FUNCTIONAL SERVICING REPORT

DAYTONA AVENUE APARTMENTS

2240 DAYTONA AVENUE

WINDSOR, ONTARIO

PROJECT NO: 22-048

DATED: AUGUST 23, 2023

REVISION 1: DECEMBER 12, 2023

BAIRD|AE
architecture + engineering

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APPENDICES

1. INTRODUCTION

Baird AE was retained to provide civil engineering services for the development of a multi-unit residential apartment building at 2230-2240 Daytona Avenue in Windsor, Ontario. This report, along with the associated design, is prepared in accordance with the Windsor-Essex Regional Stormwater Management Standards Manual (WERSMSM) and the City of Windsor Development Manual to ensure compliance with local design standards and development regulations.

The property, which is **0.18 hectares** in size, is zoned residential and is currently a vacant lot. The proposed development will include a 4-storey multi-unit apartment building, an asphalt parking lot, and entrances on both Daytona Avenue and Northwood Street.

This report aims to summarize existing conditions, storm and sanitary servicing provisions, and potable water servicing provisions to support the proposed development.

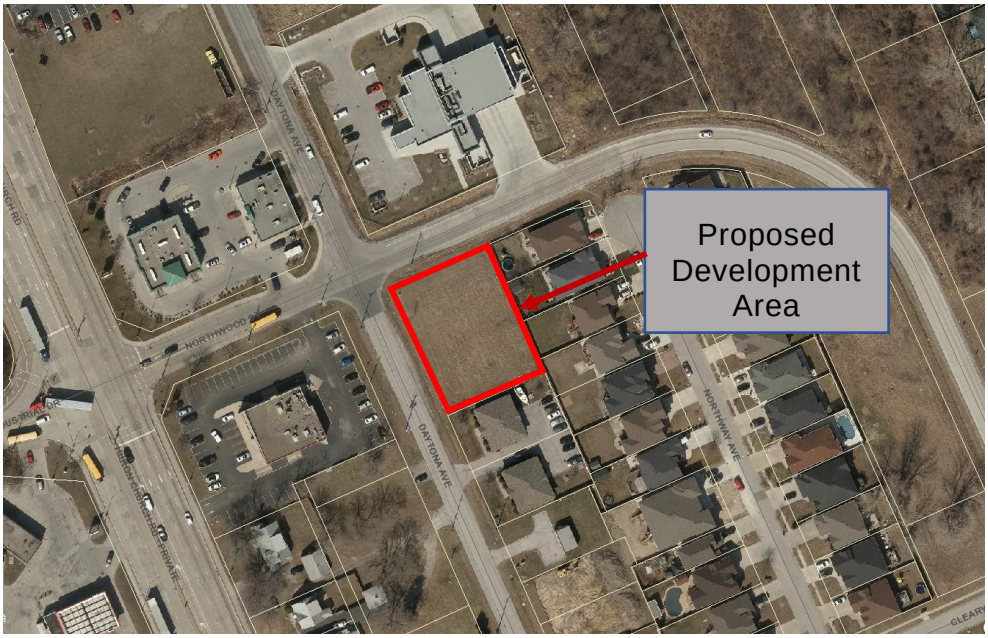


Figure 1: Existing Conditions

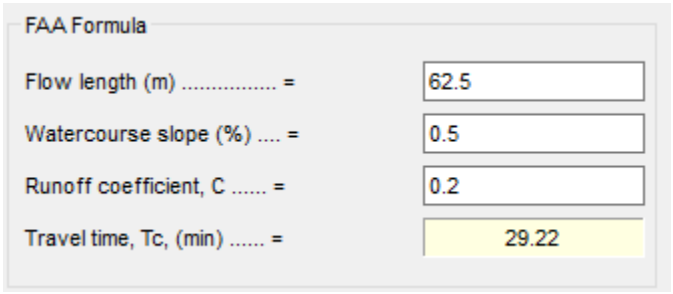
2. EXISTING CONDITIONS

2.1. EXISTING DRAINAGE

A topographic survey of the property indicates that it currently sheet drains in a northerly and westerly direction, directing water flow into roadside swales that border Northwood Street and Daytona Avenue, respectively. According to soil maps provided by ERCA, the underlying soil type is Berrien Sand, which belongs to Hydrological Soil Group C. Additional information about the existing drainage conditions is provided in Appendix A of this report.

2.2 ALLOWABLE RELEASE RATE

The pre-development site analysis was completed in accordance with the WERSMSM and in consultation with the City of Windsor. This analysis utilized the Hydraflow Hydrographs Extension for Autodesk Civil 3D. Using a runoff coefficient of 0.2 and the following IDF curve parameters: a = 854, b = 7.0 and c = 0.818, the 2-year pre-development release rate for the site was calculated as follows:



Intensity (I) $= a / (T + b)^c$

$= 854 / (29.22 + 7.0)^{0.818}$

$= 45.315$ mm/hr

Allowable Release Rate (Q) = 2.78 x Area x Runoff Coeff. x Intensity

= 2.78 x 0.1818 x 0.2 x 45.315

= 4.58 L/s

2.2. EXISTING INFRASTRUCTURE

The following storm, sanitary and watermain infrastructure exist adjacent to the subject property:

- One existing 250mm diameter PVC sanitary sewer along Daytona Avenue.
- One existing 200mm diameter watermain along Daytona Avenue.

3. PROPOSED CONDITIONS

3.1. BUILDING AND PARKING LOT

The development is planned to consist of a single 4-storey multi-unit apartment building (20 units), along with landscaped areas and an asphalt parking lot.

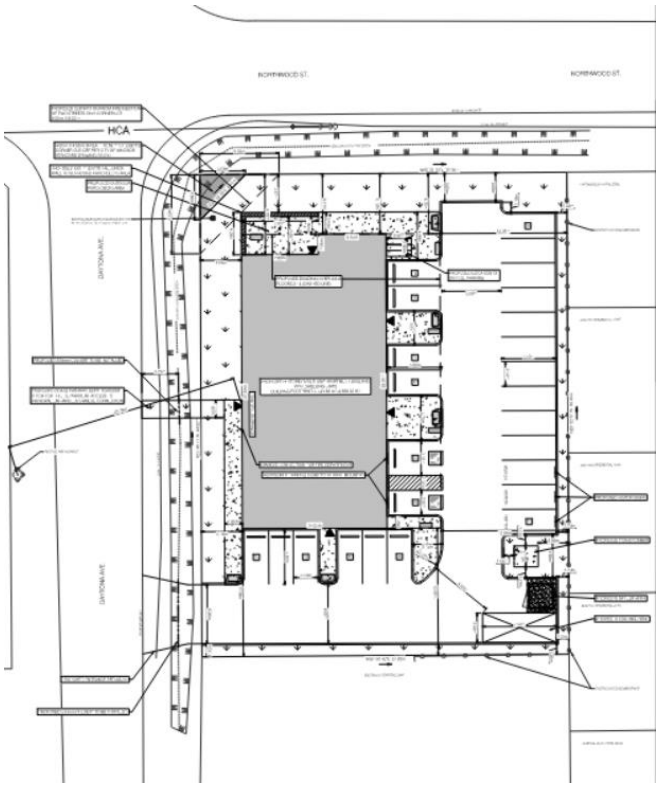


Figure 2: Proposed Development

3.2. DRAINAGE

The stormwater management criteria for this development are based on the requirements of the City of Windsor, ERCA and the WERSMSM. The Autodesk Hydrographs Extension software was used for the hydrologic and hydraulic assessment of the site. Drainage from the development will outlet to an existing roadside swale on Daytona Avenue, which slopes in a south-easterly direction.

Although the allowable release rate was determined to be 4.58 L/s, this rate will be affected by tailwater conditions during storm events. Post-development parking lot elevations will be approximately 0.6m higher than the invert elevation of the existing swale. Considering this elevation difference and the absence of any other upstream properties draining to the swale, it is reasonable to assume tailwater effects on stormwater outflow will be negligible. Thus, the post-development release rate will be restricted to **4 L/s.** Storm pipes will be designed with a minimum cover of 1m and a minimum flow velocity of 0.76 m/s.

The following rainfall distributions will be used in the analyses for modelling the stormwater management facilities' response to design storm events.

Table 1: Simulated Design Storms

Storm Event	Storm Duration	Rainfall Depth
Water Quality Storm	4 hours	32.00 mm
SCS -2-year	24 hours	53.40 mm
Chicago 5-year	4 hours	49.50 mm
Chicago 100-year	4 hours	81.60 mm
SCS Type II 100-year	24 hours	108.00 mm
Urban Stress Test	24 hours	150 mm

3.3 STORMWATER MANAGEMENT AND QUANTITY CONTROL

The stormwater management system will include underground storage chambers in addition to the parking lot storage. Both the 100-Yr SCS and the 100-Yr Chicago Storms were analyzed to determine which would necessitate a higher storage demand. Table 8 below demonstrates that the SCS 100-year storm will require more storage and will thus be used to govern the design.

Table 2: Required Storage Volumes

Design Storm	Required Storage (cu.m.)
Water Quality Storm	23.5
SCS 2-Year	37.6
Chicago 5-Year	43.7
Chicago 100-Year	84.1
SCS 100-Year	90.2
Urban Stress Test	134

The storage depth will not exceed **0.3m** for the governing 100-year storm. The pipes and underground storage facility will be sized to accommodate storms up to and including the Water Quality Storm (WQS). Runoff exceeding the WQS will be stored within the parking lot, and runoff resulting from the Urban Stress Test design storm will be contained within the subject property. A Tempest Inlet Control Device designed by Ipex will be used to restrict storm runoff from the development to the pre-determined pre-development release rate of **4 L/s.**

Table 3: Release Rates

Design Storm	Release Rate (L/s)
Water Quality Storm	2
SCS 2-Year	3
Chicago 5-Year	3
Chicago 100-Year	4
SCS 100-Year	4
Urban Stress Test	5

The building's finished floor elevation will be set at an elevation that ensures a minimum freeboard of 300mm above the governing 100-Year Storm High-Water Levels. Matters such as site HWL, building Finished Floor Elevation, underground/ parking lot storage and ICD will be addressed within the SWM report during the detailed design stages.

3.4 SANITARY SEWER SYSTEM

The sanitary servicing provisions for the development have been analyzed as per criteria set by the Ministry of Environment Conservation and Parks (MECP) sewer design guidelines and the City of Windsor standards. As previously indicated in sections of this report, an existing 250mm PVC sanitary sewer on Daytona Avenue. Sanitary waste from the proposed development will be connected to a sanitary manhole (manhole ID: 8S1920) via a proposed 200mm PVC sanitary pipe.

A comprehensive sanitary study was conducted to assess the existing sanitary systems' capacity to accommodate the proposed development. This assessment included the 600mm trunk sewer west of Cleary Street. It was determined that the catchment area draining into this trunk sewer consisted of 234 hectares. Figure 3 and Table 4 provide a breakdown of the sanitary drainage areas.

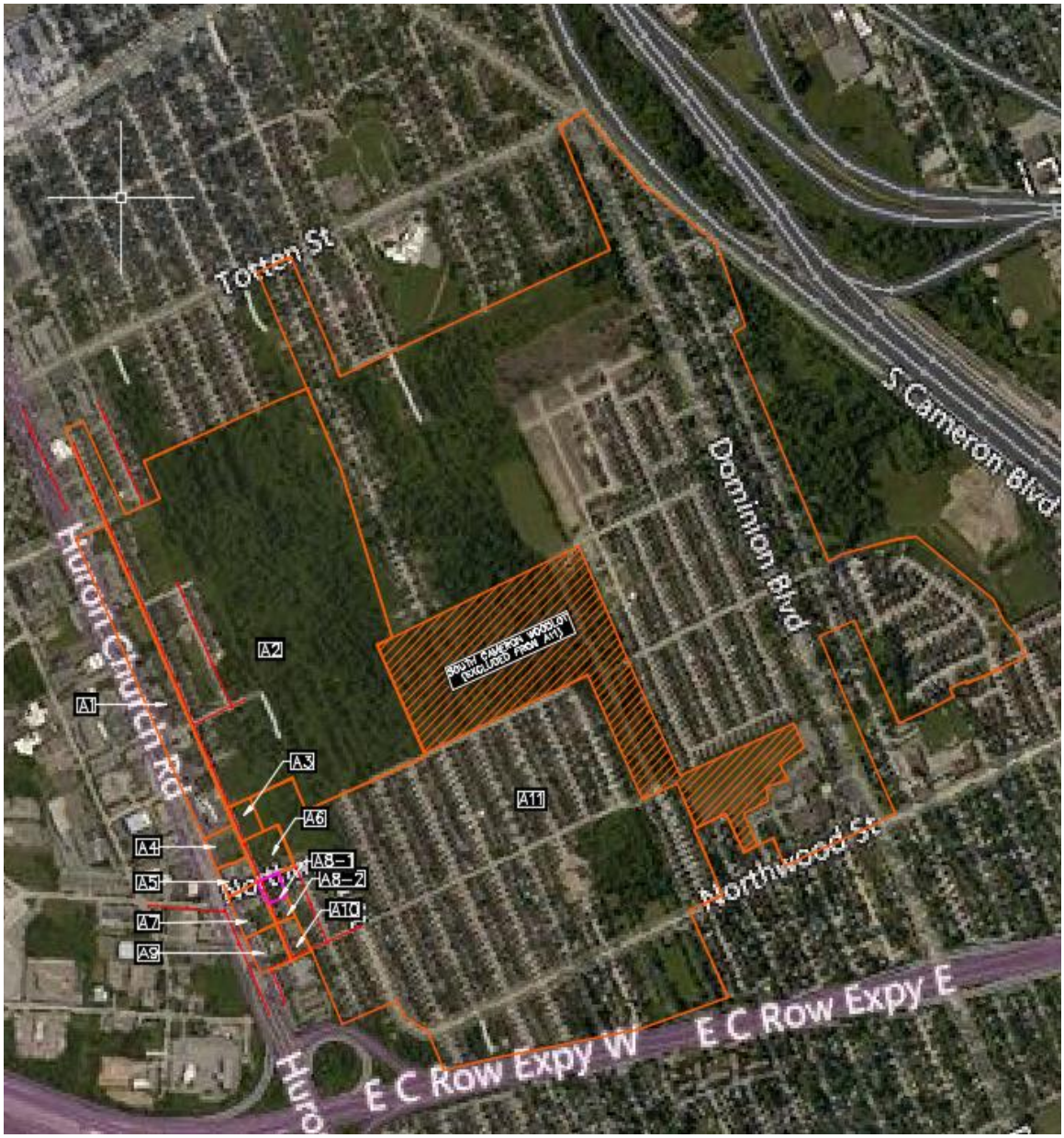


Figure 3: Sanitary Drainage Areas

Table 4: Sanitary Drainage Areas

AREAS	RESIDENTIAL	COMMERCIAL	INSTITUTIONAL	TOTAL
A1		5.9365		5.9365
A2	45.5468			45.5468
A3	0.5045			0.5045
A4	0.567			0.567
A5		0.5095		0.5095
A6			0.9696	0.9696
A7		0.8194		0.8194
A8-1[1]	0.286			0.286
A8-2	0.2521			0.2521
A9		0.7176		0.7176
A10	0.4575			0.4575
A11	166.9176	1.0382	9.1152	177.071
A8-1[1] This is the area for the proposed development				233.6375

Population densities of 50, 74 and 22 persons/ha were assigned to residential, commercial and industrial land uses, respectively, and utilized to determine appropriate design populations. The average per capita flow per day was evaluated at 362.88 L/cap/day, and an infiltration factor of 0.156 L/s/ha was used to calculate the peak flow for the subject development.

Findings are summarized below, and detailed calculations are provided in Appendix C:

- The 250mm PVC sanitary sewer immediately upstream of the proposed development operates at **37.8%** capacity.

- Based on a population density of 2.34 persons per unit, the 20-unit proposed development will have an ultimate population of 47 people. Factoring in infiltration, the ultimate sanitary flow from the development will be **1.212 L/s.** We propose a 200mm sanitary connection to the existing sanitary manhole 8S1920 on Daytona Avenue.

- The 250mm PVC sanitary sewer immediately downstream of the proposed development will flow at **46.7%** capacity post-development.

- The 600mm trunk sewer west of Cleary Street will flow at **99.5%** capacity, accounting for all potential future developments as specified in the Land Use Plan (Schedule D) and South Cameron Secondary Plan of the City of Windsor Official Plan. While this indicates the pipe will operate near maximum capacity, it is worth noting that the ultimate flow factors proposed by the City of Windsor Development Manual are significantly more conservative than the peak factors obtained using the Harmon Formula, which is an industry standard.

Additional Scenario for sanitary sewer assessemnet:

As per the City of Windsor recommendation, an additional calculation was considered due to relatively low likelihood of immediate development for the provincially significant wetlands area.

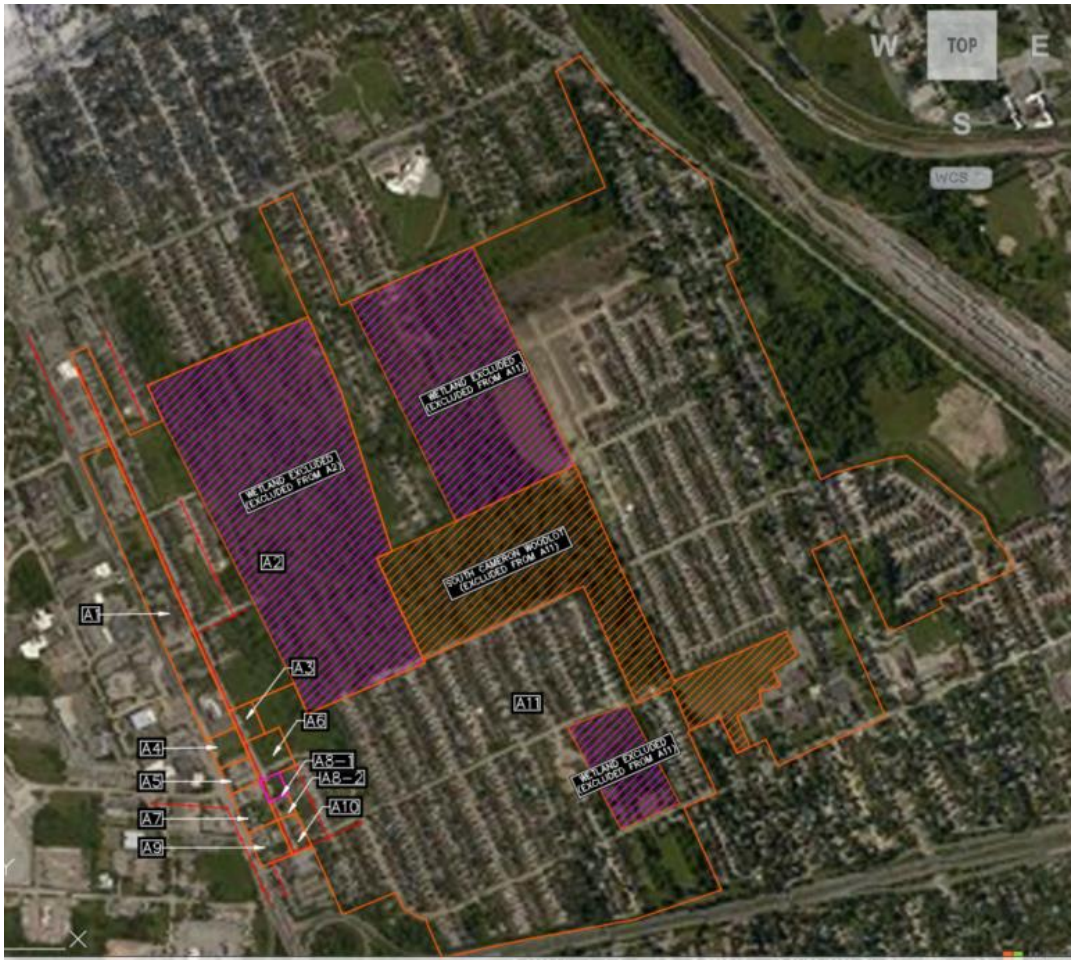


Figure 4: Additional Scenario Sanitary Drainage Areas

Table 5: Additional Scenario Sanitary Drainage Areas

AREAS	RESIDENTIAL	COMMERCIAL	INSTITUTIONAL	TOTAL
A1		5.9365		5.9365
A2	12.503			12.503
A3	0.5045			0.5045
A4	0.567			0.567
A5		0.5095		0.5095

A6			0.9696	0.9696
A7		0.8194		0.8194
A8-1[1]	0.286			0.286
A8-2	0.2521			0.2521
A9		0.7176		0.7176
A10	0.4575			0.4575
A11	143.47	1.0382	9.1152	153.6234
A8-1[1] This is the area for the proposed development				177.146

Findings are summarized below, and detailed calculations are provided in Appendix C:

- The 250mm PVC sanitary sewer immediately upstream of the proposed development operates at **37.8%** capacity.

- The 250mm PVC sanitary sewer immediately downstream of the proposed development will flow at **46.7%** capacity post-development.

- The 600mm trunk sewer west of Cleary Street will flow at **80.8%** capacity. This additional scenario with reduced area / design flows determines the current capacity of the trunk sewer as compared to **99.5%** capacity, accounting for all potential future developments as specified in the Land Use Plan (Schedule D) and South Cameron Secondary Plan of the City of Windsor Official Plan.

3.5. WATERMAINS

To serve the proposed developments' domestic and fire water supply requirements, a 150mm water service connection is proposed. The water service connection will be tapped near the property line to bifurcate the flow. This setup will provide the building with a 100mm main for potable water and a 150mm main for fire service.

- There will be no need for additional fire hydrants, as the fire department connection and principal entrance of the building will be within 45m from the nearest existing fire hydrant on Daytona Avenue.
- The watermain connection for the proposed development will be tied into the existing 200mm watermain on Daytona Avenue.

Note: No hydrant flow test has been completed at this time. If required, tests will be conducted at the detailed design stage.

3.4. WATER QUALITY, EROSION AND SEDIMENT CONTROL

Discussions with ERCA and site characterization following MECP guidelines have led to the designation that this development should provide a "normal level" of protection capable of removing at least 70% of suspended solids. Water quality control for the proposed development will be achieved through a water quality unit (OGS) designed by Hydro International. The unit will be designed to provide an overall TSS removal efficiency of at least **70%** for the simulated water quality storm and treat 99.9% of the total runoff volume. Details about the water quality unit will be discussed in the SWM report during the detailed design stages of the project.

The erosion and sediment control measures for the site will include:

- A silt fence is to be erected before grading begins on the property to preventsediment migration in the overland flow downstream;
- Filter fabric will be placed over drainage grates; and

- All disturbed areas will be stabilized by the restoration of vegetative ground cover as soon as possible.

Details concerning sediment control measures for the site will be provided in Appendix D of this report

4. CONCLUSION

This report presents municipal servicing details, proposed servicing and stormwater management requirements for the proposed residential development in the City of Windsor. Based on our investigations, we conclude and recommend the following:

Storm Servicing – All minor storm events will be serviced through the proposed storm sewers. Storms up to the 5-year Chicago storm will not result in any surface ponding above manhole rim elevations. During major storm events, the parking lot and underground storage will provide temporary storage and attenuate storm outflows. Parking lot ponding depths will not exceed 0.3m. Building finished floor elevations will be at least 0.3m above the governing 100-year storm's high-water level.

Sanitary Servicing – A new 200 mm diameter sanitary service will connect the proposed development to an existing 250mm municipal sanitary sewer on Daytona Avenue. Detailed calculations indicate that the proposed development will not negatively impact the existing sanitary drainage system. The downstream 600mm trunk sewer will operate at 99.5% capacity at its peak when all the potential future development is accounted for and will operate at 80.8% capacity under current scenario.

Water Servicing – The proposed development will be serviced via a 150mm water service connection. An existing fire hydrant is located along Daytona Avenue, less than 45m from the proposed development's fire department connection and

principal entrance. This eliminates the need for additional fire hydrants within the development.

We trust the foregoing is satisfactory and will allow for the review and approval of the stormwater, sanitary and watermain servicing design and engineering drawings for this development. If you have questions or require additional information, please contact Baird AE at your earliest convenience.

All of which is respectfully submitted.

BAIRD AE INC.

700 - 1350 PROVINCIAL ROAD,

N8W 5W1,

WINDSOR, ONTARIO.

Reviewed By:

Gowtham Sivakumar, P.Eng.

Civil Engineer

Prepared By:

Nii Nartei Nartey, M.Eng., E.I.T.

Civil Designer

Appendix A

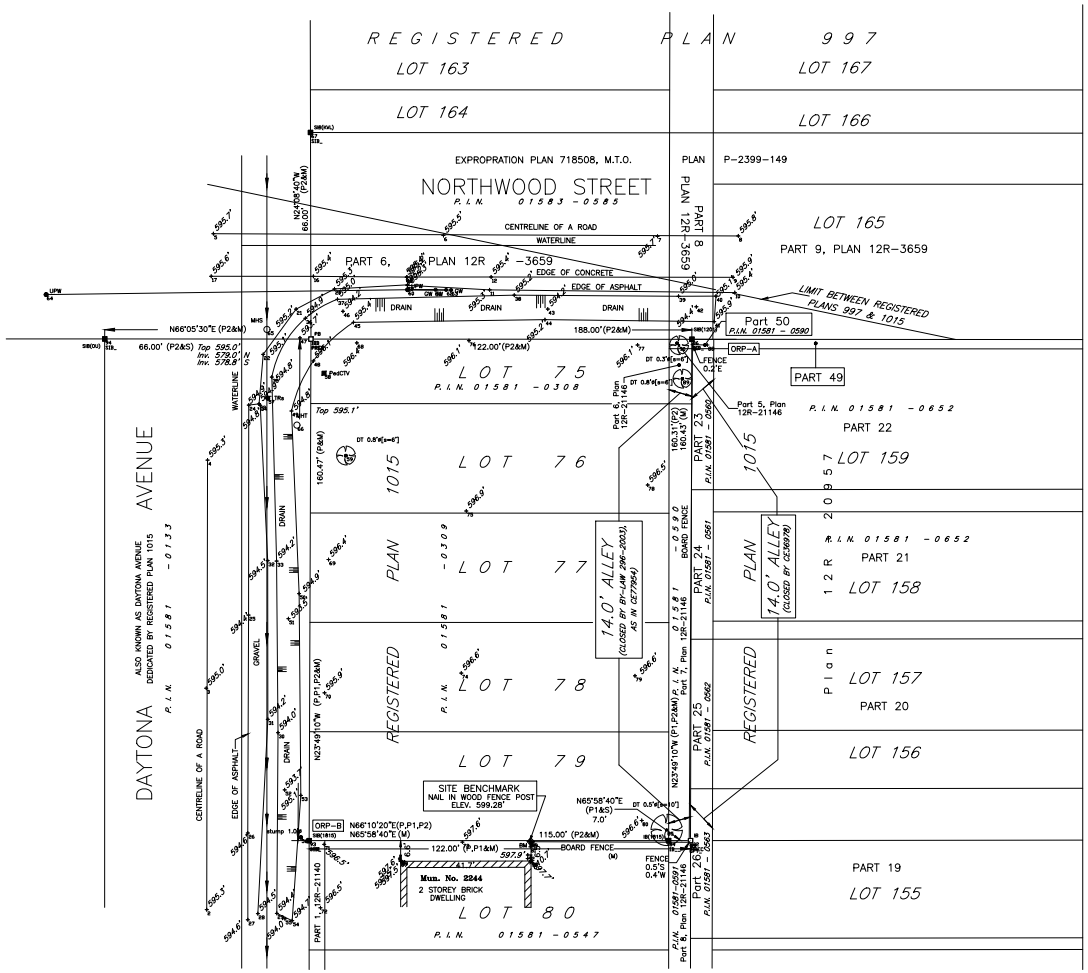
BACKGROUND INFORMATION

ELEVATIONS
ELEVATIONS SHOWN ON THIS PLAN ARE IN FEET TO CANADIAN GEODETIC VERTICAL DATUM (1928)

BENCH MARK
BENCH MARK 1319 ELEVATION 602.00'
M.B. 2030 HURON CHURCH ROAD (KENORA MOTEL); THE PLATE IS LOCATED ON THE EAST WALL, 0.33' FROM THE SOUTH WALL AND 1.64' ABOVE GRADE.

SITE BENCH MARK ELEVATION 599.28'
CORNER OF BOARD FENCE IN PK NAIL SOUTH LIMIT

AREA
0.449 ACRES



ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES TO CAN-NET/SMARTNET NETWORK (H.T.V. 2.0)

INTEGRATION DATA

COORDINATES ARE DERIVED FROM GRID OBSERVATIONS USING THE CAN-NET NETWORK SERVICE AND ARE REFERRED TO UTM ZONE 17 (81° WEST LONGITUDE) NAD83 (CSRS) (2010.0).
COORDINATE VALUES ARE TO AN URBAN ACCURACY IN ACCORDANCE WITH SECTION 14(2) O.REG 216/10

POINT ID	NORTHING	EASTING
ORP-A	N15362307.64	E1086132.23
ORP-B	N15362111.26	E1086085.67

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

THE RESULTANT TIE BETWEEN ORP 'A' AND ORP 'B' IS 201.84' (GROUND), N13°20'20"E.

CAUTION
UNDERGROUND UTILITIES AND SERVICES SHOWN ON THIS PLAN ARE APPROXIMATE AND MUST BE VERIFIED BEFORE CONSTRUCTION

INVERTS
INVERTS ARE DERIVED FROM CITY OF WINDSOR SEWER ATLAS (PLATE H10) AND SHOULD BE VERIFIED BEFORE CONSTRUCTION.

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

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2162777
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY
ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29 (3)

TOPOGRAPHIC SURVEY
OF
LOTS 75 TO 79,
PART OF ALLEY,
REGISTERED PLAN 1015
IN THE
CITY OF WINDSOR
COUNTY OF ESSEX, ONTARIO

SCALE : 1"=20'

FEET 0 10.0 20.0 40.0 60.0 100.0

LEGEND AND NOTES
BEARINGS ARE UTM GRID DERIVED FROM OBSERVED REFERENCE POINTS "A" AND "B" BY REAL TIME NETWORK OBSERVATIONS AND ARE REFERRED TO UTM ZONE 17 (81° WEST LONGITUDE NAD83 (CSRS) (2010.0).

DISTANCES ON THIS PLAN ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.99992818

ALL MONUMENTS SHOWN THUSLY □ ARE IRON BARS (IB) UNLESS OTHERWISE NOTED.
SIB DENOTES 1" X 1" X 4'-0" STANDARD IRON BAR
SSIB DENOTES 1" X 1" X 2'-0" SHORT STANDARD IRON BAR
IB DENOTES 5/8" X 5/8" X 2'-0" IRON BAR
IB ø DENOTES 3/4" diameter X 2'-0" ROUND IRON BAR
CC DENOTES CUT-CROSS
CP DENOTES 5mm X 50mm STEEL PIN
■ DENOTES SURVEY MONUMENT FOUND
□ DENOTES SURVEY MONUMENT SET AND MARKED 1744
WIT. DENOTES WITNESS ⊥ DENOTES PERPENDICULAR
(S) DENOTES SET (M) DENOTES MEASURED (D) DENOTES DEED
ORP DENOTES OBSERVED REFERENCE POINT
SSIB'S SHOWN ON THIS PLAN HAVE BEEN SET IN LIEU OF SIB'S WHERE THE POSSIBILITY THAT UNDERGROUND UTILITIES EXIST.
(S/P) DENOTES SET PROPORTIONALLY (OU) DENOTES ORIGIN UNKNOWN
(P) DENOTES PLAN 12R-21140
(P1) DENOTES PLAN 12R-21146
(P2) DENOTES PLAN 12R-20957
(1744) DENOTES VERHAEGEN STUBBERFIELD HARTLEY BREWER BEZAIRE INC., O.L.S.
(1201) DENOTES CLARKE SURVEYORS INC., O.L.S.
(682) DENOTES H.H. TOOGHAM, O.L.S.
(KVL) DENOTES VERHAEGEN AND BEZAIRE LIMITED, O.L.S.

NOTES:
FOR BEARING COMPARISON A ROTATION OF 1°12'50" CLOCKWISE WAS APPLIED TO P, P1, P2 TO CONVERT TO GRID BEARINGS.

LEGEND

MH DENOTES HYDRO MANHOLE		FH DENOTES FIRE HYDRANT	
MS DENOTES SEWER MANHOLE		WM DENOTES WATER METER	
MT DENOTES TELEPHONE MANHOLE		WVS DENOTES WATER VALVE (Service)	
MTR DENOTES TRAFFIC MANHOLE		WVM DENOTES WATER VALVE (Main)	
MW DENOTES WATER MANHOLE		GM DENOTES GAS METER	
CB DENOTES CATCH BASIN		GV DENOTES GAS VALVE	
DCB DENOTES DOUBLE CATCH BASIN		HM DENOTES HYDRO METER	
LSc DENOTES LIGHT STANDARD CONCRETE		PedT DENOTES TELEPHONE PEDESTAL	
LSs DENOTES LIGHT STANDARD STEEL		PedCTV DENOTES CABLE TV PEDESTAL	
LSw DENOTES LIGHT STANDARD WOOD		TRs DENOTES TRAFFIC SIGN	
UPc DENOTES UTILITY POLE CONCRETE		TRsg DENOTES TRAFFIC SIGNAL	
UPs DENOTES UTILITY POLE STEEL		TRsb DENOTES TRAFFIC SIGNAL BOX	
UPw DENOTES UTILITY POLE WOOD		TH DENOTES TESTHOLE	
GP DENOTES GUY POLE		BM DENOTES BENCH MARK	
GW DENOTES GUY WIRE		HCP DENOTES HORIZONTAL CONTROL POINT	
Bol DENOTES BOLLARD		VCP DENOTES VERTICAL CONTROL POINT	
PM DENOTES PARKING METER		SHRUB DENOTES SHRUB	
TOC DENOTES TOP OF CURB		SC DENOTES SEWER CLEANOUT	
BOC DENOTES BOTTOM OF CURB		INV DENOTES INVERT	

DECIDUOUS AND CONIFEROUS TREES ARE DENOTED DT AND CT RESPECTIVELY. A PREFIX TO THE DESCRIPTION DESIGNATES THE NUMBER OF TREE TRUNKS WHEN TREES ARE CLUMPED TOGETHER AND A SUFFIX DENOTES THE TREE DIAMETER OR (NTS) NOT TO SCALE.

C (pipe size) C	DENOTES OVERHEAD CABLE TV LINE
G (pipe size) G	DENOTES GAS LINE
H (pipe size) H	DENOTES OVERHEAD HYDRO LINE
CS (pipe size) CS	DENOTES COMBINED SEWER
SA (pipe size) SA	DENOTES SANITARY SEWER
ST (pipe size) ST	DENOTES STORM SEWER
T (pipe size) T	DENOTES OVERHEAD TELEPHONE LINE
W (pipe size) W	DENOTES WATER LINE

UNDERGROUND CABLE, HYDRO OR TELEPHONE LINES ARE PREFIXED WITH THE LETTER "u" (CABLE = uC HYDRO = uH TELEPHONE = uT)

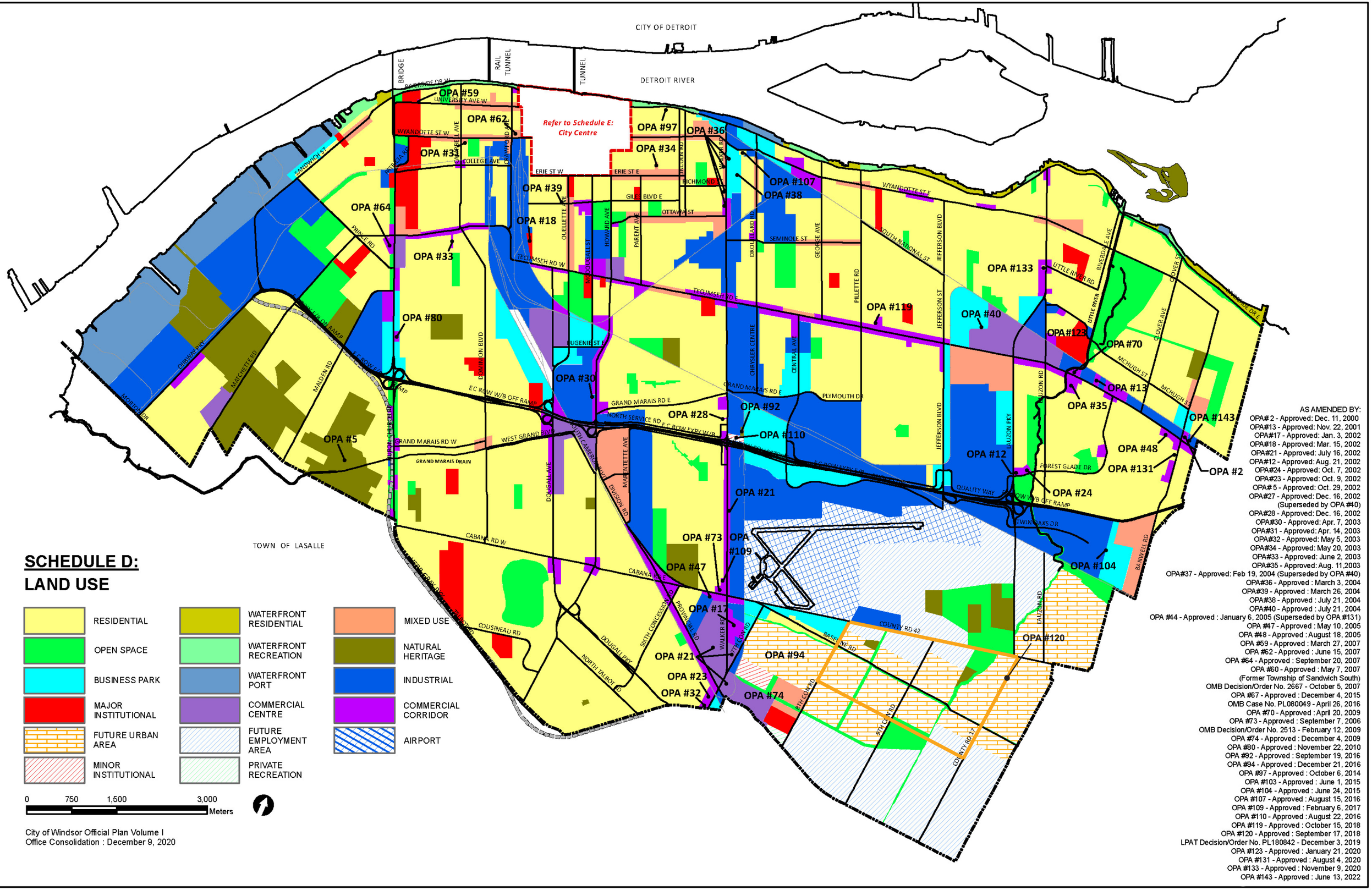
SURVEYOR'S CERTIFICATE
I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THIS SURVEY WAS COMPLETED ON THE 1st DAY OF MARCH, 2021.

DATE MARCH 15, 2021

ROY A. SIMONE
ONTARIO LAND SURVEYOR

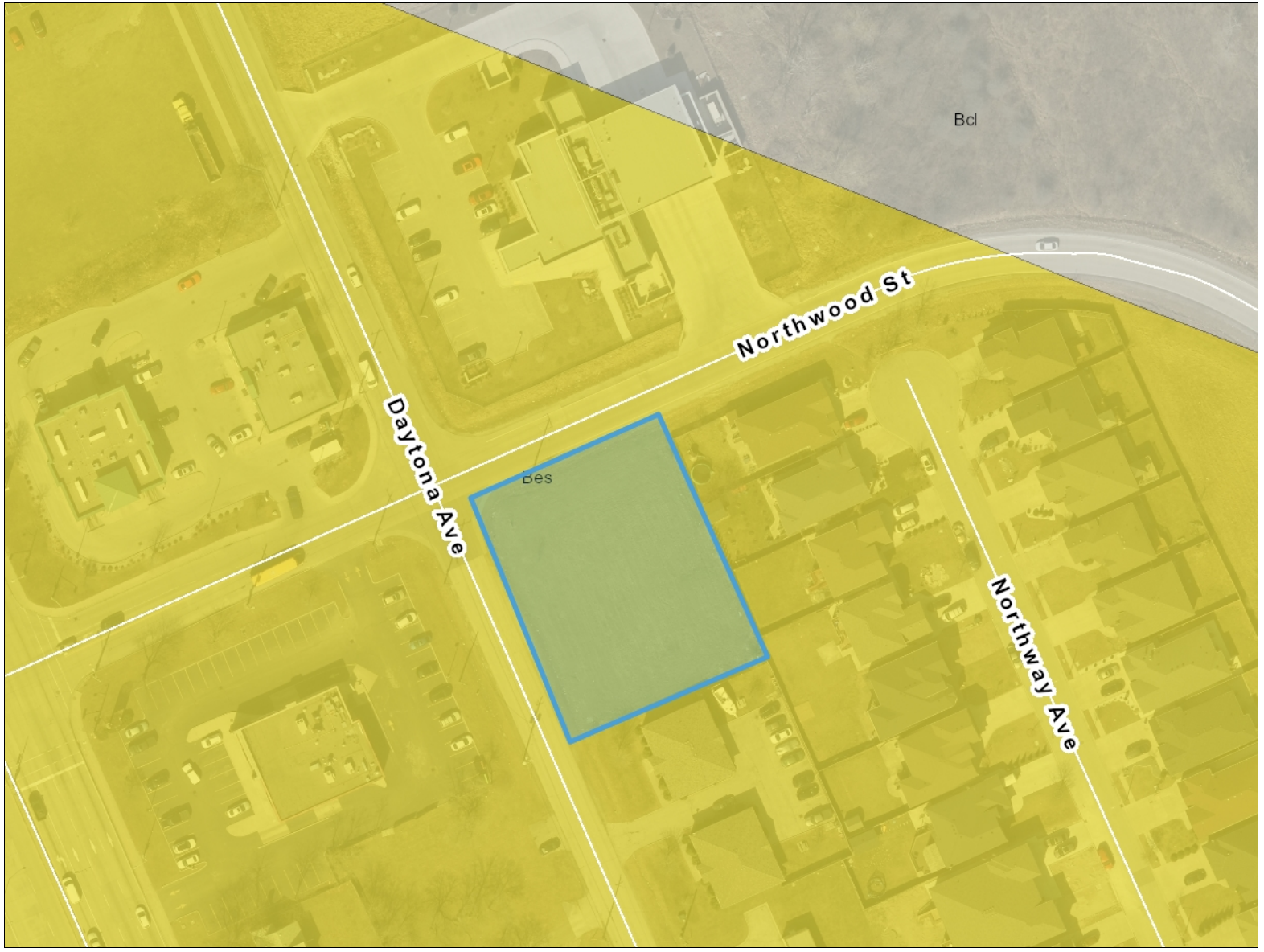
VERHAEGEN LAND SURVEYORS
SURVEYING MAPPING GIS
A DIVISION OF J.D. BARNES LTD.
944 OTTAWA STREET, WINDSOR, ON, N8X 2E1
T: (519) 258-1772 F: (519) 258-1791 www.jdbarnes.com

DRAWN BY:	CHECKED BY:	REFERENCE NO.:
A.J.M./DM	DM/RAS	21-47-056-00
FILE: 21-47-056-00.dwg	E-1015-7	CAD Date: August 25, 2023 11:02 AM CAD File: 21-47-056-00.dwg



AS AMENDED BY:
OPA# 2 - Approved: Dec. 11, 2000
OPA#13 - Approved: Nov. 22, 2001
OPA#17 - Approved: Jan. 3, 2002
OPA#18 - Approved: Mar. 15, 2002
OPA#21 - Approved: July 16, 2002
OPA#12 - Approved: Aug. 21, 2002
OPA#24 - Approved: Oct. 7, 2002
OPA#23 - Approved: Oct. 9, 2002
OPA# 5 - Approved: Oct. 29, 2002
OPA#27 - Approved: Dec. 16, 2002
(Superseded by OPA #40)
OPA#28 - Approved: Dec. 16, 2002
OPA#30 - Approved: Apr. 7, 2003
OPA#31 - Approved: Apr. 14, 2003
OPA#32 - Approved: May 5, 2003
OPA#34 - Approved: May 20, 2003
OPA#33 - Approved: June 2, 2003
OPA#35 - Approved: Aug. 11,2003
OPA#37 - Approved: Feb 19, 2004 (Superseded by OPA #40)
OPA#36 - Approved : March 3, 2004
OPA#39 - Approved : March 26, 2004
OPA#38 - Approved : July 21, 2004
OPA#40 - Approved : July 21, 2004
OPA #44 - Approved : January 6, 2005 (Superseded by OPA #131)
OPA #47 - Approved : May 10, 2005
OPA #48 - Approved : August 18, 2005
OPA #59 - Approved : March 27, 2007
OPA #62 - Approved : June 15, 2007
OPA #64 - Approved : September 20, 2007
OPA #60 - Approved : May 7, 2007
(Former Township of Sandwich South)
OMB Decision/Order No. 2667 - October 5, 2007
OPA #67 - Approved : December 4, 2015
OMB Case No. PL080049 - April 26, 2016
OPA #70 - Approved : April 20, 2009
OPA #73 - Approved : September 7, 2006
OMB Decision/Order No. 2513 - February 12, 2009
OPA #74 - Approved : December 4, 2009
OPA #80 - Approved : November 22, 2010
OPA #92 - Approved : September 19, 2016
OPA #94 - Approved : December 21, 2016
OPA #97 - Approved : October 6, 2014
OPA #103 - Approved : June 1, 2015
OPA #104 - Approved : June 24, 2015
OPA #107 - Approved : August 15, 2016
OPA #109 - Approved : February 6, 2017
OPA #110 - Approved : August 22, 2016
OPA #119 - Approved : October 15, 2018
OPA #120 - Approved : September 17, 2018
LPAT Decision/Order No. PL180842 - December 3, 2019
OPA #123 - Approved : January 21, 2020
OPA #131 - Approved : August 4, 2020
OPA #133 - Approved : November 9, 2020
OPA #143 - Approved : June 13, 2022

ERCA Public Internet Mapping



Essex Region Conservation Authority

Public Interactive Mapping

Legend

Essex Soils

- B-s
- B.L.
- Bc
- Bcl
- Bel
- Bes
- Bg
- Bg-s
- C-s
- Cac
- Cacl
- Cc
- Cdl
- Es
- Fl
- Fsl
- Gs
- Hl

Location

THIS MAP HAS BEEN PRODUCED BY THE GENERAL PUBLIC AND NOT BY QUALIFIED ERCA STAFF.

Notes

0 27.01 54.0

Meters

1: 1,215

8/21/2023

City of Windsor

Legend

- Sanitary Sewer Manholes
- Sanitary Sewers
- Combined Sewer Manholes
- Combined Sewers
- Dual Manholes
- Municipal Address
- Major Roads
- Parcels

1: 3,703

188.1 0 94.06 188.1 Meters

NAD_1983_UTM_Zone_17N

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2/]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

! Table 3.2.2.7 – Minimum C Values for Standard 5-Year Sewer Design

Land Use	C value
Asphalt, concrete, roof areas	0.95
Gravel	0.70
Grass – sandy soil	0.15
Grass – clay soil	0.20
Residential – Single family	0.60
Residential – Single family (lot size 500 m^2 or less)	0.70
Residential – Semi-detached	0.70
Residential – Townhouse / Row housing	0.80
Industrial / Commercial	0.90

Table 3.2.1.1 – IDF Curve Parameters

Parameters	Return Period (Years)					
	2	5	10	25	50	100
a	854	1259	1511	1851	2114	2375
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

! Table 3.7.4.1 – Typical Manning's Roughness Coefficients for Overland Flow

Surface	n
Smooth Asphalt/Concrete	0.013
Cultivated Soils - Residue Cover < 20%	0.06
Cultivated Soils - Residue Cover > 20%	0.17
Range (natural)	0.13
Grass - Short Prairie	0.15
Grass - Dense	0.24
Woods - Light Underbrush	0.40
Woods - Dense Underbrush	0.80

! Table 3.7.7.5 – Typical Horton Infiltration Parameters

Parameter	Hydrologic Group			
	A	B	C	D
fmax, dry (mm/hr)	250	200	125	75
fmax, normal (mm/hr)	250	80	50	25
fmin (mm/hr)				
clay	7.6	3.8	1.3	0.5
loam	9.5	5.7	2.5	1.0
sand	11.4	7.6	3.8	1.3
k (1/hr)	4	4	4	4

Table A-3.7.7 – Soil Types in Essex County

Texture	Symbol	Name	Acreage	Hydrologic Group
Clay Soils	Bc	Brookston Clay	250,000	D
	Toc	Toledo Clay	17,500	D
	Cc	Clyde Clay	2,500	D
	Jc	Jeddo Clay	3,500	D
	Cac	Caistor Clay	13,500	C
	Pc	Perth Clay	9,000	C
Clay Loams	Pcl	Perth Clay Loam	8,000	C
	Cacl	Caistor Clay Loam	2,500	C
	Bcl	Brookston Clay Loam	30,000	D
Silt Loam	Tos	Toledo Silt Loam	1,000	D
Loams	Bg	Burford Loam	3,700	A
	Bg-s	Burford Loam Shallow Phase	5,300	A
	Hl	Harrow Loam	4,000	A
	Fl	Farmington Loam	2,000	B
	Pl	Parkhill Loam	5,000	C
	P-r	Parkhill Loam Red Sand Spot Phase	5,000	C

5-YEAR DESIGN STORMS

CHICAGO 4-HOUR
Depth = 49.5 mm

Time h:mm	5min Rain mm/hr
0:00	2.44
0:05	2.58
0:10	2.73
0:15	2.91
0:20	3.12
0:25	3.36
0:30	3.65
0:35	3.99
0:40	4.41
0:45	4.92
0:50	5.59
0:55	6.46
1:00	7.66
1:05	9.42
1:10	12.20
1:15	17.18
1:20	28.20
1:25	64.52
1:30	139.58
1:35	60.83
1:40	35.06
1:45	23.95
1:50	17.96
1:55	14.28
2:00	11.81
2:05	10.06
2:10	8.75
2:15	7.74
2:20	6.94
2:25	6.29
2:30	5.76
2:35	5.30
2:40	4.92
2:45	4.59
2:50	4.30
2:55	4.05
3:00	3.83
3:05	3.63
3:10	3.45
3:15	3.29
3:20	3.14
3:25	3.01
3:30	2.89
3:35	2.78
3:40	2.67
3:45	2.58
3:50	2.49
3:55	2.41
4:00	0.00

Time h:mm	10min Rain mm/hr
0:00	2.51
0:10	2.82
0:20	3.24
0:30	3.82
0:40	4.67
0:50	6.02
1:00	8.54
1:10	14.69
1:20	38.85
1:30	107.72
1:40	29.51
1:50	16.12
2:00	10.93
2:10	8.25
2:20	6.62
2:30	5.53
2:40	4.76
2:50	4.18
3:00	3.73
3:10	3.37
3:20	3.08
3:30	2.83
3:40	2.63
3:50	2.45
4:00	0.00

Time h:mm	15min Rain mm/hr
0:00	2.58
0:15	3.13
0:30	4.02
0:45	5.66
1:00	9.76
1:15	26.72
1:30	88.40
1:45	18.73
2:00	10.21
2:15	6.99
2:30	5.33
2:45	4.31
3:00	3.64
3:15	3.15
3:30	2.78
3:45	2.49
4:00	0.00

Time h:mm	20min Rain mm/hr
0:00	2.66
0:20	3.53
0:40	5.34
1:00	11.61
1:20	75.35
1:40	20.75
2:00	9.59
2:20	6.07
2:40	4.47
3:00	3.55
3:20	2.95
3:40	2.54
4:00	0.00

Time h:mm	30min Rain mm/hr
0:00	2.86
0:30	4.84
1:00	13.11
1:30	58.69
2:00	8.60
2:30	4.82
3:00	3.39
3:30	2.64
4:00	0.00

100-YEAR DESIGN STORMS

CHICAGO 4-HOUR
Depth = 81.6 mm

Time h:mm	5min Rain mm/hr
0:00	3.71
0:05	3.94
0:10	4.20
0:15	4.50
0:20	4.85
0:25	5.25
0:30	5.73
0:35	6.31
0:40	7.03
0:45	7.92
0:50	9.07
0:55	10.59
1:00	12.72
1:05	15.84
1:10	20.81
1:15	29.71
1:20	49.12
1:25	108.91
1:30	218.23
1:35	103.42
1:40	60.97
1:45	41.72
1:50	31.11
1:55	24.53
2:00	20.12
2:05	16.98
2:10	14.65
2:15	12.86
2:20	11.44
2:25	10.30
2:30	9.36
2:35	8.58
2:40	7.91
2:45	7.34
2:50	6.85
2:55	6.42
3:00	6.04
3:05	5.70
3:10	5.40
3:15	5.13
3:20	4.88
3:25	4.66
3:30	4.46
3:35	4.27
3:40	4.10
3:45	3.95
3:50	3.80
3:55	3.67
4:00	0.00

Time h:mm	10min Rain mm/hr
0:00	3.83
0:10	4.35
0:20	5.05
0:30	6.02
0:40	7.47
0:50	9.83
1:00	14.28
1:10	25.26
1:20	67.16
1:30	172.68
1:40	51.34
1:50	27.82
2:00	18.55
2:10	13.75
2:20	10.87
2:30	8.97
2:40	7.63
2:50	6.63
3:00	5.87
3:10	5.26
3:20	4.77
3:30	4.37
3:40	4.03
3:50	3.74
4:00	0.00

Time h:mm	15min Rain mm/hr
0:00	3.95
0:15	4.87
0:30	6.36
0:45	9.19
1:00	16.45
1:15	46.45
1:30	143.67
1:45	32.45
2:00	17.25
2:15	11.53
2:30	8.62
2:45	6.87
3:00	5.71
3:15	4.89
3:30	4.28
3:45	3.81
4:00	0.00

Time h:mm	20min Rain mm/hr
0:00	4.09
0:20	5.54
0:40	8.65
1:00	19.77
1:20	123.48
1:40	36.02
2:00	16.15
2:20	9.92
2:40	7.13
3:00	5.56
3:20	4.57
3:40	3.88
4:00	0.00

Time h:mm	30min Rain mm/hr
0:00	4.41
0:30	7.78
1:00	22.45
1:30	97.06
2:00	14.39
2:30	7.74
3:00	5.30
3:30	4.04
4:00	0.00

SCS TYPE II 24-HOUR DESIGN STORMS

		Unit Rainfall Depth = 1 mm	100-Year Depth = 108 mm	Rural Stress Test Depth = 150 mm	5-Year Depth = 68.0 mm
Time h:mm	Rain %	2hour Rain mm/hr	2hour Rain mm/hr	2hour Rain mm/hr	2hour Rain mm/hr
0:00	0	0.000	0.00	0.00	0.00
2:00	2	0.010	1.08	1.50	0.68
4:00	3	0.015	1.62	2.25	1.02
6:00	3	0.015	1.62	2.25	1.02
8:00	4	0.020	2.16	3.00	1.36
10:00	6	0.030	3.24	4.50	2.04
12:00	48	0.240	25.92	36.00	16.32
14:00	16	0.080	8.64	12.00	5.44
16:00	4	0.030	3.24	4.50	2.04
18:00	3	0.020	2.16	3.00	1.36
20:00	3	0.015	1.62	2.25	1.02
22:00	2	0.015	1.62	2.25	1.02
0:00	0	0.010	1.08	1.50	0.68

URBAN STRESS TEST STORM

CHICAGO 100-YEAR 24-HOUR (108 mm) + UNIFORM DISTRIBUTION OF ADDITIONAL 42 mm Depth = 108 mm + 42 mm = 150 mm			
Time h:mm	**15min Rain mm/hr**	**Time h:mm**	**15min Rain mm/hr**
0:00	2.41	12:15	4.49
0:15	2.43	12:30	4.29
0:30	2.45	12:45	4.12
0:45	2.46	13:00	3.98
1:00	2.48	13:15	3.85
1:15	2.51	13:30	3.74
1:30	2.53	13:45	3.63
1:45	2.55	14:00	3.54
2:00	2.58	14:15	3.46
2:15	2.61	14:30	3.39
2:30	2.64	14:45	3.32
2:45	2.67	15:00	3.26
3:00	2.71	15:15	3.20
3:15	2.74	15:30	3.15
3:30	2.79	15:45	3.10
3:45	2.83	16:00	3.05
4:00	2.88	16:15	3.01
4:15	2.94	16:30	2.97
4:30	3.00	16:45	2.93
4:45	3.07	17:00	2.90
5:00	3.15	17:15	2.87
5:15	3.23	17:30	2.84
5:30	3.33	17:45	2.81
5:45	3.45	18:00	2.78
6:00	3.59	18:15	2.76
6:15	3.75	18:30	2.73
6:30	3.94	18:45	2.71
6:45	4.18	19:00	2.69
7:00	4.49	19:15	2.67
7:15	4.89	19:30	2.65
7:30	5.43	19:45	2.63
7:45	6.20	20:00	2.61
8:00	7.41	20:15	2.59
8:15	9.56	20:30	2.57
8:30	14.29	20:45	2.56
8:45	32.01	21:00	2.54
9:00	145.13	21:15	2.53
9:15	48.51	21:30	2.51
9:30	23.13	21:45	2.50
9:45	15.08	22:00	2.49
10:00	11.35	22:15	2.47
10:15	9.23	22:30	2.46
10:30	7.88	22:45	2.45
10:45	6.94	23:00	2.44
11:00	6.25	23:15	2.43
11:15	5.73	23:30	2.42
11:30	5.32	23:45	2.41
11:45	4.99	0:00	0.00
12:00	4.72		

Appendix B

AUTODESK HYDROGRAPHS RESULTS

Hydrograph Report

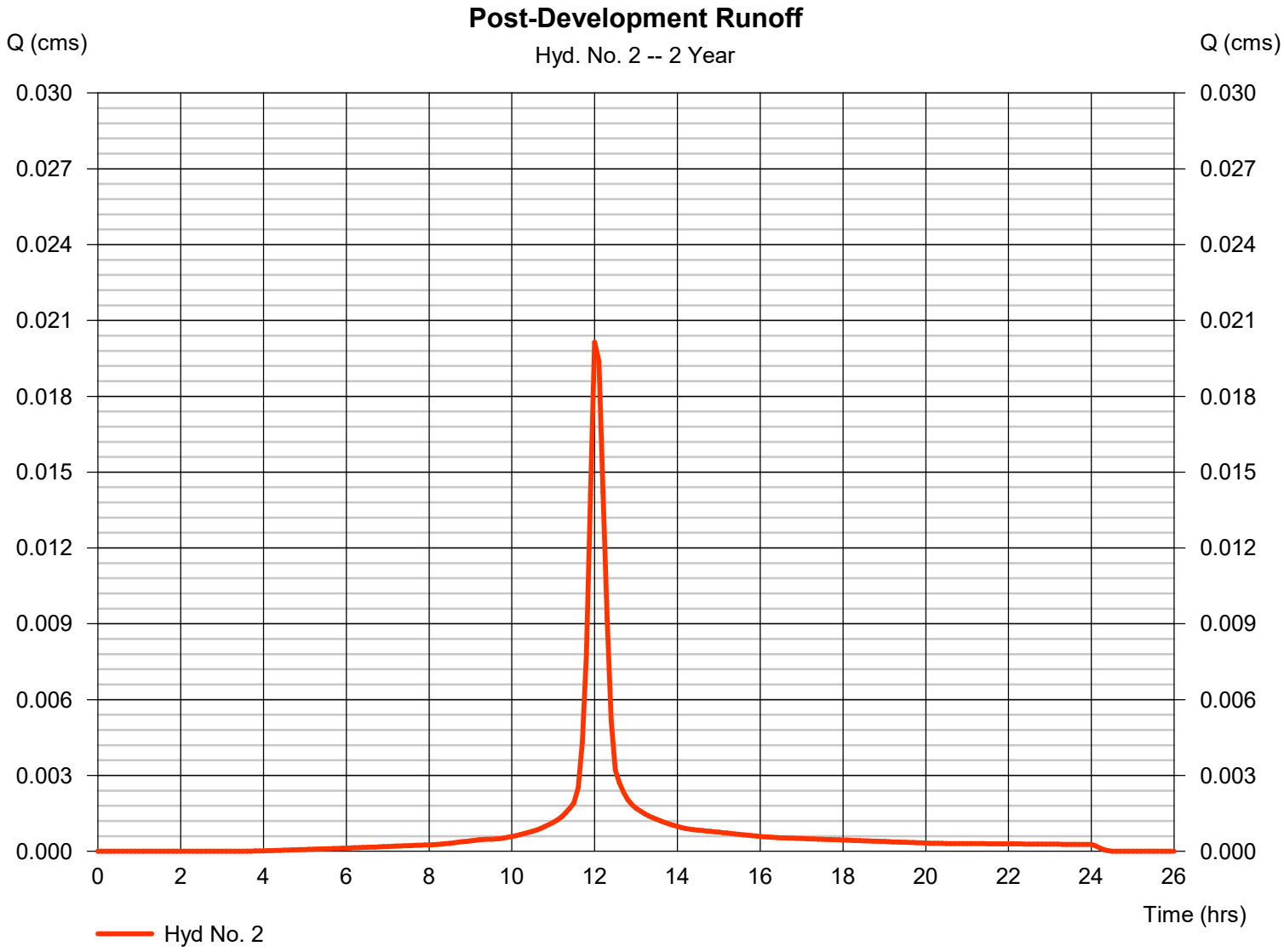
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 08 / 21 / 2023

Hyd. No. 2

Post-Development Runoff

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.020 cms
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	6 min	Hyd. volume	=	71.1 cum
Drainage area	=	0.180 hectare	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 m
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	53.40 mm	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	400

* Composite (Area/CN) = [(0.162 x 98) + (0.018 x 79)] / 0.180



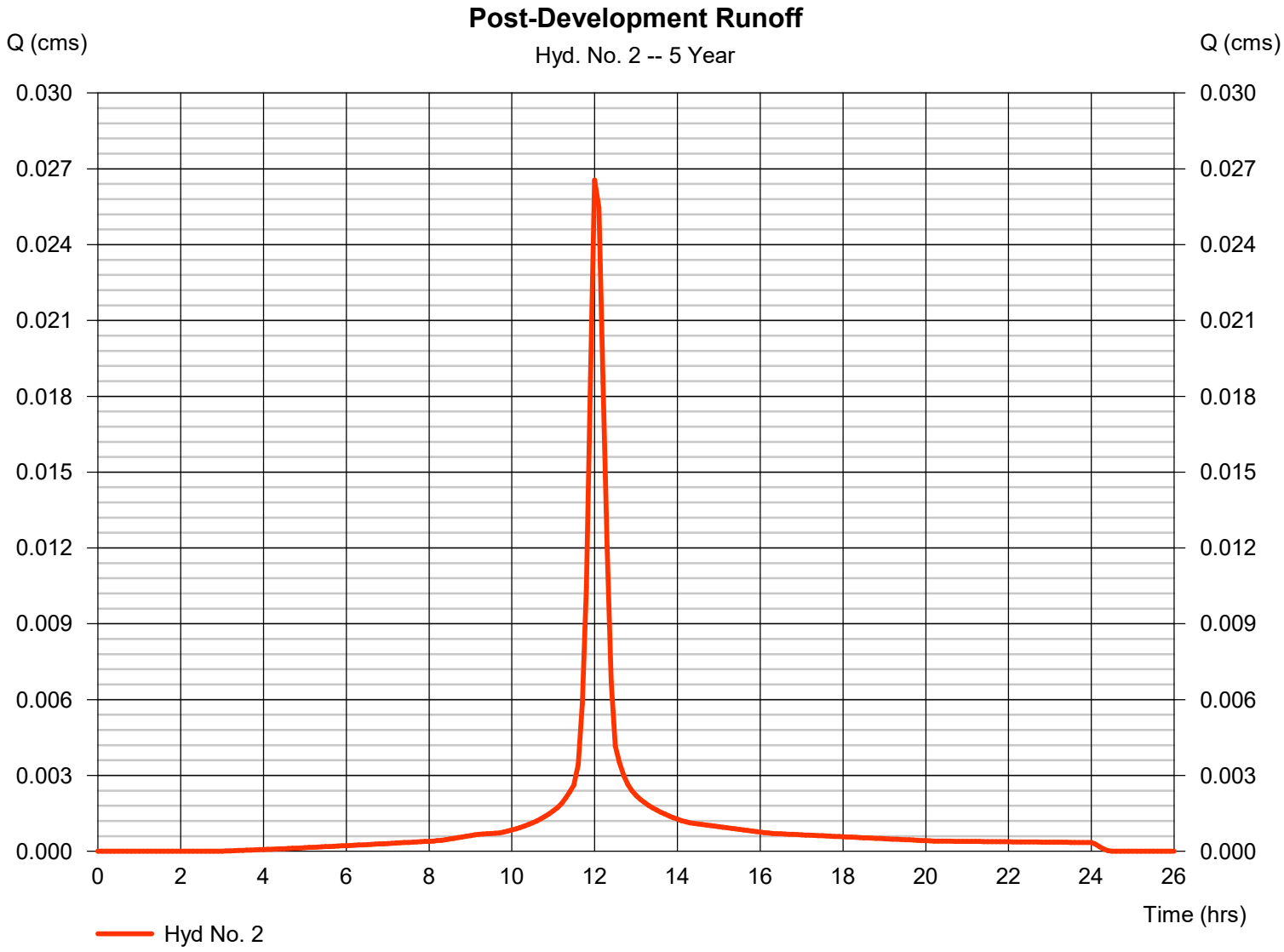
Hydrograph Report

Hyd. No. 2

Post-Development Runoff

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.027 cms
Storm frequency	=	5 yrs	Time to peak	=	12.00 hrs
Time interval	=	6 min	Hyd. volume	=	95.0 cum
Drainage area	=	0.180 hectare	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 m
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	68.00 mm	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	400

* Composite (Area/CN) = [(0.162 x 98) + (0.018 x 79)] / 0.180



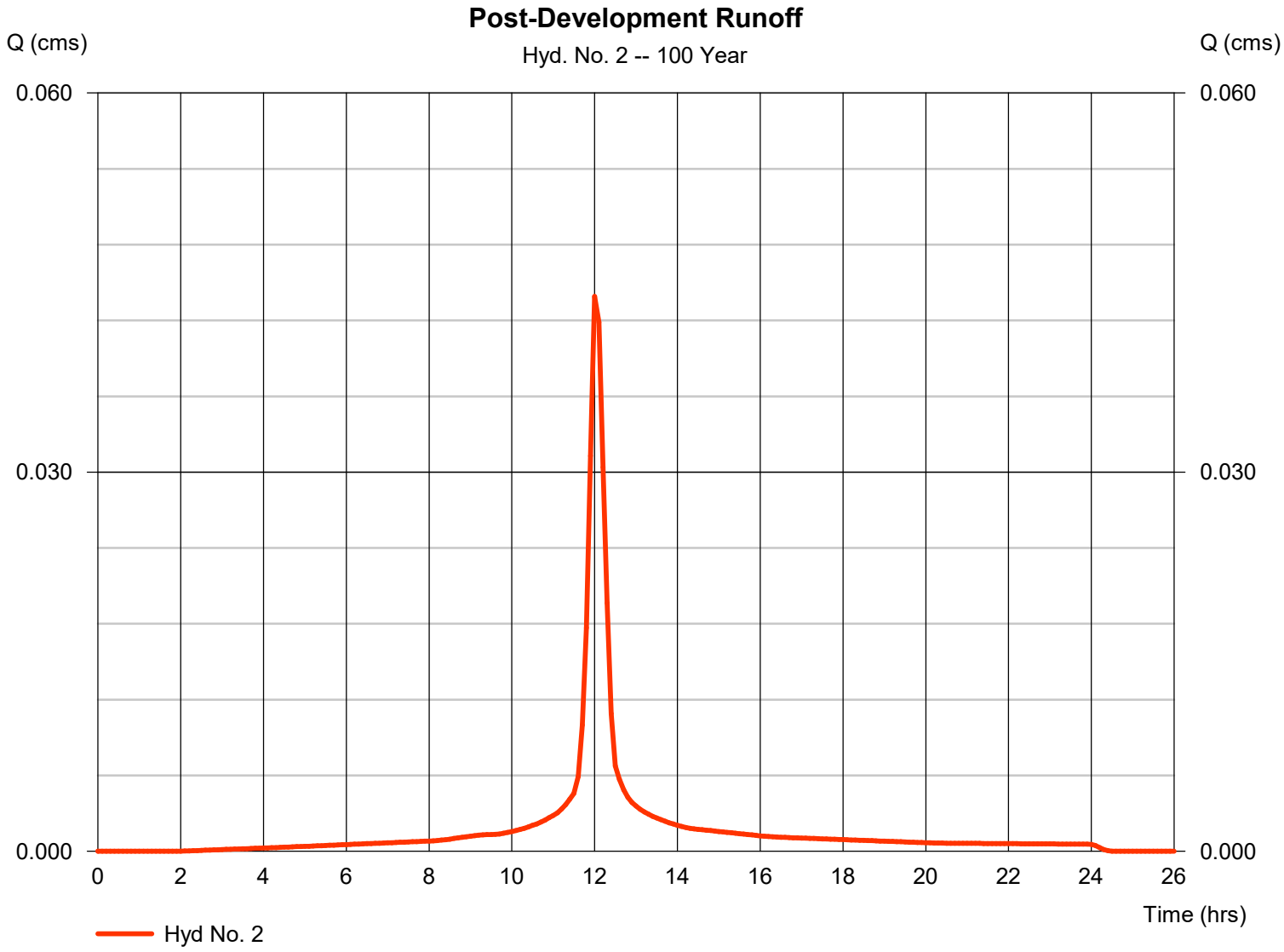
Hydrograph Report

Hyd. No. 2

Post-Development Runoff

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.044 cms
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	6 min	Hyd. volume	=	161.1 cum
Drainage area	=	0.180 hectare	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 m
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	108.00 mm	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	400

* Composite (Area/CN) = [(0.162 x 98) + (0.018 x 79)] / 0.180



Hydrograph Report

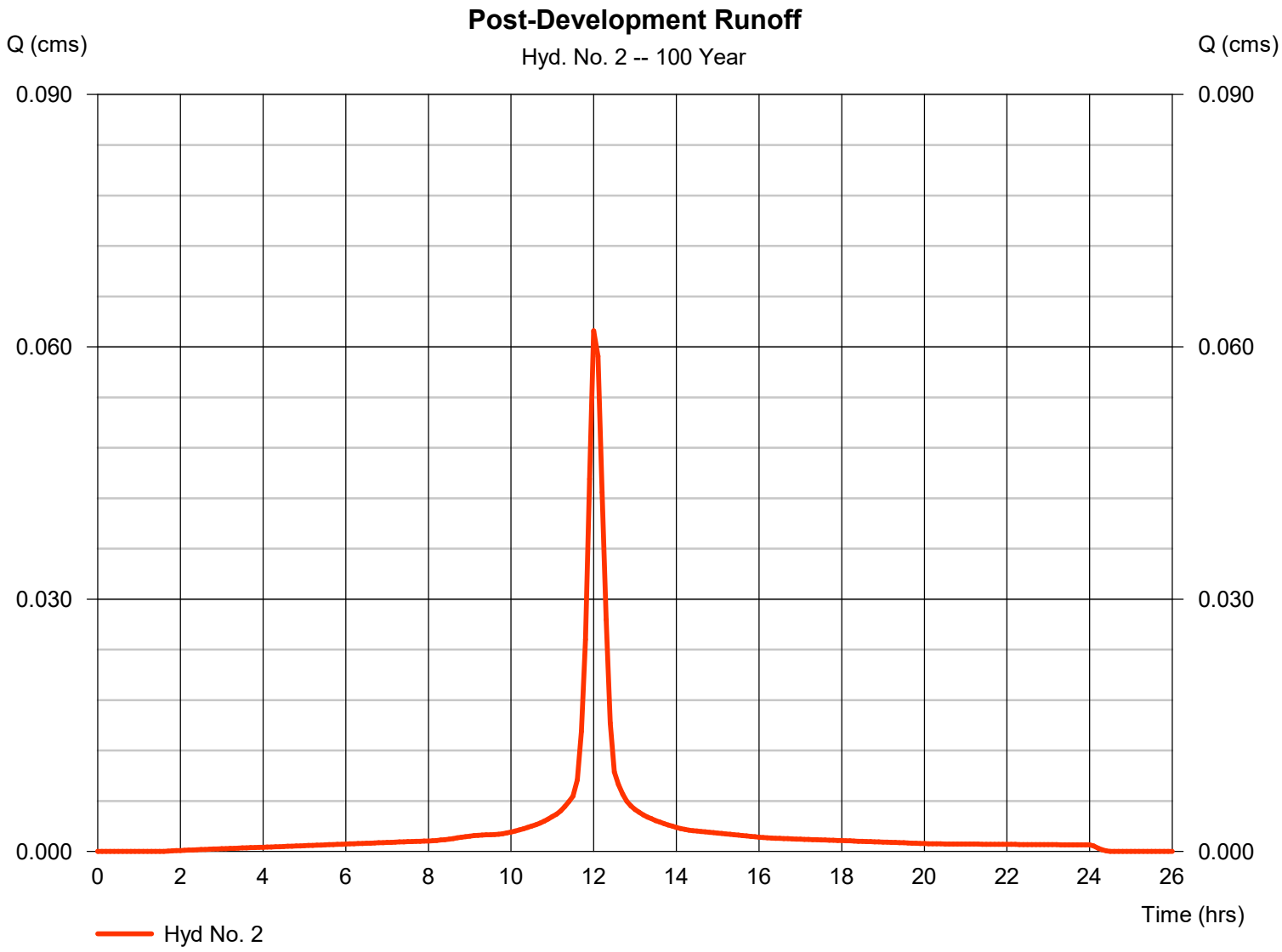
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 08 / 21 / 2023

Hyd. No. 2

Post-Development Runoff

Hydrograph type	= ~~SCS Runoff~~ Stress	Peak discharge	= 0.062 cms
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 6 min	Hyd. volume	= 231.0 cum
Drainage area	= 0.180 hectare	Curve number	= 96*
Basin Slope	= 0.0 %	Hydraulic length	= 0 m
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 150.00 mm	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 400

* Composite (Area/CN) = [(0.162 x 98) + (0.018 x 79)] / 0.180



Hydrograph Report

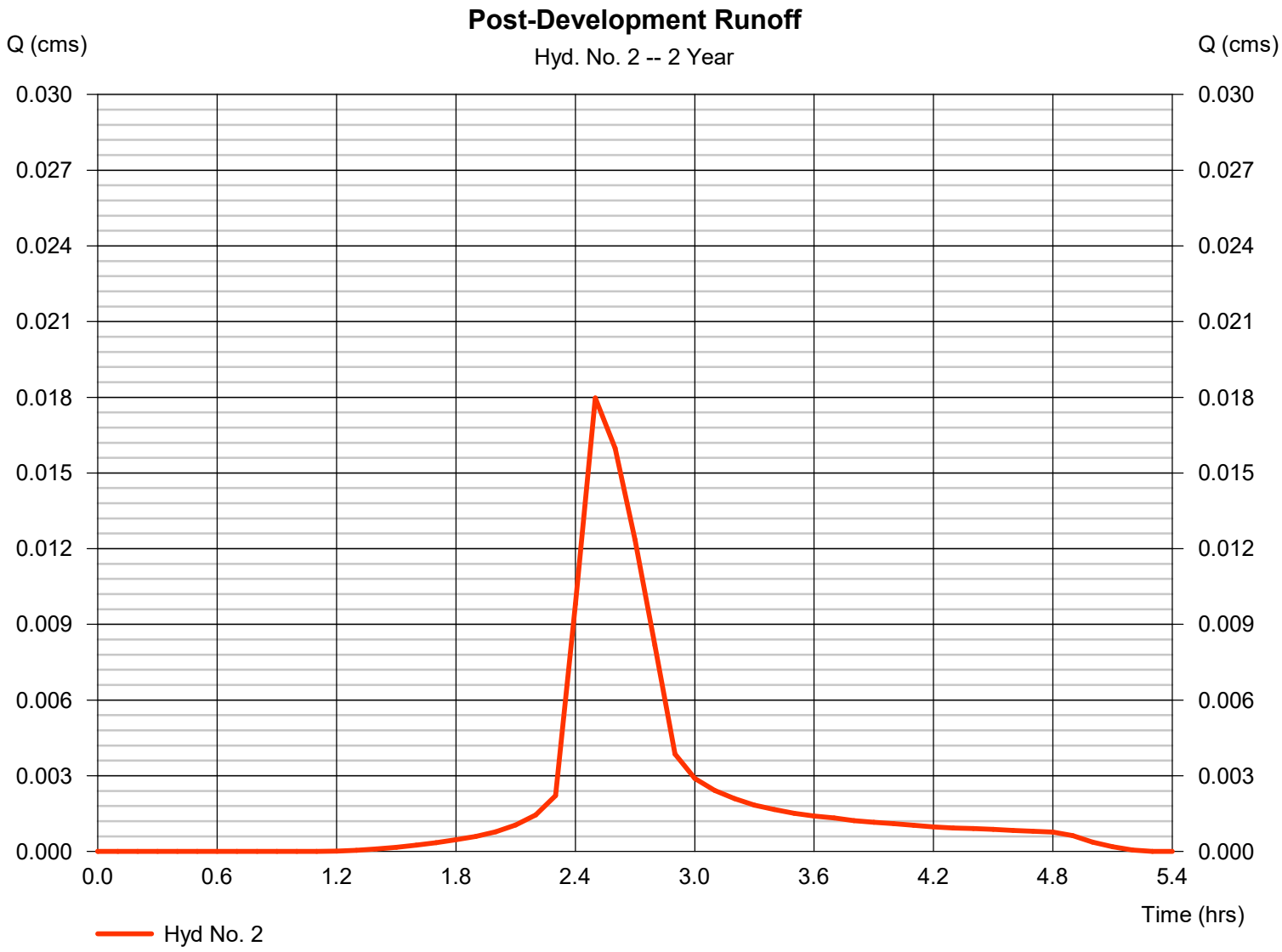
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 08 / 21 / 2023

Hyd. No. 2

Post-Development Runoff

Hydrograph type	=	~~SCS Runoff~~ Water Quality	Peak discharge	=	0.018 cms
Storm frequency	=	2 yrs	Time to peak	=	2.50 hrs
Time interval	=	6 min	Hyd. volume	=	36.9 cum
Drainage area	=	0.180 hectare	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 m
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	32.00 mm	Distribution	=	Custom
Storm duration	=	Sample.cds	Shape factor	=	400

* Composite (Area/CN) = [(0.162 x 98) + (0.018 x 79)] / 0.180



Hydrograph Report

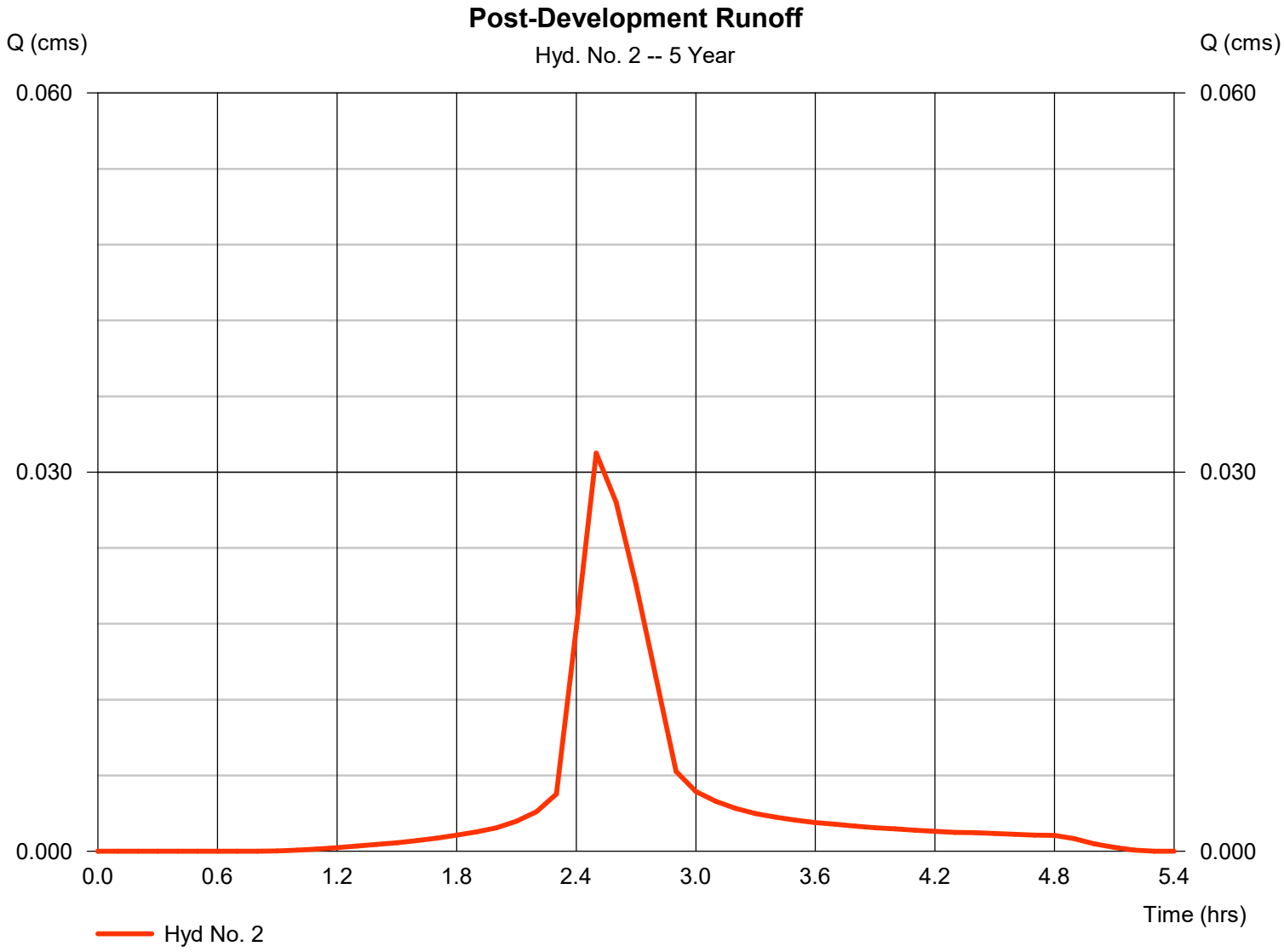
Hyd. No. 2

Post-Development Runoff

Chicago 5-Year

Hydrograph type	=	~~SCS Runoff~~	Peak discharge	=	0.031 cms
Storm frequency	=	5 yrs	Time to peak	=	2.50 hrs
Time interval	=	6 min	Hyd. volume	=	65.0 cum
Drainage area	=	0.180 hectare	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 m
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	49.60 mm	Distribution	=	Custom
Storm duration	=	Sample.cds	Shape factor	=	400

* Composite (Area/CN) = [(0.162 x 98) + (0.018 x 79)] / 0.180



Hydrograph Report

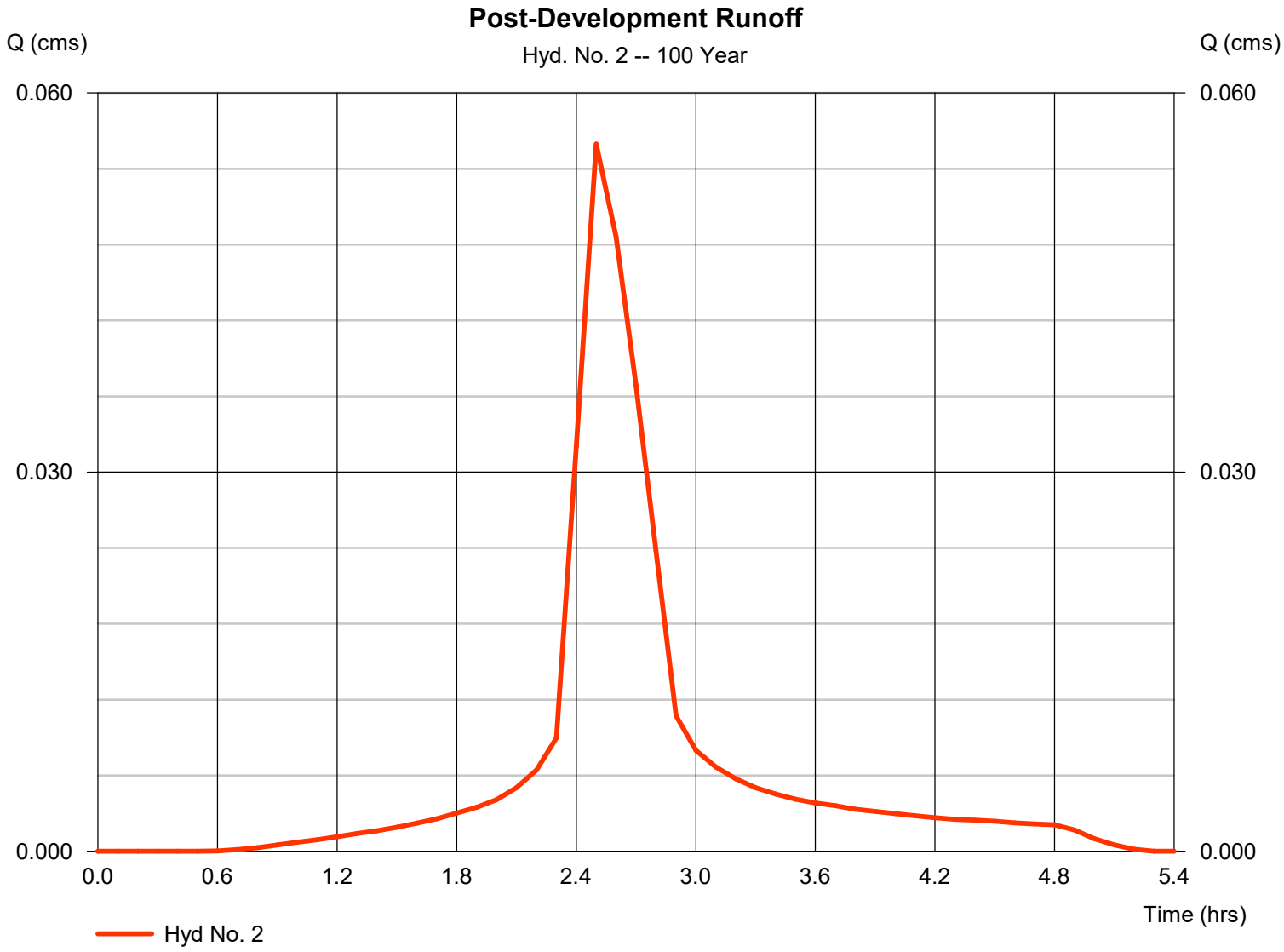
Hyd. No. 2

Post-Development Runoff

Chicago 100-Year

Hydrograph type	=	~~SCS Runoff~~	Peak discharge	=	0.056 cms
Storm frequency	=	100 yrs	Time to peak	=	2.50 hrs
Time interval	=	6 min	Hyd. volume	=	117.4 cum
Drainage area	=	0.180 hectare	Curve number	=	96*
Basin Slope	=	0.0 %	Hydraulic length	=	0 m
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	81.60 mm	Distribution	=	Custom
Storm duration	=	Sample.cds	Shape factor	=	400

* Composite (Area/CN) = [(0.162 x 98) + (0.018 x 79)] / 0.180



Hydrograph Report

SCS 2-YEAR

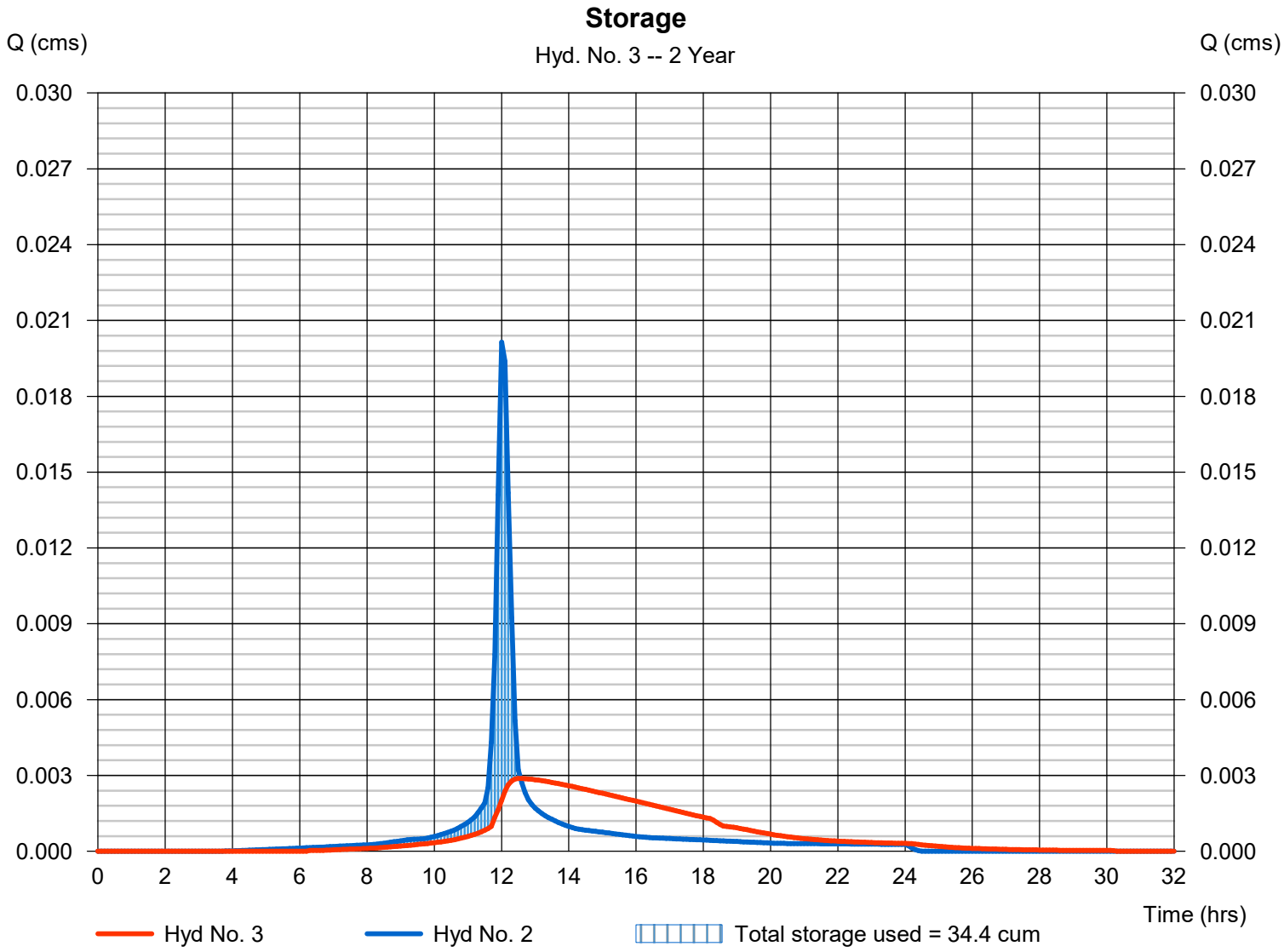
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 08 / 21 / 2023

Hyd. No. 3

Storage

Hydrograph type	=	Reservoir	Peak discharge	=	0.003 cms
Storm frequency	=	2 yrs	Time to peak	=	12.60 hrs
Time interval	=	6 min	Hyd. volume	=	70.5 cum
Inflow hyd. No.	=	2 - Post-Development Runoff	Max. Elevation	=	100.13 m
Reservoir name	=	<New Pond>	Max. Storage	=	34.4 cum

Storage Indication method used.



Hydrograph Report

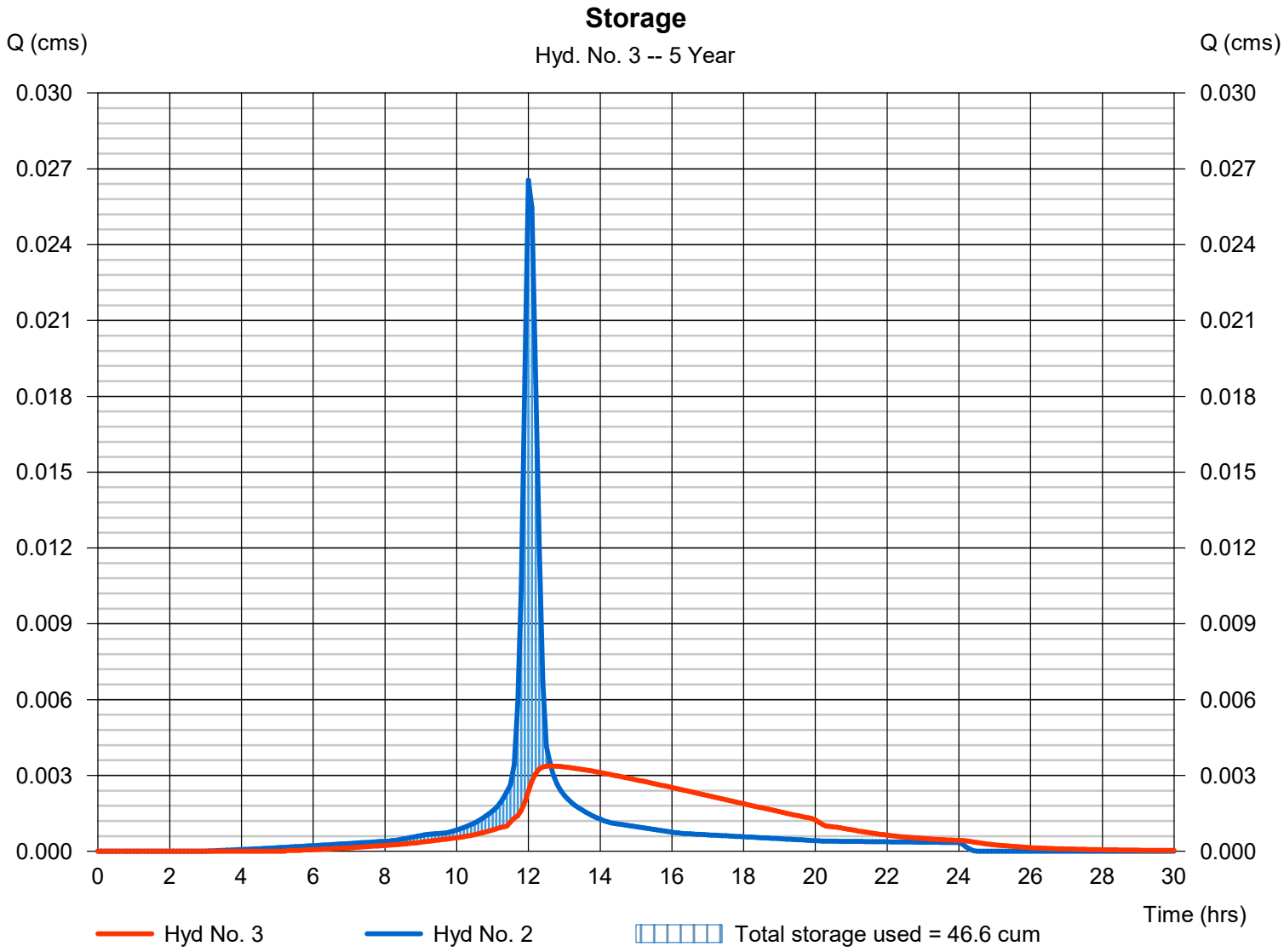
SCS 5-YEAR

Hyd. No. 3

Storage

Hydrograph type	= Reservoir	Peak discharge	= 0.003 cms
Storm frequency	= 5 yrs	Time to peak	= 12.60 hrs
Time interval	= 6 min	Hyd. volume	= 94.4 cum
Inflow hyd. No.	= 2 - Post-Development Runoff	Max. Elevation	= 100.15 m
Reservoir name	= <New Pond>	Max. Storage	= 46.6 cum

Storage Indication method used.



Hydrograph Report

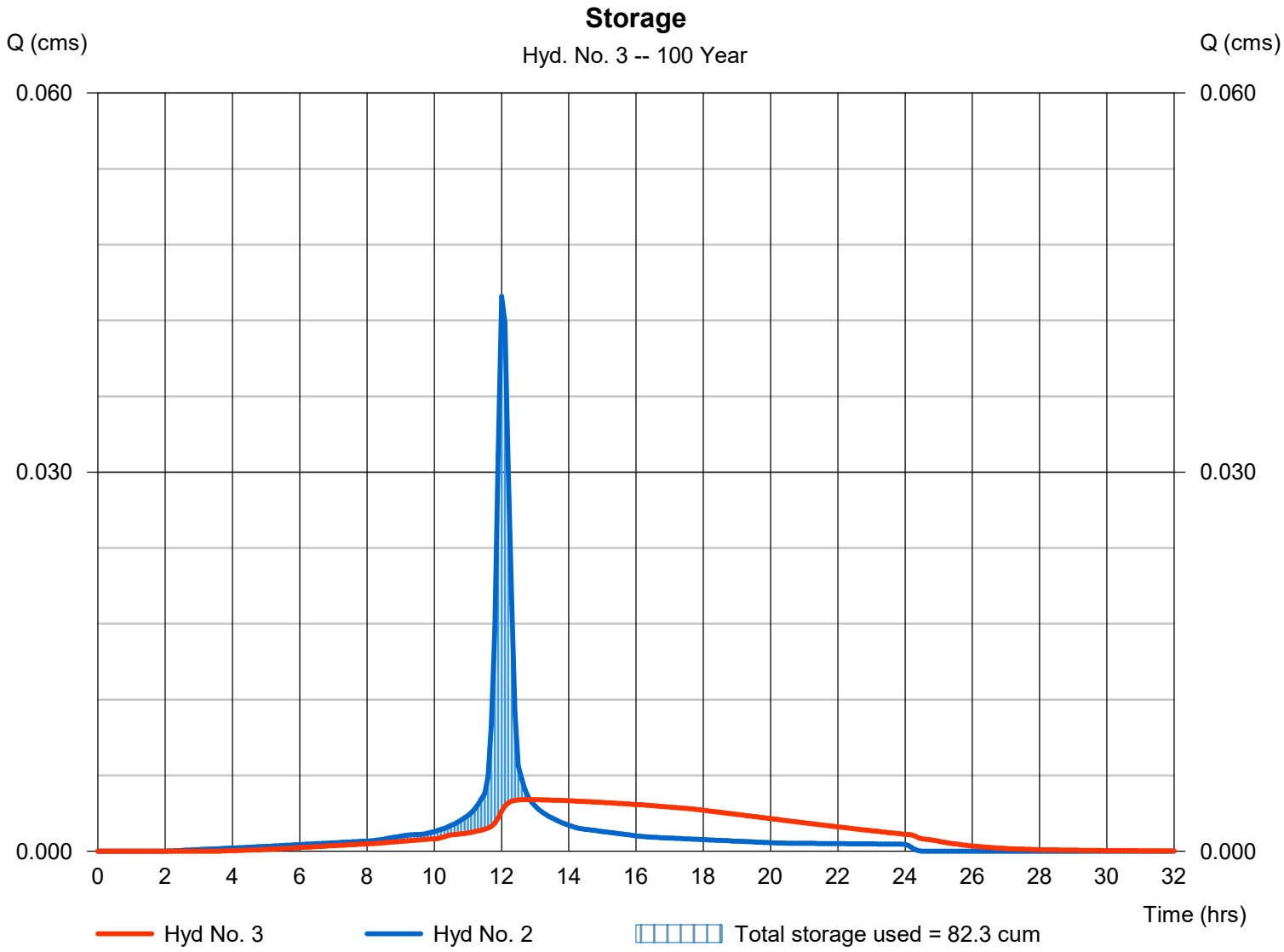
SCS 100-YEAR

Hyd. No. 3

Storage

Hydrograph type	= Reservoir	Peak discharge	= 0.004 cms
Storm frequency	= 100 yrs	Time to peak	= 12.80 hrs
Time interval	= 6 min	Hyd. volume	= 160.5 cum
Inflow hyd. No.	= 2 - Post-Development Runoff	Max. Elevation	= 100.19 m
Reservoir name	= <New Pond>	Max. Storage	= 82.3 cum

Storage Indication method used.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	123.0355	26.6700	2.2952	--------
3	0.0000	0.0000	0.0000	--------
5	200.3809	32.7660	2.3753	--------
10	268.0860	36.5760	2.4372	--------
25	348.7222	39.6241	2.4776	--------
50	499.0544	44.9581	2.6097	--------
100	471.7757	42.9261	2.5180	--------

File name: Windsor A 2007.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (mm/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0	0	0	0	0	0	0	0	0	0	0	0
2	103	80	66	56	49	43	39	36	33	30	28	26
3	0	0	0	0	0	0	0	0	0	0	0	0
5	135	107	89	76	67	60	54	49	45	42	39	36
10	156	125	105	90	79	70	64	58	53	49	46	43
25	182	148	124	107	94	84	76	69	64	59	55	51
50	202	164	139	120	105	94	85	77	71	66	61	57
100	221	180	152	132	116	104	94	86	79	73	68	64

Tc = time in minutes. Values may exceed 60.

e: Z:\2017\17-156 - Regal Drive Extension\Engineering\REPORT\SWM Report\IDF\IDF Curves 2012 WINDSOR A .pcp

Storm Distribution	Rainfall Precipitation Table (mm)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0	53	0	68	78	90	99	108
SCS 6-Hr	0	0	0	0	0	0	0	0
Huff-1st	0	0	0	0	0	0	0	0
Huff-2nd	0	0	0	0	0	0	0	0
Huff-3rd	0	0	0	0	0	0	0	0
Huff-4th	0	0	0	0	0	0	0	0
Huff-Indy	0	0	0	0	0	0	0	0
Custom	0	32	0	50	0	0	0	82

Hydrograph Report

STRESS TEST

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

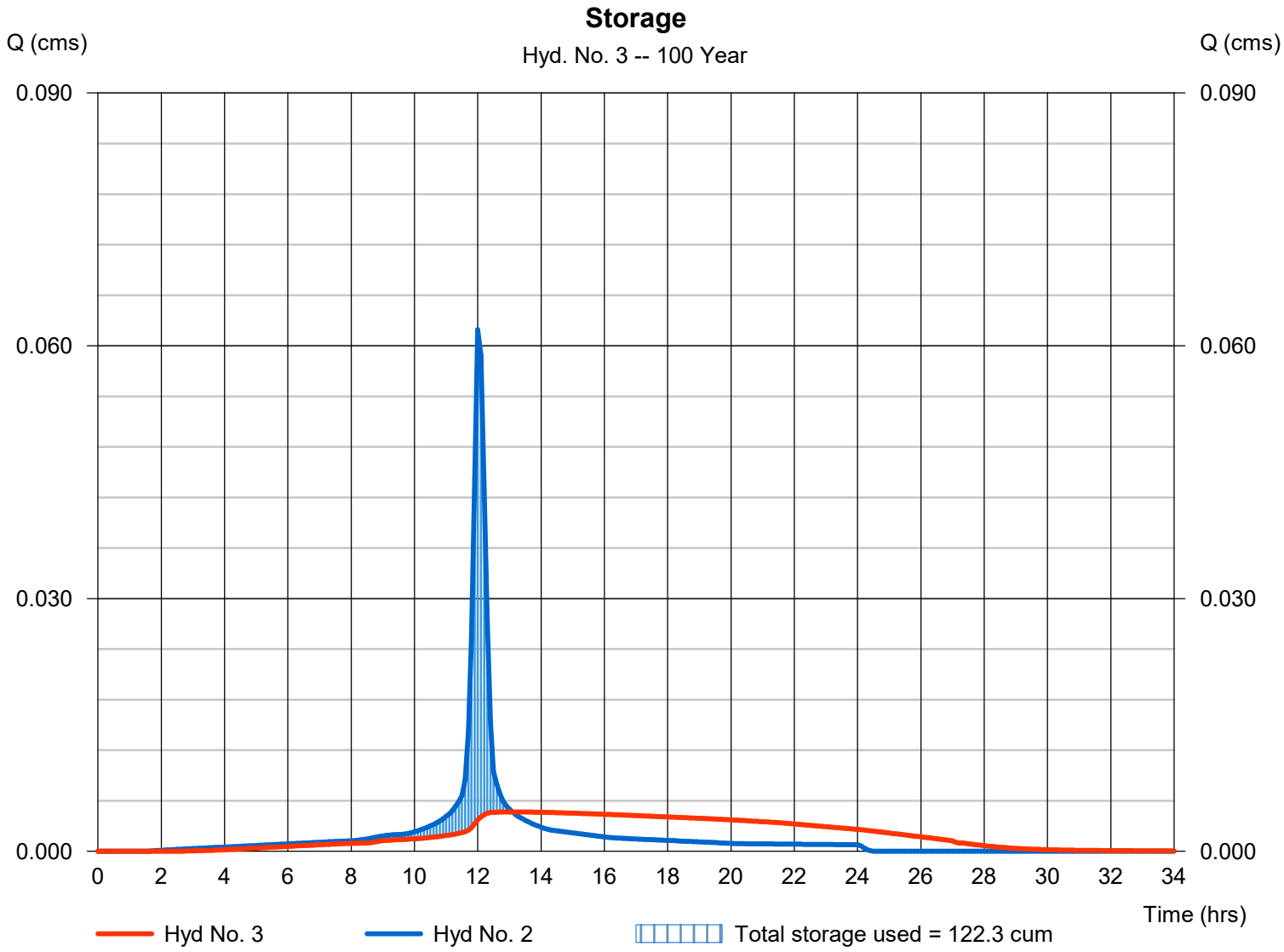
Monday, 08 / 21 / 2023

Hyd. No. 3

Storage

Hydrograph type	= Reservoir	Peak discharge	= 0.005 cms
Storm frequency	= 100 yrs	Time to peak	= 13.10 hrs
Time interval	= 6 min	Hyd. volume	= 230.3 cum
Inflow hyd. No.	= 2 - Post-Development Runoff	Max. Elevation	= 100.24 m
Reservoir name	= <New Pond>	Max. Storage	= 122.3 cum

Storage Indication method used.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	123.0355	26.6700	2.2952	--------
3	0.0000	0.0000	0.0000	--------
5	200.3809	32.7660	2.3753	--------
10	268.0860	36.5760	2.4372	--------
25	348.7222	39.6241	2.4776	--------
50	499.0544	44.9581	2.6097	--------
100	471.7757	42.9261	2.5180	--------

File name: Windsor A 2007.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (mm/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0	0	0	0	0	0	0	0	0	0	0	0
2	103	80	66	56	49	43	39	36	33	30	28	26
3	0	0	0	0	0	0	0	0	0	0	0	0
5	135	107	89	76	67	60	54	49	45	42	39	36
10	156	125	105	90	79	70	64	58	53	49	46	43
25	182	148	124	107	94	84	76	69	64	59	55	51
50	202	164	139	120	105	94	85	77	71	66	61	57
100	221	180	152	132	116	104	94	86	79	73	68	64

Tc = time in minutes. Values may exceed 60.

e: Z:\2017\17-156 - Regal Drive Extension\Engineering\REPORT\SWM Report\IDF\IDF Curves 2012 WINDSOR A .pcp

Storm Distribution	Rainfall Precipitation Table (mm)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0	53	0	68	78	90	99	150
SCS 6-Hr	0	0	0	0	0	0	0	0
Huff-1st	0	0	0	0	0	0	0	0
Huff-2nd	0	0	0	0	0	0	0	0
Huff-3rd	0	0	0	0	0	0	0	0
Huff-4th	0	0	0	0	0	0	0	0
Huff-Indy	0	0	0	0	0	0	0	0
Custom	0	32	0	50	0	0	0	82

Hydrograph Report

WATER QUALITY STORM

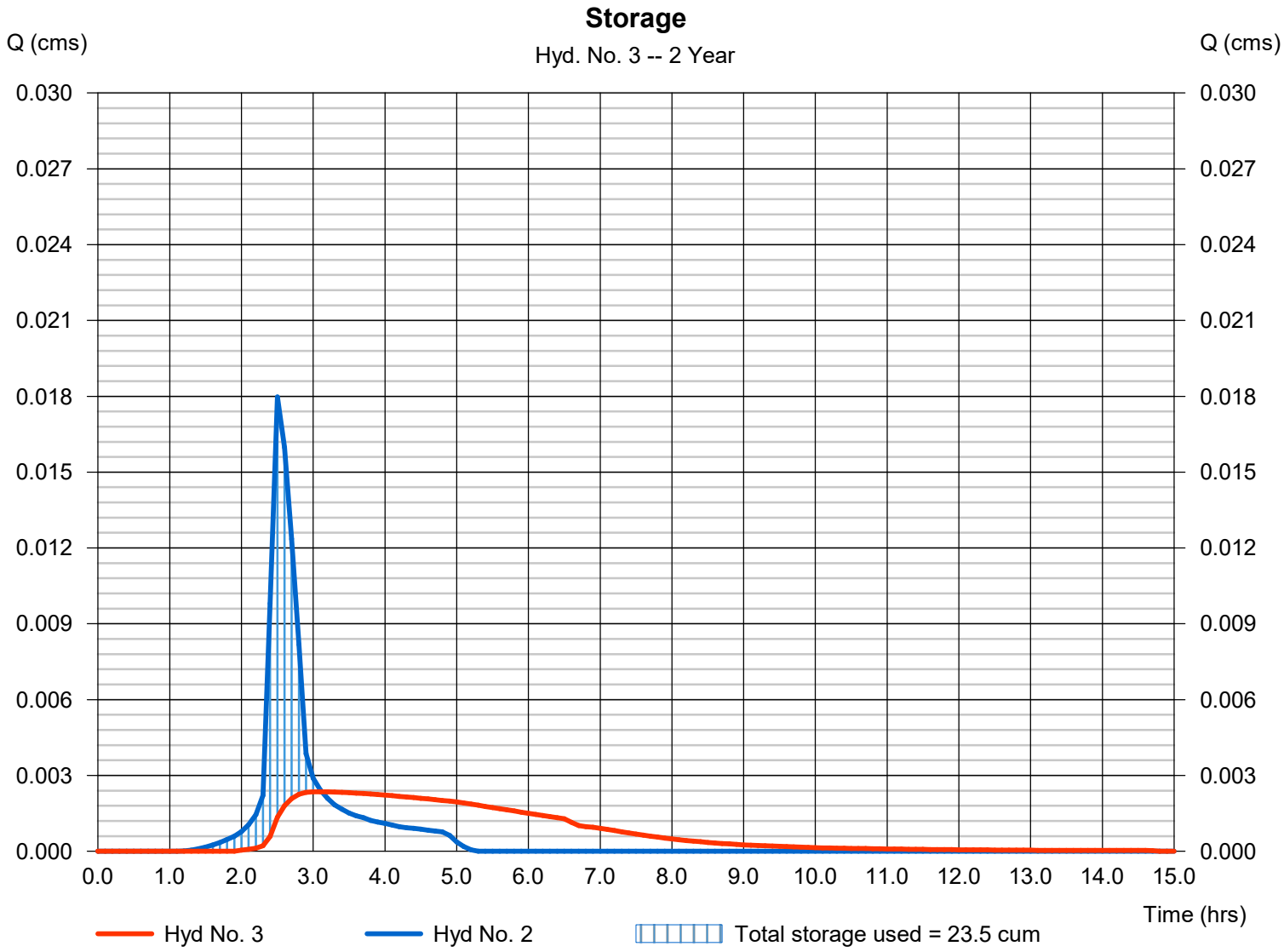
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 08 / 21 / 2023

Hyd. No. 3

Storage

Hydrograph type	= Reservoir	Peak discharge	= 0.002 cms
Storm frequency	= 2 yrs	Time to peak	= 3.10 hrs
Time interval	= 6 min	Hyd. volume	= 36.3 cum
Inflow hyd. No.	= 2 - Post-Development Runoff	Max. Elevation	= 100.10 m
Reservoir name	= <New Pond>	Max. Storage	= 23.5 cum

Storage Indication method used.



Hydrograph Report

CHICAGO 5-YEAR

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

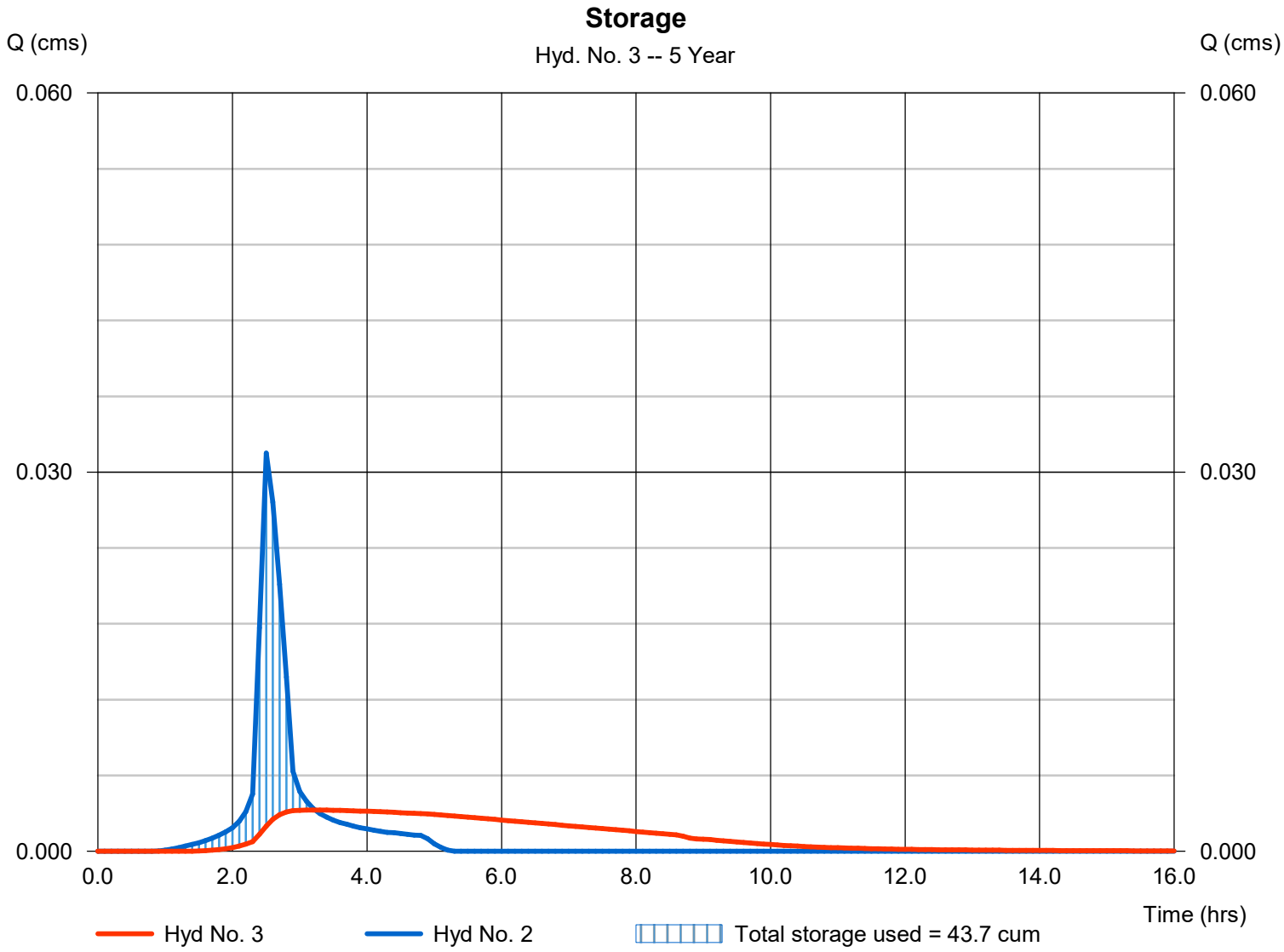
Monday, 08 / 21 / 2023

Hyd. No. 3

Storage

Hydrograph type	=	Reservoir	Peak discharge	=	0.003 cms
Storm frequency	=	5 yrs	Time to peak	=	3.20 hrs
Time interval	=	6 min	Hyd. volume	=	64.4 cum
Inflow hyd. No.	=	2 - Post-Development Runoff	Max. Elevation	=	100.14 m
Reservoir name	=	<New Pond>	Max. Storage	=	43.7 cum

Storage Indication method used.



Hydrograph Report

CHICAGO 100-YEAR

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

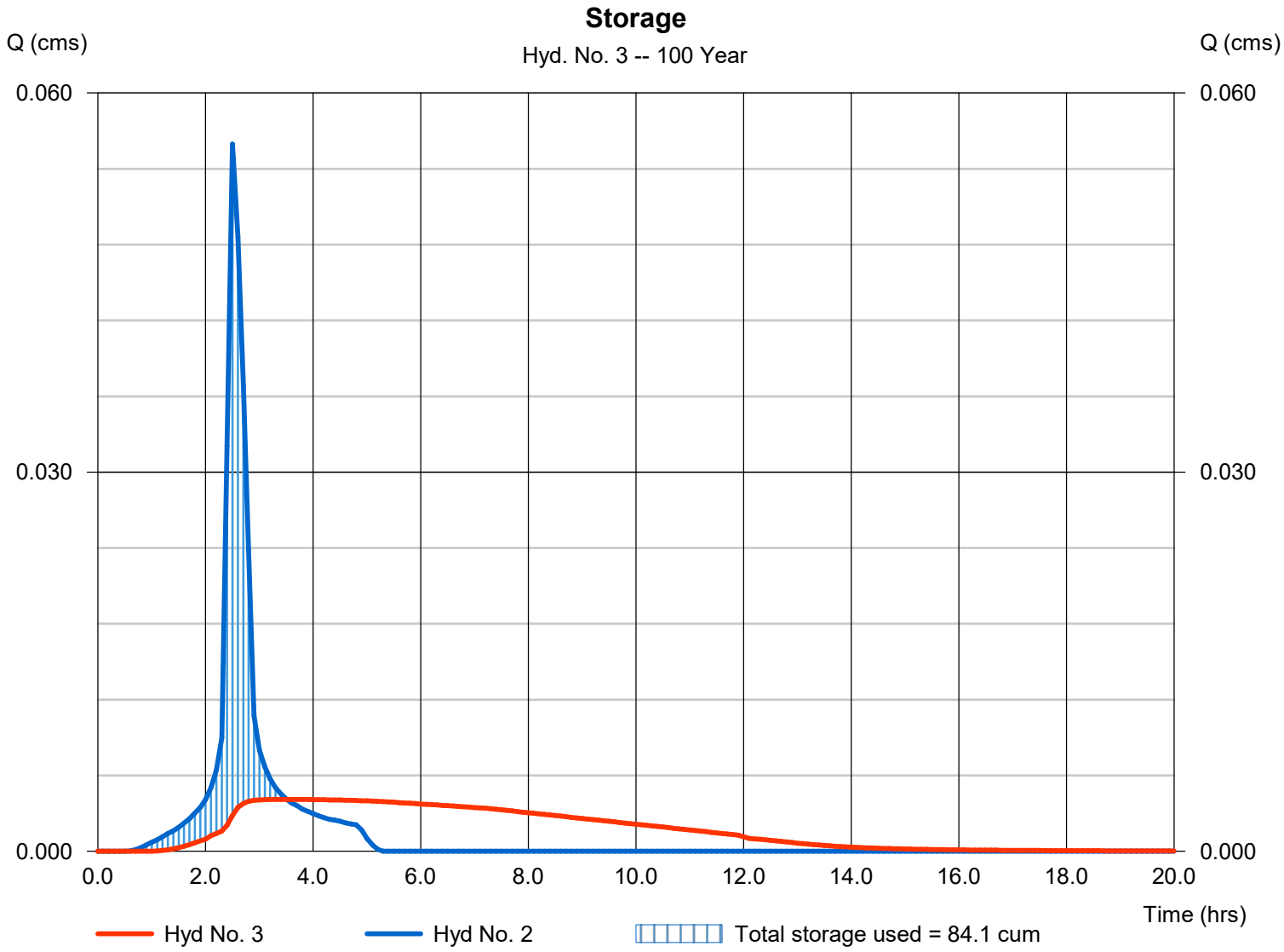
Monday, 08 / 21 / 2023

Hyd. No. 3

Storage

Hydrograph type	=	Reservoir	Peak discharge	=	0.004 cms
Storm frequency	=	100 yrs	Time to peak	=	3.50 hrs
Time interval	=	6 min	Hyd. volume	=	116.8 cum
Inflow hyd. No.	=	2 - Post-Development Runoff	Max. Elevation	=	100.20 m
Reservoir name	=	<New Pond>	Max. Storage	=	84.1 cum

Storage Indication method used.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	123.0355	26.6700	2.2952	--------
3	0.0000	0.0000	0.0000	--------
5	200.3809	32.7660	2.3753	--------
10	268.0860	36.5760	2.4372	--------
25	348.7222	39.6241	2.4776	--------
50	499.0544	44.9581	2.6097	--------
100	471.7757	42.9261	2.5180	--------

File name: Windsor A 2007.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (mm/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0	0	0	0	0	0	0	0	0	0	0	0
2	103	80	66	56	49	43	39	36	33	30	28	26
3	0	0	0	0	0	0	0	0	0	0	0	0
5	135	107	89	76	67	60	54	49	45	42	39	36
10	156	125	105	90	79	70	64	58	53	49	46	43
25	182	148	124	107	94	84	76	69	64	59	55	51
50	202	164	139	120	105	94	85	77	71	66	61	57
100	221	180	152	132	116	104	94	86	79	73	68	64

Tc = time in minutes. Values may exceed 60.

e: Z:\2017\17-156 - Regal Drive Extension\Engineering\REPORT\SWM Report\IDF\IDF Curves 2012 WINDSOR A .pcp

Storm Distribution	Rainfall Precipitation Table (mm)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0	53	0	68	78	90	99	108
SCS 6-Hr	0	0	0	0	0	0	0	0
Huff-1st	0	0	0	0	0	0	0	0
Huff-2nd	0	0	0	0	0	0	0	0
Huff-3rd	0	0	0	0	0	0	0	0
Huff-4th	0	0	0	0	0	0	0	0
Huff-Indy	0	0	0	0	0	0	0	0
Custom	0	32	0	50	0	0	0	82

Appendix C

SANITARY STUDY

BAIRD | AE architecture + engineering
www.bairdae.ca Local 519-336-6161
info@bairdae.ca Toll Free 1-844-842-9188

PARTNER / CONSULTANTS

REVISIONS

Date	Revision
DEC 12, 2023	CITY COMMENTS
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LICENSED PROFESSIONAL ENGINEER
G. SIVAKUMAR
100546565
DEC 12, 2023
PROVINCE OF ONTARIO

DATE:	DEC 12, 2023
SCALE:	1:5000

DRAWN BY: CFS — [X] PRELIMINARY
CHECKED BY: G.S. — [-] CONSTRUCTION
APPROVED BY: ---- — [-] RECORD

PROJECT TITLE
DAYTONA AVENUE APARTMENTS DEVELOPMENT
2230-2240 DAYTONA AVENUE, WINDSOR, ONTARIO

SHEET TITLE
SANITARY SEWER DRAINAGE AREA PLAN - ULTIMATE BUILD OUT

JOB NUMBER 22-048

SHEET NUMBER
1

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DAYTONA AVENUE APARTMENTS
SANITARY STUDY - ULTIMATE BUILD OUT

CATCHMENT AREA			DESIGN AREA				DESIGN POPULATION				Ult. Flow Factor	DESIGN FLOW			SEWER DATA						
Area Included	From Node	To Node	Residential (ha)	Commercial (ha)	Institutional (ha)	Total Area (ha)	Residential 1	Commercial 2	Institutional	Total		Sewage (L/s)	Infiltration Flow (L/s)	Q Total Flow (L/s)	Dia. (m) Actual	Dia. (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
A1,A3	MH0	MH1	0.505	5.937		6.441	25	439	0	465	6.00	11.71	1.00	12.71	0.250	250	0.32	100.31	33.6	0.68	2.44	37.8%
A1,A3, A4,A5,A6	MH1	MH2	1.072	6.446	0.970	8.487	161	479	21	662	6.00	16.67	1.32	18.00	0.250	250	0.42	99.15	38.5	0.78	2.11	46.7%
A1,A3, A4,A5,A6,A7,A8	MH2	MH3	1.610	7.265		8.875	221	540	0	760	6.00	19.16	1.38	20.55	0.250	250	0.42	97.74	38.5	0.78	2.08	53.4%
A1,A3, A4,A5,A6,A7,A8,A9,A10	MH3	MH4	2.067	7.983		10.050	244	593	0	836	6.00	21.08	1.57	22.65	0.250	250	2.09	87.13	85.9	1.75	0.83	26.4%
A1, A2,A3, A4,A5,A6,A7,A8,A9,A10,A11	MH4	MH5	214.532	9.021	10.085	233.638	10867	670	222	11758	3.72	183.71	36.45	220.16	0.600	600	0.13	81.25	221.2	0.78	1.73	99.5%

Average Flow per Person (l/day) =	362.88	Population Density			
Infiltration (l /s/ha) =	0.156	Residential =	50	persons/ha	
Pipe Friction "n" =	0.013	Commercial =	74	persons/ha	
Pipe velocity range (m/s) =	0.75 - 3.00	Institutional=	22	persons/ha	
Pipe Type =	P.V.C. SDR-35				

A8-1 Residential Population
=2.34 person/unit x 20
= 47 (Residential)

BAIRD|AE architecture + engineering

Date:	December 12, 2023
Design By:	Nii Nartei Nartey
Project No:	22-048
Dwg. Reference:	Daytona Avenue Apartments
Reviewed By:	Gowtham Sivakumar

1 Proposed development area excluded and estimated population added
2 Proposed development commercial space added

AREAS	RESIDENTIAL	COMMERCIAL	INSTITUTIONAL	TOTAL	
A1		5.9365		5.9365	
A2	45.5468			45.5468	
A3	0.5045			0.5045	
A4	0.567			0.567	
A5		0.5095		0.5095	
A6			0.9696	0.9696	
A7		0.8194		0.8194	
A8-1	0.286			0.286	1
A8-2	0.2521			0.2521	
A9		0.7176		0.7176	
A10	0.4575			0.4575	
A11	166.9176	1.0382	9.1152	177.071	
1 proposed development Area				233.6375	

BAIRD | AE
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PARTNER / CONSULTANTS

REVISIONS

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DEC 12, 2023	CITY COMMENTS
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LICENSED PROFESSIONAL ENGINEER
G. SIVAKUMAR
100546565
DEC 12, 2023
PROVINCE OF ONTARIO

DATE:	DECEMBER 12, 2023
SCALE:	1:5000
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APPROVED BY: -----	[ ] RECORD

PROJECT TITLE
DAYTONA AVENUE APARTMENTS DEVELOPMENT
2230-2240 DAYTONA AVENUE, WINDSOR, ONTARIO

SHEET TITLE
SANITARY SEWER DRAINAGE AREA PLAN - CURRENT SCENARIO

JOB NUMBER 22-048

SHEET NUMBER 2

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DAYTONA AVENUE APARTMENTS
SANITARY STUDY - CURRENT SCENARIO

CATCHMENT AREA			DESIGN AREA				DESIGN POPULATION					DESIGN FLOW			SEWER DATA							
Area Included	From Node	To Node	Residential (ha)	Commercial (ha)	Institutional (ha)	Total Area (ha)	Residential 1	Commercial 2	Institutional	Total	Ult. Flow Factor	Sewage (L/s)	Infiltration Flow (L/s)	Q Total Flow (L/s)	Dia. (m) Actual	Dia. (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
A1,A3	MH0	MH1	0.505	5.937		6.441	25	439	0	465	6.00	11.71	1.00	12.71	0.250	250	0.32	100.31	33.6	0.68	2.44	37.8%
A1,A3, A4,A5,A6	MH1	MH2	1.072	6.446	0.970	8.487	161	479	21	662	6.00	16.67	1.32	18.00	0.250	250	0.42	99.15	38.5	0.78	2.11	46.7%
A1,A3, A4,A5,A6,A7,A8	MH2	MH3	1.610	7.265		8.875	221	540	0	760	6.00	19.16	1.38	20.55	0.250	250	0.42	97.74	38.5	0.78	2.08	53.4%
A1,A3, A4,A5,A6,A7,A8,A9,A10	MH3	MH4	2.067	7.983		10.050	244	593	0	836	6.00	21.08	1.57	22.65	0.250	250	2.09	87.13	85.9	1.75	0.83	26.4%
A1, A2,A3, A4,A5,A6,A7,A8,A9,A10,A11	MH4	MH5	158.040	9.021	10.085	177.146	8042	670	222	8934	4.03	151.21	27.63	178.85	0.600	600	0.13	81.25	221.2	0.78	1.73	80.8%

Average Flow per Person (l/day) =	362.88	Population Density			
Infiltration (l /s/ha) =	0.156	Residential =	50	persons/ha	
Pipe Friction "n" =	0.013	Commercial =	74	persons/ha	
Pipe velocity range (m/s) =	0.75 - 3.00	Institutional=	22	persons/ha	
Pipe Type =	P.V.C. SDR-35				

A8-1 Residential Population
=2.34 person/unit x 20
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BAIRD|AE architecture + engineering

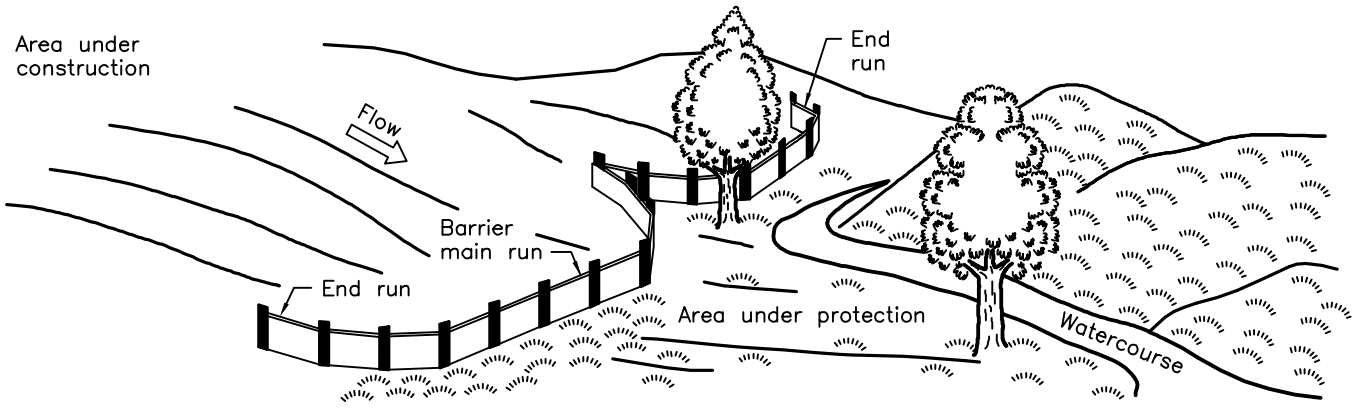
Date:	December 12, 2023
Design By:	Nii Nartei Nartey
Project No:	22-048
Dwg. Reference:	Daytona Avenue Apartments
Reviewed By:	Gowtham Sivakumar

1 Proposed development area excluded and estimated population added
2 Proposed development commercial space added

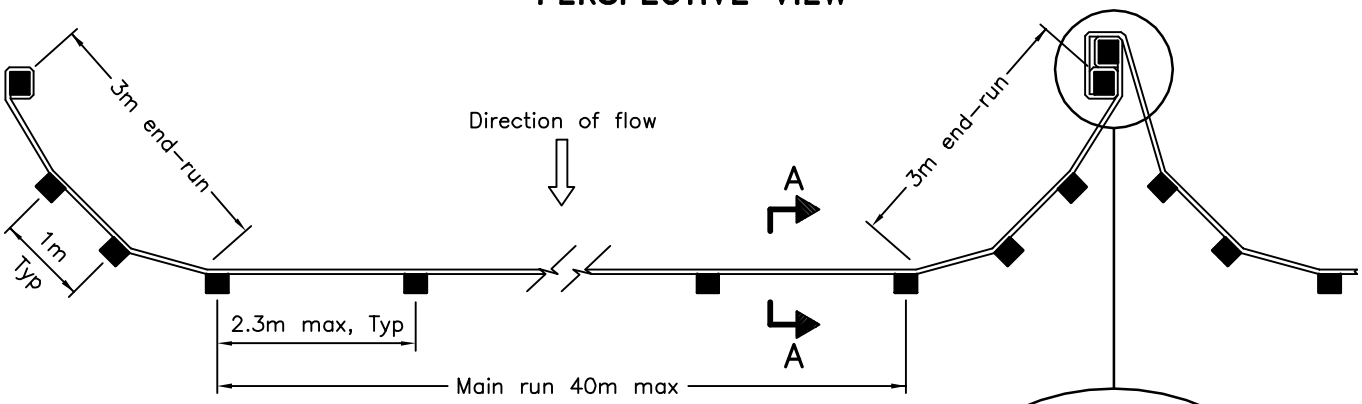
AREAS	RESIDENTIAL	COMMERCIAL	INSTITUTIONAL	TOTAL	
A1		5.9365		5.9365	
A2	12.503			12.503	
A3	0.5045			0.5045	
A4	0.567			0.567	
A5		0.5095		0.5095	
A6			0.9696	0.9696	
A7		0.8194		0.8194	
A8-1	0.286			0.286	1
A8-2	0.2521			0.2521	
A9		0.7176		0.7176	
A10	0.4575			0.4575	
A11	143.47	1.0382	9.1152	153.6234	
1 proposed development Area				177.1461	

Appendix D

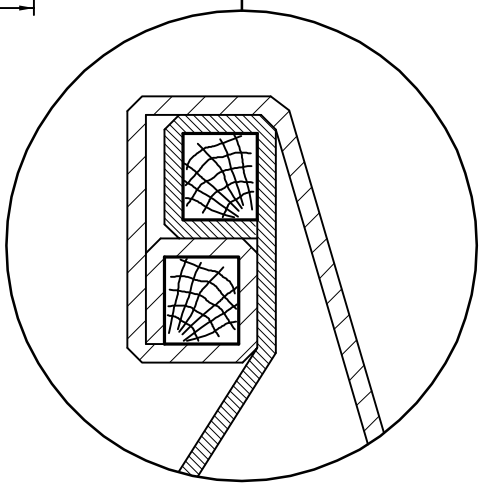
WATER QUALITY SCHEME DETAILS



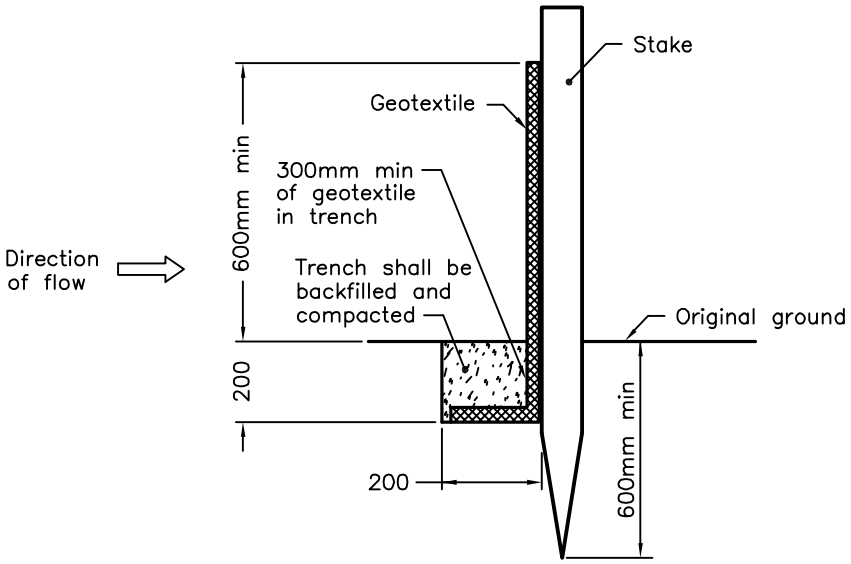
PERSPECTIVE VIEW



PLAN



JOINT DETAIL

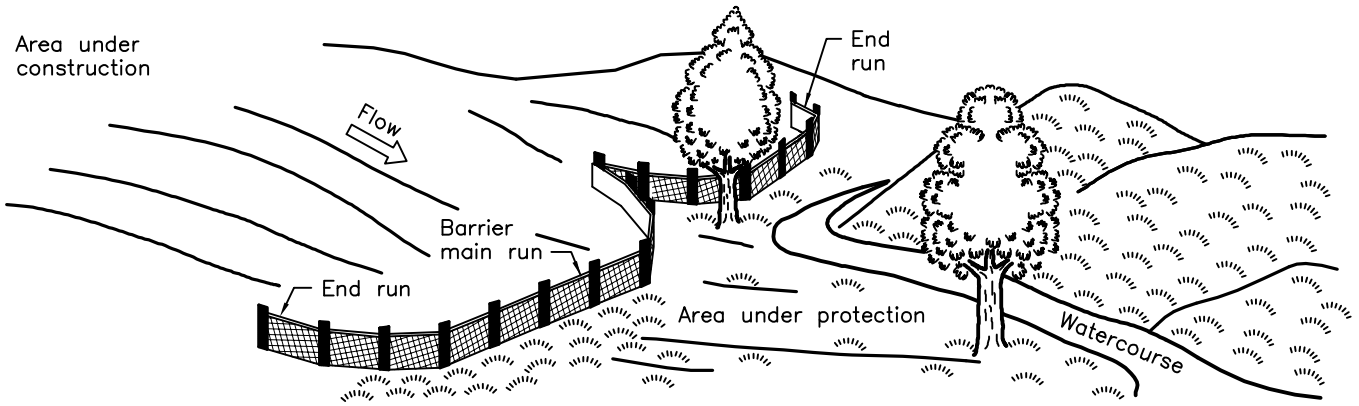


SECTION A–A

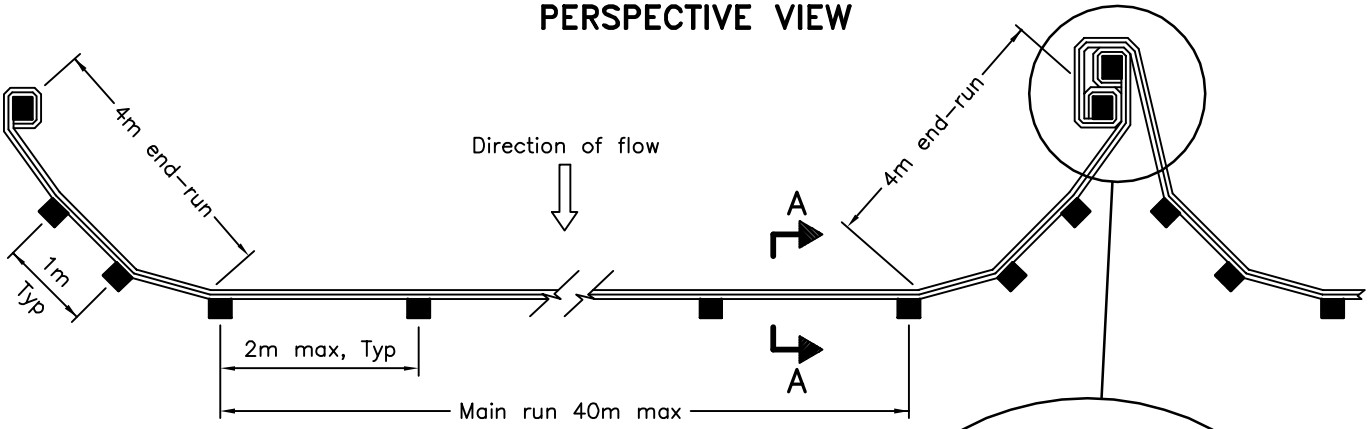
NOTE:

A All dimensions are in millimetres unless otherwise shown.

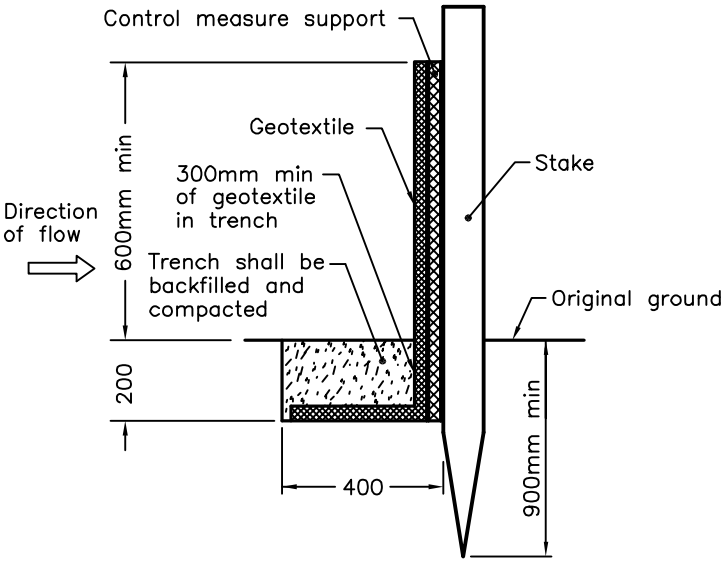
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	2
LIGHT–DUTY SILT FENCE BARRIER			
	OPSD 219.110		



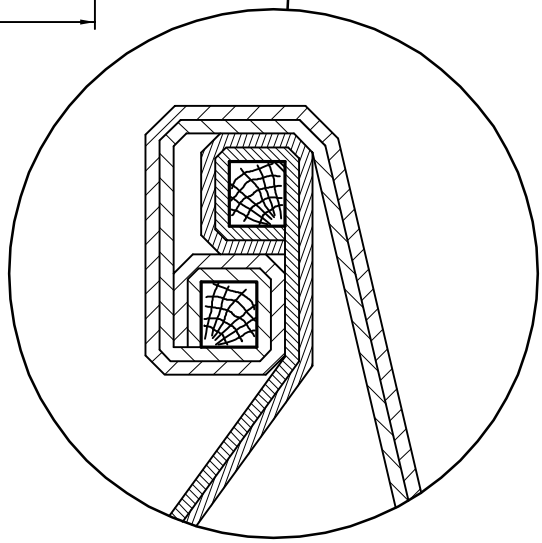
PERSPECTIVE VIEW



PLAN



SECTION A–A



JOINT DETAIL

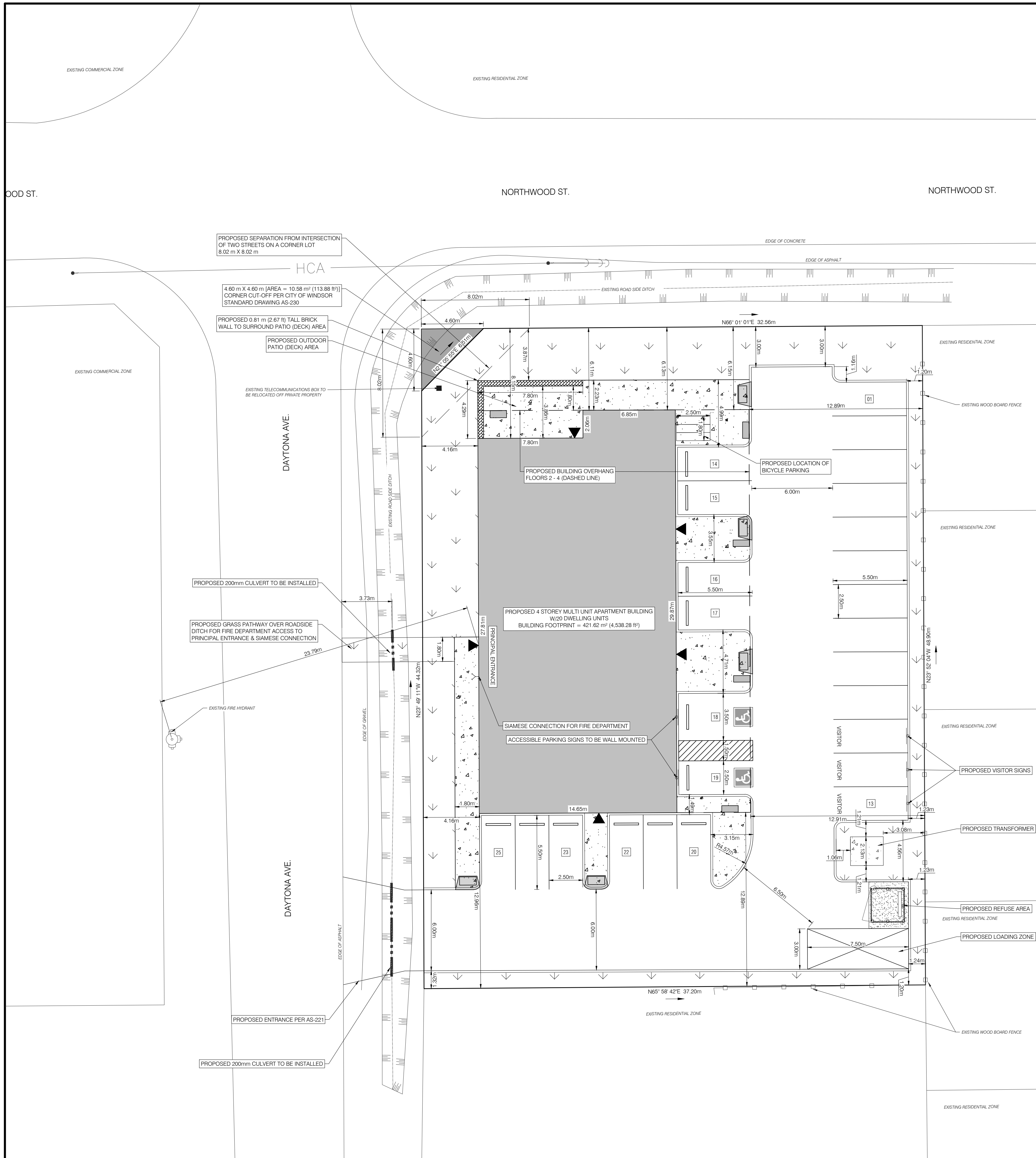
NOTE:

A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev	2
HEAVY–DUTY SILT FENCE BARRIER			
	OPSD 219.130		

Appendix E

DRAWING SET



LEGEND

01	NUMBERED PARKING SPACES
	ROAD/PARKING SIGN
	ACCESSIBLE SPACE SYMBOL
	FIRE HYDRANT
	PROPOSED BUILDING ENTRANCE
	LANDSCAPE OPEN SPACE
	SIDEWALK/CONCRETE
	PROPOSED BRICK WALL
	EXISTING INTERNET BOX
	EXISTING HYDRO POLE
	EXISTING GUY WIRE
	EXISTING AERIAL HYDRO CABLES
	EXISTING WOODEN BOARD FENCE
	PROPERTY LINE
	SIAMESE CONNECTION TO BUILDING
	200mm CULVERT
	BICYCLE PARKING SPACE
	PROPOSED PARKING BLOCK
	BUILDING COLUMN
	CURB CUT

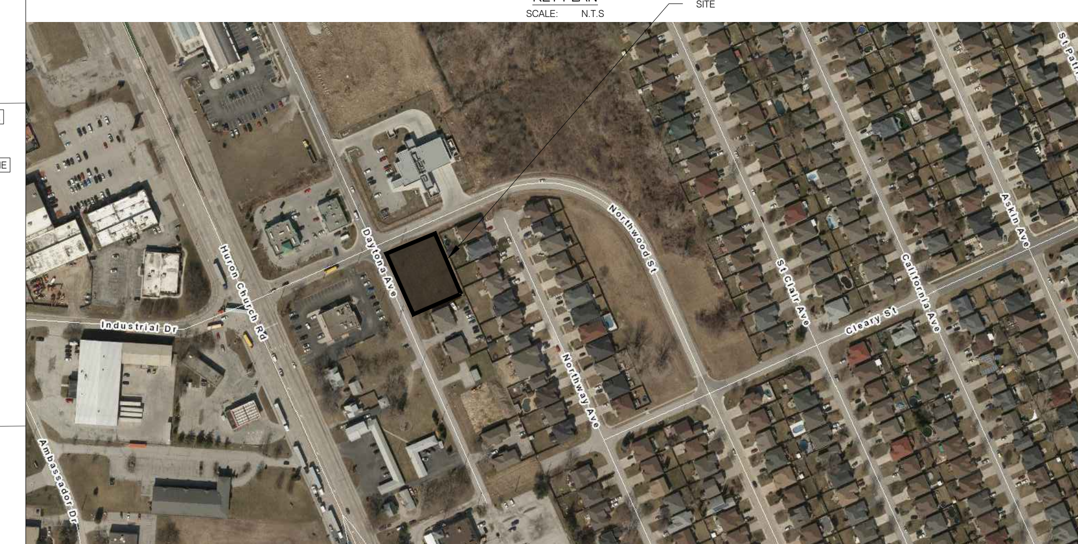
SITE DATA:

EXISTING SITE ZONING:	RESIDENTIAL DISTRICT 2.2 (RD2.2) ZONE		
PROPOSED SITE ZONING:	RESIDENTIAL DISTRICT 2.5 (RD2.5) EXCEPTION XX ZONE (RD2.5-S.20(1)XX)		
PERMITTED USE:	MULTIPLE DWELLING WITH 5 OR MORE DWELLING UNITS INCLUDING ALL OTHER USES PERMITTED IN RD2.5-S.20(1)XX ZONE		
PROPOSED USE:	MULTIPLE DWELLING WITH 5 OR MORE DWELLING UNITS		
DESCRIPTION:	REQUIRED:	PROVIDED:	ZONING COMPLIANCE:
MIN. LOT AREA:	166 m² (1,786.81 ft².) PER UNIT @ 20 UNITS = 3,320.00 m² (35,736.00 ft².)	90.38 m² (972.84 ft²) PER UNIT @ 20 UNITS = 1,807.68 m² (19,457.71 ft²)	RELIEF REQUESTED
MIN. LOT WIDTH:	20.00 m (65.62 ft)	37.18 m (121.92 ft)	COMPLIES
MAX. BUILDING HEIGHT:	18.00 m (59.055ft)	14.63 m (48.00 ft)	COMPLIES
FRONT YARD SETBACK (NORTH):	MIN: 6.00 m (19.70 ft) MAX: 7.0 m (23.0 ft)	6.11 m (20.05 ft)	COMPLIES
MIN. EXTERIOR YARD SETBACK (WEST):	2.50 m (8.20 ft)	4.16 m (13.65 ft)	COMPLIES
MIN. REAR YARD SETBACK (SOUTH)	7.50 m (24.60 ft)	12.89 m (42.29 ft)	COMPLIES
MIN. INTERIOR YARD SETBACK (EAST):	2.50 m (8.20 ft)	12.89 m (42.29 ft)	COMPLIES
MIN. PARKING SEPARATION FROM INTERIOR LOT LINE	0.90 m (2.95 ft)	1.20 m (3.94 ft)	COMPLIES
PATIO (DECK) ENCROACHMENT INTO A YARD:	PART OF A DECK HAVING A FLOOR HEIGHT OF 0.30 m OR LESS ABOVE THE GROUND ANY REQUIRED YARD - NO LIMIT	2.23 m (7.32 ft)	COMPLIES
MAX. LOT COVERAGE:	50.00%	32.72%	COMPLIES
LANDSCAPE OPEN SPACE:	N/A	19.76%	COMPLIES
SIGHT VISIBILITY TRIANGLE:	6.00 m - 6.00 m	8.02 m - 8.02 m	COMPLIES
RESIDENTIAL PARKING CALCULATED BASED DWELLING UNITS:	1.25 SPACES PER DWELLING UNIT OF TOTAL 20 DWELLING UNITS = 25 SPACES	25 SPACES	COMPLIES
VISITOR PARKING:	MIN. OF 15% OF PARKING SPACES SHALL BE MARKED FOR VISITOR PARKING @ 25 SPACES = 3 SPACES	3 SPACES	COMPLIES
ACCESSIBLE PARKING (INCLUDED IN TOTAL PARKING NUMBER CALCULATIONS):	BOTH TYPE "A" AND TYPE "B" SPACES ARE TO BE 2% OF TOTAL PARKING COUNT @ 25 SPACES = 1 TYPE "A" & 1 TYPE "B" SPACE	1 TYPE "A" SPACE 1 TYPE "B" SPACE	COMPLIES
BICYCLE PARKING:	WHEN 20 OR MORE TOTAL PARKING SPACES THERE SHALL BE 2 BICYCLE SPACES FOR THE FIRST 19 PARKING SPACES PLUS 1 BICYCLE SPACE FOR EACH ADDITIONAL 20 PARKING SPACES; 25 PARKING SPACES = 3 SPACES	3 SPACES	COMPLIES
LOADING SPACES:	FOR A MULTIPLE DWELLING WITH 9 OR MORE DWELLING UNITS THAT HAS A GFA OF 1,000m² TO 7,500m² = 1 SPACE	1 SPACE	COMPLIES

LOT/BUILDING INFO:		
LOT AREA:	*EXISTING LOT:*	*1,818.26 m² (19,571.57 ft²) 0.18 ha (0.45 ac)*
	PROPOSED LOT W/CORNER CONVEYANCE PER CITY OF WINDSOR	1,807.68 m² (19,457.71 ft²) 0.18 ha (0.45 ac)
BUILDING AREA:	421.62 m² (4,538.28 ft²)	
BUILDING GFA:	*FLOOR 1* = 421.62 m² (4,538.28 ft²) *FLOOR 2, 3, & 4 = 591.53 m² (6,367.18 ft²) PER FLOOR* TOTAL GFA = 2,196.21 m² (23,639.81 ft²)	
TOTAL UNITS:	20 RESIDENTIAL DWELLING UNITS	
HEIGHT OF BUILDING/ NUMBER OF STOREYS:	4 STOREYS @ 14.63 m (48.00 ft)	
TOTAL PARKING SPACES:	25 TOTAL SPACES *(2 ACCESSIBLE SPACES & 23 STANDARD SPACES)*	
BUILDING USE & OCCUPANCY:	RESIDENTIAL GROUP C, UP TO 4 STOREYS SPRINKLERED (3.2.2.43)	
LATERAL LENGTH OF CONCRETE CURBING:	217.91 m (714.93 ft)	

NOTES:
1. ALL ACCESSIBLE PARKING SPACES TO HAVE RB-93 AND RB-93T SIGNS INSTALLED.
2. ALL LIGHTING TO BE DARK SKY COMPLIANT.
3. FIRE ROUTE TO BE IN COMPLIANCE WITH OBC REQUIREMENTS & TO BE LOCATED OFF DAYTONA AVE. AS PRINCIPAL ENTRANCE IS LOCATED WITHIN 3 m & 15 m OF DAYTONA AVE.

KEY PLAN
SCALE: N.T.S



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PARTNER / CONSULTANTS

REVISIONS

Date	Revision
DEC. 12, 2023	CITY COMMENTS
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LICENSED PROFESSIONAL ENGINEER
G. SIVAKUMAR
100546565
DEC 12, 2023
PROVINCE OF ONTARIO

DATE:	AUGUST 23, 2023
SCALE:	1:150
DRAWN BY: CFS	[X] PRELIMINARY
CHECKED BY: B.P.	[-] CONSTRUCTION
APPROVED BY: ----	[-] RECORD

PROJECT TITLE
DAYTONA AVENUE APARTMENTS DEVELOPMENT
2230-2240 DAYTONA AVENUE, WINDSOR, ONTARIO

SHEET TITLE
CONCEPT SITE PLAN

JOB NUMBER 22-048

SHEET NUMBER C101