



ALEO ASSOCIATES INC.
CONSULTING ENGINEERS

8256_StormSewerStudy.docx

November 28, 2022

Corporation of the City of Windsor
Engineering Department – Development Division
350 City Hall Square West, Room 210
Windsor, Ontario, N9A 6S1

ATT: MR. ROBERT PERISSINOTTI, DEVELOPMENT ENGINEER
RE: STORM SEWER STUDY FOR THE PROPOSED RESIDENTIAL DEVELOPMENT AT
3623, 3631, 3637 HOWARD AVENUE, WINDSOR, ONTARIO

Dear Mr. Perissinotti,

We were retained by Vitti Construction to conduct a storm sewer study as part of their proposed residential development at 3623, 3631, 3637 Howard Avenue which is required at this time for a zoning by-law amendment.

The three individual properties will be merged into one as part of the proposed development and will have a total area of 12,589 m² (1.26 ha.). Each lot is currently occupied by a single-family dwelling with detached garage structures and concrete driveways. The properties consist mostly of undeveloped open grass lands located at the rear of the dwellings to the west.

The rear yard lands are generally flat and do not appear to have any slope toward an existing drainage feature and instead drains mostly by infiltration and evapotranspiration. The Merritt municipal drain is located along the west property line; however, the rear yard lands do not appear to be draining to this ditch since the top of bank is higher than the rear yard ground elevations. The developed portion of the properties located on the east side drains by overland flow to the Howard Ave. right-of-way and through piped connections to the 1,050 mm municipal storm sewer along Howard Avenue. This municipal storm sewer outfalls to the South Cameron drain which outfalls to the Grand Maris drain and ultimately drains to the Detroit River.

The pre-development release rate to be used for the proposed development shall be based on the current runoff rate of which stormwater runoff from the existing developed portion of the site drains to the Howard Avenue storm sewer unrestricted. The pre-development release rate was determined to be 33 L/s based on a hydrologic analysis using the 1:5 year 4-hour Chicago design storm distribution. See determination of the pre-development release rate enclosed.

The proposed development consists of eleven, two story multi-unit residential buildings with surrounding parking lot and landscape areas. An 80% impervious percentage will be used for the developed site. A flow restrictor will be installed at the outlet to restrict the post development flows to the pre-development release of 33 L/s. The runoff rate of the existing pre-developed condition is being maintained as part of the proposed development and therefore there will not be any effect on the receiving storm sewer system or surrounding properties.

A storm detention scheme will be carried out during the detailed design phase and will be completed to conform to the Windsor-Essex Region Stormwater Management Standards. Storage will be provided through surface storage on the parking lot surface, in swales and depressed grass areas, and in underground storm pipe and structures.

Stormwater quality control will be accomplished by incorporating an oil and grit separator unit at the outlet to treat stormwater captured from the site before it is released to the municipal sewer system. The level of treatment will be normal (70% TSS removal).

If you have any questions or concerns please contact me.

Yours Very Truly,

John-Paul Aleo, P.Eng.
ALEO ASSOCIATES INC.



Pre-Development Release Rate:

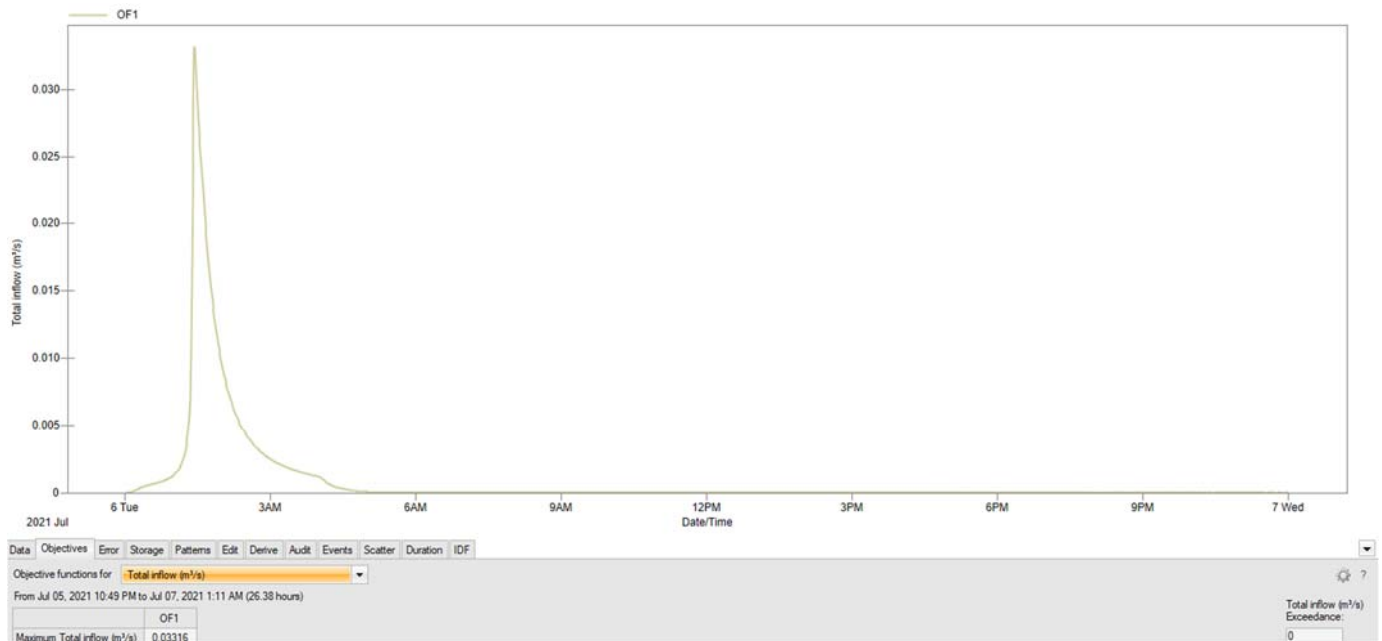
A PCSWMM model was prepared to simulate the existing drainage condition and to determine the pre-development release rate for the property. The pre-development release rate model ran the 1:5 year 4 hour Chicago storm event. Provided in the table below are the sub-catchment parameters used. The total property area is 1.26 ha., however, an area of 0.2 ha. was used in the model as this is the area currently draining to the Howard Avenue storm sewer. The remainder of the property is undeveloped grass land that does not have a drainage outlet. Since the proposed development will utilize the available storm sewer along Howard Avenue, the pre-development release will be based on the existing runoff rate from the developed portion of the property that currently drains to the municipal storm sewer unrestricted.

Table 1: Sub-catchment Parameters for the Pre-Development Release Rate Model

Attribute		Value
Area (Ha.)		0.2
Flow Length (m)		34
Flow Width (m)		59
Percent of Impervious Area (%)		35
Slope (%)		0.5
Manning's n for Impervious Area		0.013
Manning's n Pervious Area		0.24
Depression Storage Impervious (mm)		2.5
Depression Storage Pervious (mm)		7.5
Infiltration	Suction Head (mm)	180
	Conductivity (mm/hr)	0.50
	Initial Deficit, normal	0.10

Based on the existing condition, the pre-development release rate for the proposed drainage area was determined to be 33 L/s. Refer to Figure 1.

Figure 1: Pre-development 1:5 year hydrograph using 4 hour Chicago storm event.



- LEGEND**
- MH DENOTES HYDRO MANHOLE
 - MS DENOTES SEWER MANHOLE
 - MT DENOTES TELEPHONE MANHOLE
 - MR DENOTES TRAFFIC MANHOLE
 - MW DENOTES WATER MANHOLE
 - MB DENOTES BENCH MARK
 - CR DENOTES CATCH BASIN
 - DB DENOTES DOUBLE CATCH BASIN
 - LSC DENOTES LIGHT STANDARD CONCRETE
 - LSS DENOTES LIGHT STANDARD STEEL
 - LSW DENOTES LIGHT STANDARD WOOD
 - UPC DENOTES UTILITY POLE CONCRETE
 - UPS DENOTES UTILITY POLE STEEL
 - UPW DENOTES UTILITY POLE WOOD
 - GP DENOTES GUY POLE
 - GW DENOTES GUY WIRE
 - BM DENOTES BOLLARD
 - PM DENOTES PARKING METER
 - TDC DENOTES TOP OF CURB
 - BDC DENOTES BOTTOM OF CURB
 - FV DENOTES FIRE VALVE
 - WV DENOTES WATER VALVE
 - MV DENOTES WATER VALVE (Service)
 - MV DENOTES WATER VALVE (Main)
 - GM DENOTES GAS METER
 - GV DENOTES GAS VALVE
 - HM DENOTES HYDRO METER
 - PWC DENOTES TELEPHONE PEDESTAL
 - PWCV DENOTES CABLE TV PEDESTAL
 - TSS DENOTES TRAFFIC SIGN
 - TSSC DENOTES TRAFFIC SIGNAL
 - TSSB DENOTES TRAFFIC SIGNAL BOX
 - TH DENOTES TESTHOLE
 - BM DENOTES BENCH MARK
 - HCP DENOTES HORIZONTAL CONTROL POINT
 - VCP DENOTES VERTICAL CONTROL POINT
 - SH DENOTES SHRUB
 - SC DENOTES SEWER CLEANOUT
 - INV DENOTES INVERT

DECIDUOUS AND CONIFEROUS TREES ARE DENOTED BY 'D' AND 'C' RESPECTIVELY. A PREFIX TO THE DESCRIPTION RESERVES THE NUMBER OF TREE TRUNKS WHEN TREES ARE CLUMPED TOGETHER AND A SUFFIX DENOTES THE TREE DIAMETER OR (N/S) NOT TO SCALE.

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

UNDERGROUND CABLE, HYDRO OR TELEPHONE LINES ARE PREFIXED WITH THE LETTER "U" (CABLE = UC HYDRO = UH TELEPHONE = UT)

"METRIC"
Distances and coordinates shown on this plan are in Metres and can be converted to feet by dividing by 0.3048

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

- 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 CORRECTED SCALE FACTOR OF 0.9999910
- ALL SET SSB AND PS MONUMENTS WERE USED DUE TO LACK OF OVERBURDEN AND/OR PROXIMITY OF UNDERGROUND UTILITIES IN ACCORDANCE WITH SECTION 11 (4) OF OREG. 525/91
- DENOTES SURVEY MONUMENT FOUND
 - DENOTES SURVEY MONUMENT SET
 - SSB DENOTES STANDARD IRON BAR
 - PSB DENOTES SHORT STANDARD IRON BAR
 - IRB DENOTES IRON BAR
 - PB DENOTES PLASTIC BAR
 - WIT DENOTES WITNESS
 - M DENOTES MEASURED
 - S DENOTES SET
 - L DENOTES PERPENDICULAR
 - D DENOTES DEED
 - U DENOTES UNCOMMON
 - ORP DENOTES OBSERVED REFERENCE POINT
 - ORP DENOTES OBSERVED REFERENCE POINT
 - (P) DENOTES REGISTERED PLAN 1431
 - (P1) DENOTES PLAN OF SURVEY BY (1744), DATED: JAN 5, 2017, PLAN FILE: B-6574
 - (P2) DENOTES PLAN OF SURVEY BY (1744), DATED: MARCH 23, 1998, PLAN FILE: B-3016
 - (JDB) DENOTES J.D. BARNES LIMITED
 - (1744) DENOTES VERHAEGEN LAND SURVEYORS

TOPOGRAPHIC SURVEY
OF
LOTS 12 & 13,
REGISTERED PLAN 1431
IN THE
CITY OF WINDSOR
COUNTY OF ESSEX, ONTARIO
© VERHAEGEN LAND SURVEYORS - A DIVISION OF J. D. BARNES LIMITED.
SCALE = 1:250

ASSOCIATION OF ONTARIO
LAND SURVEYORS
PLAN SUBMISSION FORM
2197036

THIS PLAN IS NOT VALID UNLESS IT IS AN UNCORRECTED ORIGINAL COPY ISSUED BY THE SURVEYOR

MERRITT DRAIN TOP OF BANK ELEVATIONS ARE HIGHER THAN GROUND ELEVATIONS WITHIN PROPERTY. AN OVERLAND FLOW ROUTE TO THE DRAIN IS NOT EVIDENT.

Part 1, Plan 12R -3406

UNDEVELOPED PORTION OF SITE, THE REAR YARD GRASS LAND WEST OF EX. DWELLINGS, ARE GENERALLY FLAT. DRAINS BY INFILTRATION & EVAPOTRANSPIRATION. AREA OF ~10,600 m² (1.06 Ha.)

TOTAL COMBINED PROPERTY AREA IS 12,600 m² (1.26 Ha.)

DEVELOPED PORTION OF THE SITE, ON EAST SIDE OF PROPERTY, DRAINS TO THE 1,050 mm STORM SEWER ALONG HOWARD AVENUE. AREA OF ~2,000 m² (0.2 Ha.)

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

BENCH MARK
BENCH MARK 486
3567 HOWARD AVENUE, THE PLATE IS LOCATED ON THE EAST WALL, 0.18m SOUTH OF THE NORTH WALL AND 0.39m ABOVE GROUND. ELEVATION 188.10

SITE BENCH MARK
TOP OF FIRE HYDRANT ON EAST SIDE OF HOWARD AVENUE OPPOSITE MUN. NO. 3631 HOWARD AVENUE. ELEVATION 188.28

INTEGRATION DATA

POINT ID	NORTHING	EASTING
ORP-A	N4680867.63	E334978.89
ORP-B	N4681034.96	E335130.53

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 225.84m (GROUND) N42°11'00"E FOR BEARING COMPARISON. A ROTATION OF 01°19'30" CLOCKWISE WAS APPLIED TO (P) & (P1) TO CONVERT TO GRID BEARINGS.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

- THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
- THIS SURVEY WAS COMPLETED ON THE 6th DAY OF OCTOBER, 2022.

DATE: OCTOBER 21, 2022

Roy A. Simone
ROY A. SIMONE
ONTARIO LAND SURVEYOR

VERHAEGEN SURVEYING
LAND SURVEYORS
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DRAWN BY: A.J.M. CHECKED BY: R.A.S. REFERENCE NO.: 22-47-405-00
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