site and internal servicing requirements.

6.4 MNSI

MNSi has aerial services available along Howard Avenue. During the Site Plan Control stage, additional consultation will be held with the utility owner to confirm site and internal servicing requirements.

6.5 ENWIN (HYDRO)

Existing overhead three-phase hydro is available along Howard Avenue, coordination with ENWIN will be required during the Site Plan Control stage to confirm servicing to the proposed buildings.

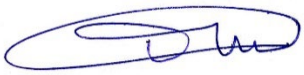
7.0 CONCLUSIONS

The review of the adjacent services has been found to be sufficient for the proposed development. The design of the proposed internal services will be finalized during detailed design.

Yours sincerely,

Counterpoint Land Development by Dillon Consulting Limited

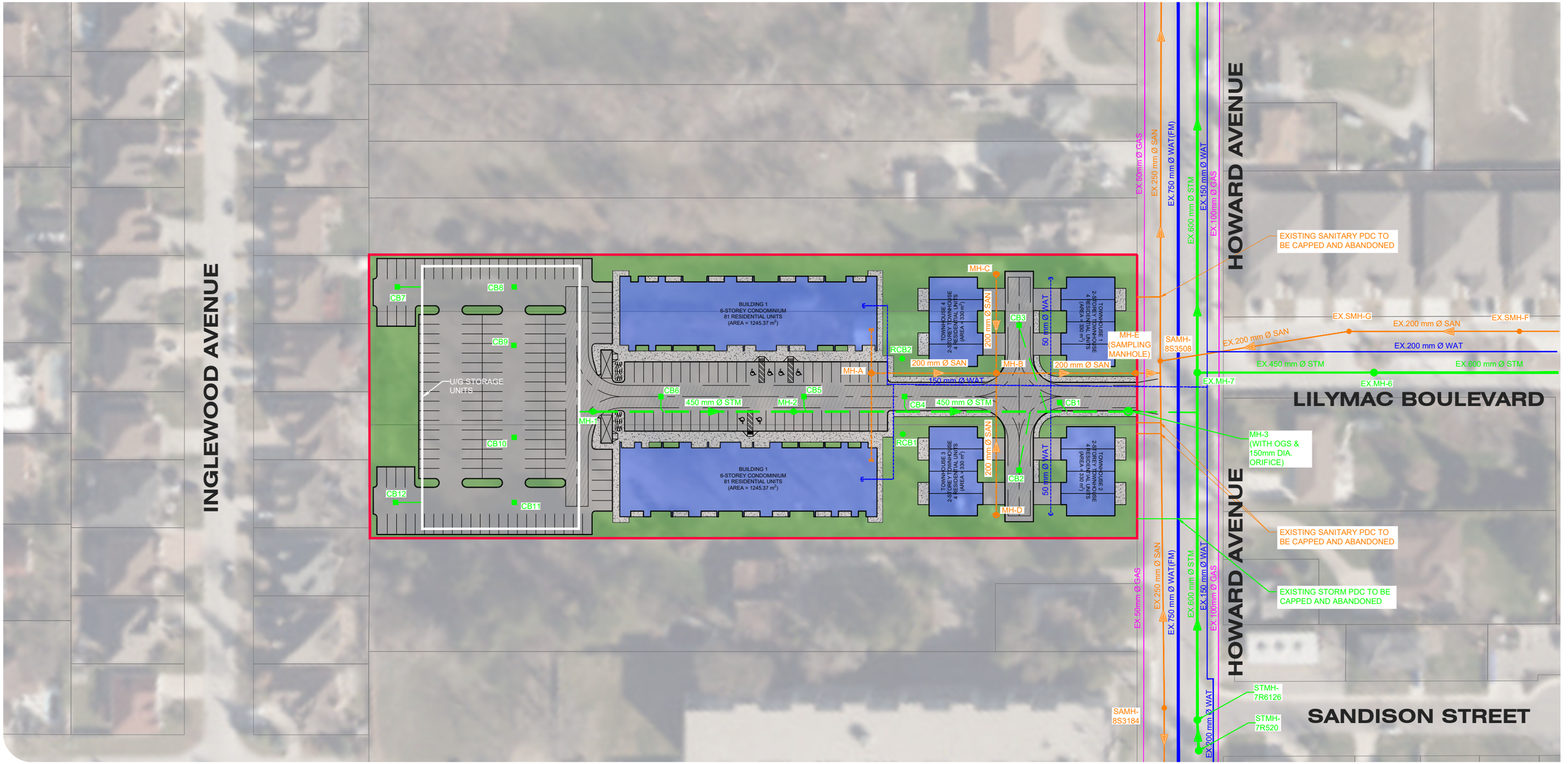
Kyle Edmunds, P.Eng.
Project Engineer



Dhruv Moradiya, EIT,
Project Designer

APPENDIX A

FUNCTIONAL SERVICING PLANS AND SANITARY SEWER ANALYSIS



ASTORIA INC.
ASTORIA DEVELOPMENT
3771 - 3793 HOWARD AVENUE, WINDSOR, ON N9E3N8

CONCEPTUAL SERVICING PLAN
FIGURE 1.0

SUBJECT AREA
(± 1.57ha / 3.88ac)

PROPOSED BUILDING

PROPOSED PAVEMENT

PROPOSED LANDSCAPING

FIRE ROUTE

PROPOSED SIDEWALK/
PATIO AREA

EXISTING STORM MANHOLE
EXISTING SANITARY MANHOLE
EXISTING STORM SEWER
EXISTING SANITARY SEWER
EXISTING WATERMAIN
EXISTING GASMAIN

PROPOSED STORM MANHOLE
PROPOSED STORM CATCHBASIN
PROPOSED SANITARY MANHOLE
PROPOSED STORM SEWER
PROPOSED SANITARY SEWER
PROPOSED WATERMAIN

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SOURCE: THE COUNTY OF ESSEX INTERACTIVE MAPPING (2023)

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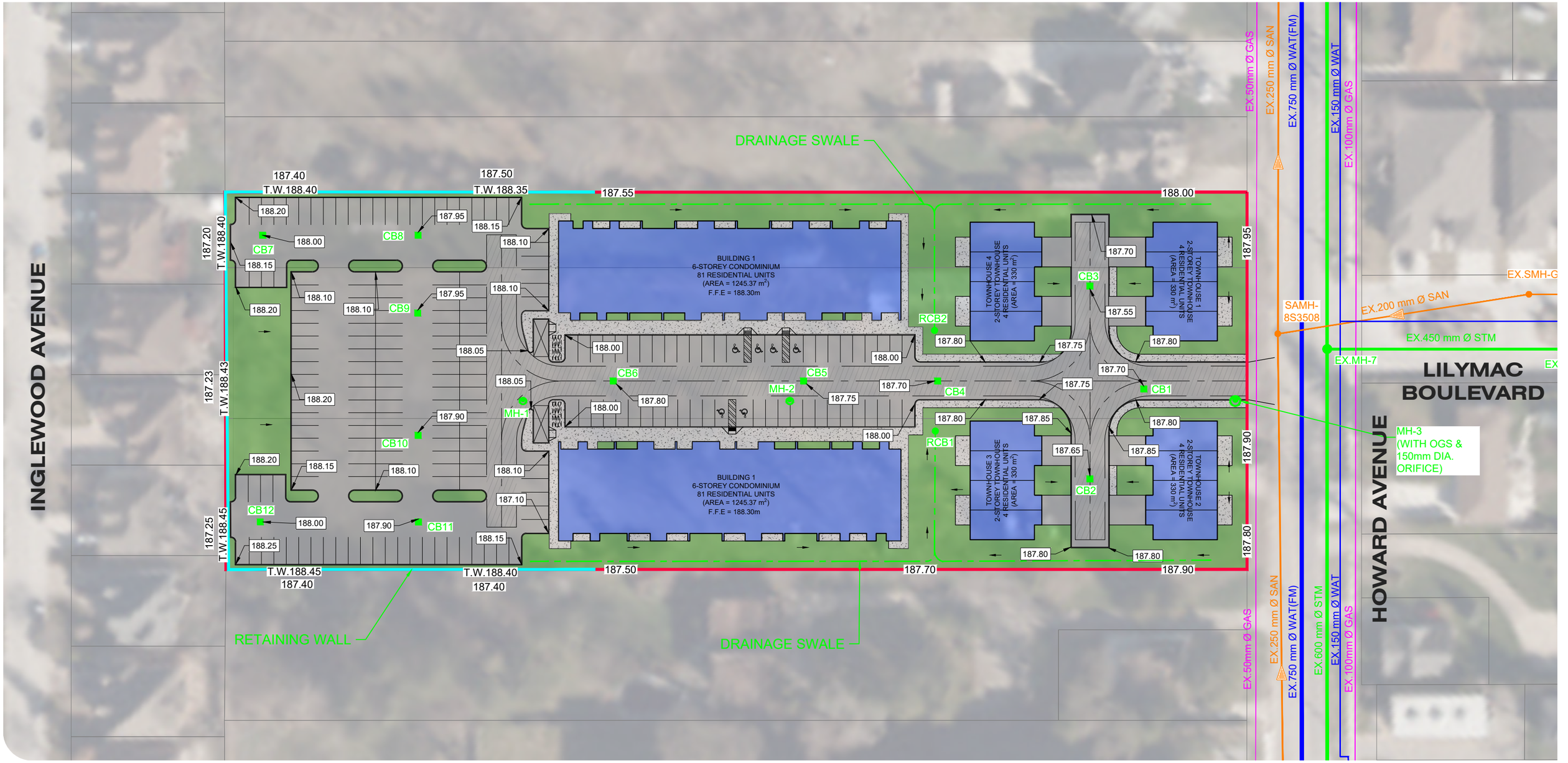

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3771 - 3793 HOWARD AVENUE, WINDSOR, ON N9E3N8

CONCEPTUAL GRADING PLAN
FIGURE 2.0

SUBJECT AREA (± 1.57ha / 3.88ac)
PROPOSED BUILDING
PROPOSED PAVEMENT
PROPOSED LANDSCAPING
FIRE ROUTE
PROPOSED SIDEWALK/ PATIO AREA

EXISTING STORM MANHOLE
EXISTING SANITARY MANHOLE
EXISTING STORM SEWER
EXISTING SANITARY SEWER
EXISTING WATERMAIN
EXISTING GASMAIN

PROPOSED STORM MANHOLE
PROPOSED SANITARY MANHOLE
187.XX PROPOSED LOT GRADE
187.XX PROPOSED TOP OF ASPHALT GRADE

PROPOSED LANDSCAPING GRADING
PROPOSED DRAINAGE SWALE

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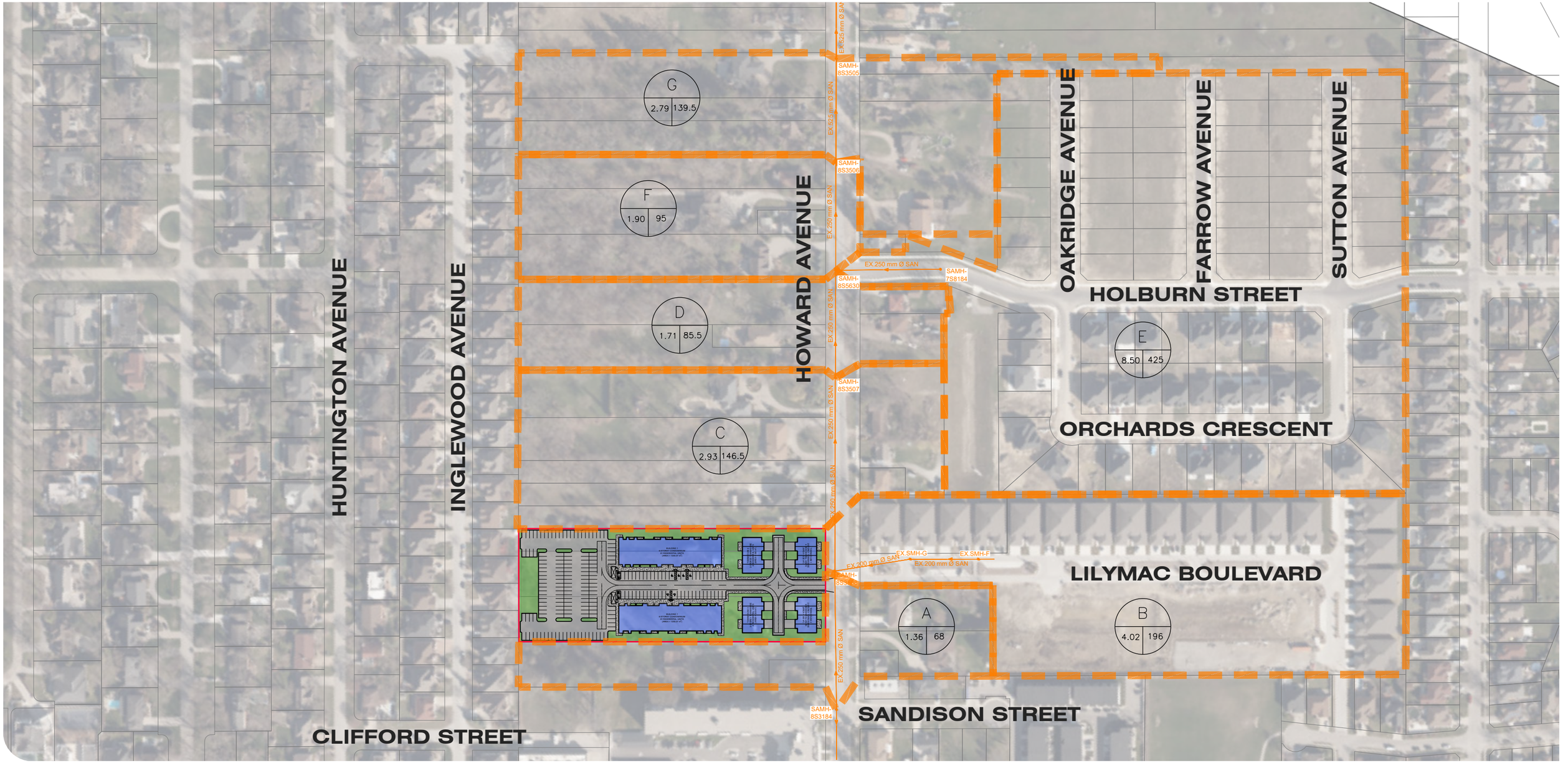

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3771 - 3793 HOWARD AVENUE, WINDSOR, ON N9E3N8

SANITARY SEWER ASSESSMENT
FIGURE 3.0

SUBJECT AREA (± 1.57ha / 3.88ac)
PROPOSED BUILDING
PROPOSED PAVEMENT
PROPOSED LANDSCAPING
FIRE ROUTE
PROPOSED SIDEWALK/ PATIO AREA
EXISTING SANITARY MANHOLE
EXISTING SANITARY SEWER
SANITARY DRAINAGE AREA
AREA IN ha — B — CATCHMENT NUMBER — 4.02 — 120 — POPULATION

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DATE: 11/11/2025

ASTORIA DEVELOPMENT
SANITARY SEWER DESIGN SHEET

Project Name: Astoria Development
Project No: 24-8888

City of Windsor

The Peaking Factor was derived:
Using Harmon Formula= N (Y or N)
From a Table= Y
Value from table= 5.750

Residential Average Daily Flow= 363 L/Cap.D
Peak Extraneous Flow= 0.156 L/Ha.S

Outlet Invert Elevation= 181.646
Mannings 'n'= 0.013
Total Area= 24.780

Basement Floor Elevation =
or
Hydraulic Grade Line Cover =

Ground Elevation at Outlet =
HGL at Outlet =

Location			Flow Characteristics								Sewer Design/Profile										Cover			Hydraulic Grade Line		
ROAD/STN	LOCATION FROM MH	LOCATION TO MH	INDIVIDUAL POP	INDIVIDUAL AREA (ha.)	CUMULATIVE POP	CUMULATIVE AREA (ha.)	PEAKING FACTOR M	POP FLOW Q(p) (L/s)	PEAK EXTR. FLOW Q(i) (L/s)	PEAK DESIGN FLOW Q(d) (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE DIA. (mm)	Wall 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)	HGL Elev at Upstream MH	HGL Elev vs. Grnd Elev @ Up MH	HGL Elev vs. Obvert @ Up MH
Howard Ave	8S3184	8S3508	68.0	1.36	68	1.36	5.750	1.643	0.212	**1.85**	**42.47**	94.0	250	11	0.51	183.447	182.968	0.479	0.87		187.200	3.492	4.601	0.493		INTERSECTS OB\
Astoria Dev	MH-A	MH-B	324.0	1.07	324	1.07	5.750	7.827	0.167	**7.99**	**32.80**	120.0	200	9	1.00	185.257	184.057	1.200	1.04		188.000	2.534	3.334	0.641		INTERSECTS OB\
Astoria Dev	MH-C	MH-B	16.0	0.26	340	1.33	5.750	8.214	0.207	**8.42**	**27.44**	26.6	200	9	0.70	184.057	183.870	0.186	0.87		187.600	3.334	3.621	0.569		INTERSECTS OB\
Astoria Dev	MH-D	MH-B	16.0	0.25	356	1.57	5.750	8.600	0.245	**8.85**	**27.44**	38.1	200	9	0.70	183.870	183.604	0.267	0.87		187.700	3.621	3.787	0.552		INTERSECTS OB\
Astoria Dev	MH-B	MH-E	0.0	0.00	356	1.57	5.750	8.600	0.245	**8.85**	**27.44**	37.4	200	9	0.70	183.604	183.342	0.262	0.87		187.600	3.787	4.199	0.524		INTERSECTS OB\
Astoria Dev	MH-E	8S3508	0.0	0.00	356	1.57	5.750	8.600	0.245	**8.85**	**32.80**	7.4	200	9	1.00	183.342	183.268	0.074	1.04	0.300	187.750	4.199	4.353	0.497		INTERSECTS OB\
Lily Mac Dev	EX.MH-G	8S3508	196.0	4.02	196	4.02	5.750	4.735	0.627	**5.36**	**29.34**	53.9	200	9	0.80	183.399	182.968	0.431	0.93		187.840	4.232	4.653	0.506		INTERSECTS OB\
Howard Ave	8S3508	8S3507	146.5	2.93	767	9.88	5.750	18.517	1.541	**20.06**	**38.26**	131.2	250	11	**0.41**	182.968	182.425	0.543	0.78		187.830	4.601	4.914	0.492		INTERSECTS OB\
Howard Ave	8S3507	8S5630	85.5	1.71	852	11.59	5.750	20.583	1.808	**22.39**	**36.22**	72.4	250	11	0.37	182.425	182.156	0.269	0.74	0.030	187.600	4.914	5.233	0.342		INTERSECTS OB\
Holburn St	7S8184	8S5630	425.0	8.50	425	8.50	5.750	10.267	1.326	**11.59**	**37.94**	77.0	250	11	0.41	182.445	182.131	0.313	0.77	0.005	187.500	4.794	5.258	0.269		INTERSECTS OB\
Howard Ave	8S5630	8S3506	95.0	1.90	1372	21.99	5.750	33.145	3.430	**36.58**	**38.26**	61.8	250	11	0.41	182.126	181.871	0.256	0.78	0.125	187.650	5.263	5.368	0.240		INTERSECTS OB\
Howard Ave	8S3506	8S3505	139.5	2.79	1512	24.78	5.750	36.515	3.866	**40.38**	**162.06**	70.1	525	94	0.14	181.746	181.646	0.100	0.75		187.500	5.135	-182.265	0.006		INTERSECTS OB\