



FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

PROPOSED MIXED-USE DEVELOPMENT
109 GARDEN DRIVE

TOWN OF OAKVILLE
REGIONAL MUNICIPALITY OF HALTON

FILE No. 224-OK30

JUNE 24, 2024



3464 Semenyk Court, Suite 100
Mississauga, Ontario L5C 4P8
(905) 276-5100
info@skiraconsult.ca

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1.0 INTRODUCTION

Skira & Associates Ltd. Was retained by Plaza Corp. to investigate and prepare a Functional Servicing Report (FSR) and Stormwater Management Report (SWM) in support of the proposed mixed-use development consisting of two (2) commercial units and four (4) townhouse blocks (48 units).

The proposed mixed-use development is located on the east side of Garden Dr., north of Lakeshore Rd. in the Town of Oakville, Regional Municipality of Halton. The existing dwellings within the boundary of the site have been demolished as part of the preparation of the proposed development.

It is intended that this report will assist in the assessment and review of Site Plan application and guide the detailed design of the proposed mixed-use development. The proposed design criteria is intended to meet the requirements of the Town of Oakville and any other relevant authorities. This report is to be implemented and reviewed in conjunction with the detailed design on site grading and servicing plans.

2.0 SITE AREA INFORMATION

The subject site is part of Lot 17, Concession 3, south of Dundas St., Town of Oakville, Regional Municipality of Halton. It covers an area of 0.4989 Ha. The existing municipal easement was quit claimed.

The subject site is bounded by Garden Dr. to the southwest and Lakeshore Rd. W. to the southeast. The subject site is surrounded by existing townhouses and mid-rise condominium on the northeast side and northwest side. *Refer to **Figure 1: Key Plan**.*

The existing dwellings in the subject site have been demolished as part of the preparation for the proposed development. Currently, the subject site is vacant. The subject site is sloping from northwest to southeast with a grade differential of approx. 2.0m.

The proposed mixed-use development will consist of two (2) retail units and four (4) townhouse blocks (48 units) with garages being part of the building footprint.

3.0 SITE ACCESS

The subject site access will be Garden Dr. The existing road network will provide access to arterial roads such as Lakeshore Rd. W, Dorval Dr., and to nearby highways such as Highway QEW.

Currently, the subject site has a driveway off Garden Dr. The existing driveway will be removed.

The proposed mixed-use development will be provided with four (4) 7.5m wide driveway accesses off Garden Dr. to each townhouse block.

Block A, B & C will have garage access doors at the face of the building fronting Garden Dr. Block D will be accessed through a short condominium road complete with visitor parking for retail/commercial units as well as residential dwellings.

Lakeshore Rd. frontage will be reconstructed to provide urbanized boulevard cross-section complete with hard surface streetscaping treatment.

Garden Dr. E. boulevard will be complete with top curb and sidewalk to finalise the work previously started by Vandyk Corporation.

*Refer to **Dwg. No. 224-OK30-2: Concept Grading Plan.***

4.0 STORM DRAINAGE SYSTEM

4.1 Existing Drainage Conditions

According to available records, there is an existing 450mm storm sewer running east on garden Dr. The existing storm sewer on Garden Dr. is designed for 5-yr storm intensity at runoff coefficient $C = 0.60$.

Refer to Storm Drainage Plan prepared by Skira & Associates – Dwg. No. 210-OK22-4.

The existing discharge from the site is as follows:

$$\begin{array}{ll} A & = 0.4948 \text{ Ha} \\ C & = 0.60 \\ T_c & = 10.00 \text{ min.} \\ I_{5\text{yr}} & = \frac{1,170}{(10+5.8)^{0.843}} \\ & = 114.2 \text{ mm/hr} \end{array} \qquad \begin{array}{ll} Q & = 0.028 \text{ CIA} \\ Q_{5\text{yr}} & = 0.028 \times 0.60 \times 114.2 \times 0.4989 \\ & = \mathbf{0.0957\text{m}^3/\text{s}} \end{array}$$

Therefore, the allowable discharge from the site is **0.0957m³/s**.

4.2 Proposed Discharge

A 300mm storm connection will be constructed off the existing storm sewer on Garden Dr. to service the proposed development. The proposed development consists of two (2) retail units and four (4) townhouse blocks, with a runoff coefficient $C = 0.70$.

Refer to Dwg. No. 224-OK30-1: Concept Servicing Plan.

On-site stormwater management will be implemented to restrict post-development flows up to 100-yr storm intensity to 5-yr storm intensity at pre-development level.

Using the Rational Method for the 100-yr storm event calculation and established allowable discharge, the required detention volume is calculated as follows:

YEAR STORM

100 YEAR

C =

0.700

TOWN

OAKVILLE

A (ha) =

0.49890

Max. Required

Allow. Discharge Q_a (m³/s) =

0.095700

Detention (m³) =

59.46

Safety Factor S_f =

0%

RAINFALL DURATION	RAINFALL INTENSITY	TOTAL RUNOFF	INFLOW VOLUME	OUTFLOW VOLUME	REQUIRED DETENTION VOLUME (m ³)
T_c (min)	I (mm/hr)	$Q=CIA/360$ (m ³ /sec)	V_i (m ³)	V_o (m ³)	$D=(V_i-V_o)*S_f$
5	279.34	0.2710	81.30	32.68	48.62
10	200.80	0.1948	116.88	57.42	59.46
15	158.27	0.1535	138.18	82.34	55.84
20	131.37	0.1274	152.92	107.38	45.54

The maximum required detention volume is **59.46m³** which will be provided by a CULTEC Recharger 360HD system. The cultec system is designed with 2 rows x 12 units. Both legs of cultec can provide a combined total a storage volume of **74.06m³** which satisfies the detention requirement.

See *Appendix D* for calculations.

4.3 Orifice Control

The allowable discharge of **0.0957m³/s** will be controlled by means of an orifice restrictor plate installed downstream of control manhole STMMH 1. The size of the orifice plate is **166mm dia.**, with a discharge rate of **0.0951m³/s**.

Refer to *Appendix B* for the orifice control plate calculations done through Flow Master program developed by Haestad Methods Inc. (USA).

4.4 Quality Control

According to the Ministry of the Environment & Climate Change's Stormwater Management Planning & Design Manual, the site is required to provide a long-term average removal of 80% of Total Suspended Solids (TSS) for the enhanced protection of waterways. Quality control will be provided to Level 1 TSS removal through the use of oil/grit separator (OGS).

Oil/grit separator is suitable for institutional/commercial/industrial areas where the level of concentrated pollutants is expected to be higher. For the proposed mixed-use development, it is considered feasible to provide an OGS on the proposed storm sewer.

Stormwater runoff will be intercepted at catchbasins and conveyed through the OGS prior to being released into the proposed storm sewer.

The proposed OGS is HydroDome HD 6 manufactured by Hydroworks. This unit will provide Level 1 protection (83% TSS removal).

Refer to *Appendix C* for the output file created by Hydroworks.

4.5 Water Balance Consideration

The Town of Oakville requires the site to retain 5mm of every rainfall and allow it to infiltrate back into the ground.

The required volume to be retained on site is as follows:

$$\begin{aligned} V_{5\text{mm}} &= 4,989\text{m}^2 \times 0.005\text{m} \\ &= \mathbf{24.95\text{m}^3} \text{ per rainfall} \end{aligned}$$

The cultec system will be extended 0.15m below the outlet to accommodate the required 5mm volume. The storage volume provided is as follows:

$$\begin{aligned} V_{\text{cultec}} &= 83.43\text{m}^2 \text{ (base area)} \times 0.75\text{m} \text{ (depth)} \times 0.40 \text{ (porosity)} \\ &= \mathbf{25.03\text{m}^3} \end{aligned}$$

5.0 SANITARY DRAINAGE SYSTEM

According to available records, there is an existing 250mm sanitary sewer running west on Garden Dr. The existing sanitary connections will be disconnected as per Region of Halton standards.

Four (4) 150mm sanitary connections will be constructed off the existing sanitary sewer on Garden Dr. to service the proposed development. Individual 125mm sanitary connections will be provided for the townhouse units and a 150mm sanitary connection will be provided for the retail units. Detailed sanitary sewer layout will be provided through site plan application process.

*Refer to **Dwg. No. 224-OK30-1: Concept Servicing Plan.***

The existing 250mm sanitary sewer will have sufficient capacity and depth to accept the proposed mixed-use development via gravity flow.

The sanitary design flow for the proposed mixed-use development is established as follows:

Sanitary Design Flow Calculation

Commercial Population = $90\text{p/ha} \times 0.0264\text{ha}$
= $2.376\text{p} \approx 3\text{p}$

Peak Flow Factor = $1 + \frac{14}{4 + \sqrt{0.003}}$
= 4.453

Commercial Average Flow = $24.75\text{m}^3/\text{ha/day} \times 0.0264\text{ha}$
= $0.6534\text{m}^3/\text{day}$
= 0.0076 L/s

Commercial Peak Flow = $0.0076\text{ L/s} \times 4.453$
= **0.0338 L/s**

Townhouse Population = $135\text{p/ha} \times 0.4725\text{ha}$
= $63.79\text{p} \approx 64\text{p}$

Peak Flow Factor = $1 + \frac{14}{4 + \sqrt{0.064}}$
= 4.292

Townhouse Average Flow = $0.275\text{m}^3/\text{p/day} \times 64\text{p}$
= $17.6\text{ m}^3/\text{day}$
= 0.2037 L/s

Townhouse Peak Flow = $0.2037\text{ L/s} \times 4.292$
= **0.8743 L/s**

Infiltration Flow = $0.286\text{ L/ha/s} \times 0.4989\text{ha}$
= **0.1427 L/s**

Total Combined Design Flow = $0.0338 + 0.8743 + 0.1427$
= **1.051 L/s**

6.0 WATER DISTRIBUTION SYSTEM

According to available records, there is an existing 200mm watermain on Garden Drive. The existing water service connections will be disconnected as per Region of Halton standards.

An existing 150mm watermain within the municipal easement has been decommissioned and pipe will be removed during construction. Easement was quit claimed and all abandoned watermains will be removed off-site.

For reference see Skira & Associates Ltd. Drawing for Maurice Dr. Reconstruction – Dwg. No. 212-OK86 in Appendix A.

A 150mm watermain connection will be constructed off the existing watermain on Garden Dr. and looped back to the existing watermain on Garden Dr. Individual 25mm copper type ‘K’ water service connections will be provided for the townhouse units and a 150mm water service connection will be provided for the retail units. Detailed watermain layout will be provided through site plan application process. Refer to **Dwg. No. 224-OK30-1: Concept Servicing Plan.**

The existing fire hydrant on Garden Dr. will be utilized to provide fire coverage for the proposed mixed-use development.

Each residential block will be provided with fire main sprinkler riser. Based on building code requirement, the garage space, as well as each individual unit, will be completely sprinklered.

Water demand from the proposed mixed-use development is established as follows:

Water Demand Calculation

Commercial Population	= 3p
Townhouse Population	= 64p
Total Population	= 3 + 64 = 67p
Average Daily Demand	= 0.275 m ³ /p/day x 67p = 18.43 m ³ /day = 0.2133 L/s
Max. Daily Demand	= 0.2133 L/s x 2.25 = 0.4799 L/s
Max. Hourly Demand	= 0.2133 L/s x 4.00 = 0.8532 L/s

Based on Fire Underwriters Survey (2019), the fire flow demand for the proposed mixed-use development was calculated using the formula:

$$F = 220C\sqrt{A} \quad \text{where, } F = \text{fire flow in L/min}$$

$C = \text{construction coefficient, 1.0 for ordinary construction}$
 $A = \text{total effective area, 2,476m}^2$

$$F = 220 \times 1.0 \times \sqrt{2,476}$$
$$= 10,947 \text{ L/min}$$

Decrease can be applied for occupancy having a low content fire hazard:

$$F = 10,947 \text{ L/min} \times (1 - 25\%)$$
$$= 8,210 \text{ L/min}$$

Each unit will be sprinklered allowing further reduction:

$$F = 8,210 \text{ L/min} \times (1 - 30\%)$$
$$= 5,747 \text{ L/min}$$

Adjustment surcharge must be applied based on the exposure of the building and close proximity to other existing residences:

$$F = 5,747 \text{ L/min} \times (1 + 60\%)$$
$$= 9,195 \text{ L/min} \approx 9,000 \text{ L/min}$$
$$= \mathbf{150 \text{ L/s}}$$

$$\text{Design Water Demand} = 0.4799 \text{ L/s} + 150 \text{ L/s}$$
$$= \mathbf{50.48 \text{ L/s}}$$

A fire flow test will be conducted on the existing Garden Dr. watermain to confirm that there is sufficient fire protection and water demand.

7.0 SUMMARY

The findings and recommendations were prepared in accordance with accepted professional engineering principles and practices. Based on the above, the proposed mixed-use development can be adequately serviced by the proposed and existing municipal infrastructure.

The findings and recommendations of this report are global and are related to the servicing functionality of this application. These findings by means are final and are not to replace the detail review of this application which shall take place upon submission of future application for building permit.


The conclusion is as follows:

- The proposed mixed-use development will be serviced by the existing storm sewer on Garden Dr. Quantity control will be achieved by Cultec system. Quality control will be achieved by oil/grit separator.
- The proposed mixed-use development will be serviced by the existing sanitary sewer on Garden Dr. Individual 125mm sanitary connections will be provided for townhouse units and a 150mm sanitary connection will be provided for retail units.
- The proposed mixed-use development will be serviced by the existing watermain on Garden Dr. Individual 25mm water service connections will be provided for townhouse units and a 150mm water service connection will be provided for retail units. All blocks will be provided with 150 dia. fire line and individual units will be sprinklered.
- The existing fire hydrant will be utilized to provide fire coverage

We respectfully submit this report with intention of obtaining approval in principal the recommendations herein, which will be implemented in detail design during engineering submission, site plan process and building permits.

Yours truly,

SKIRA & ASSOCIATES LTD.


Michael Jozwik, P. Eng.
MJ:ak

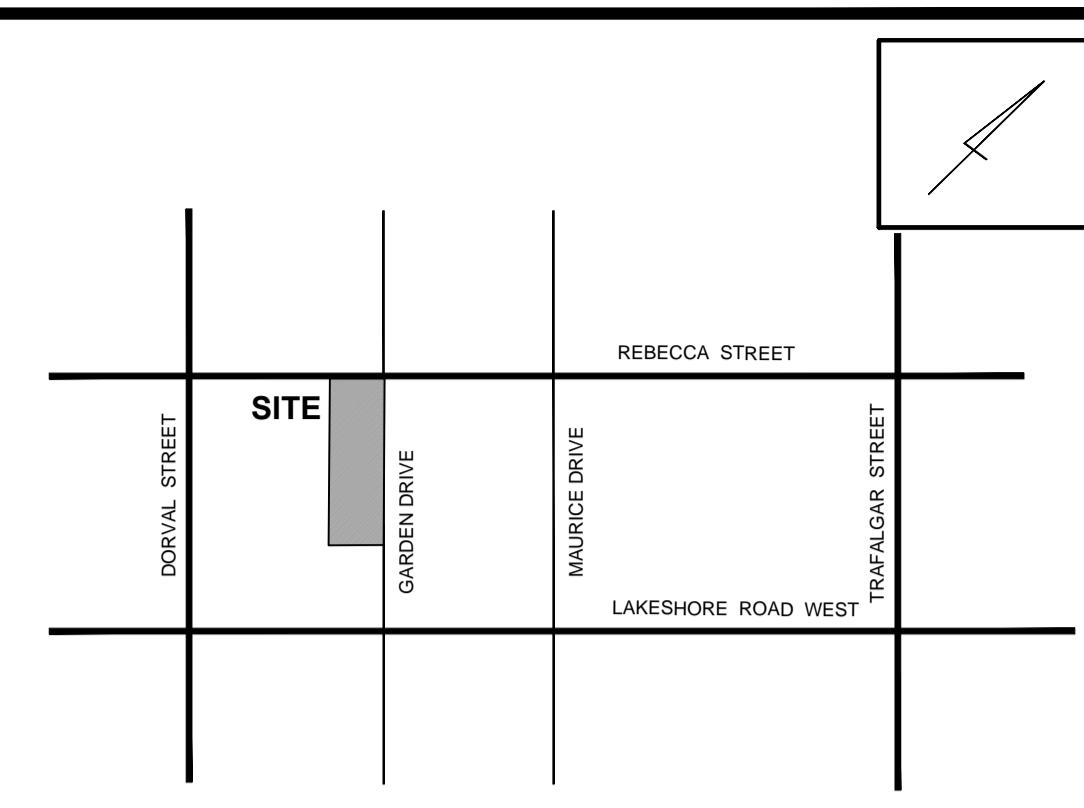
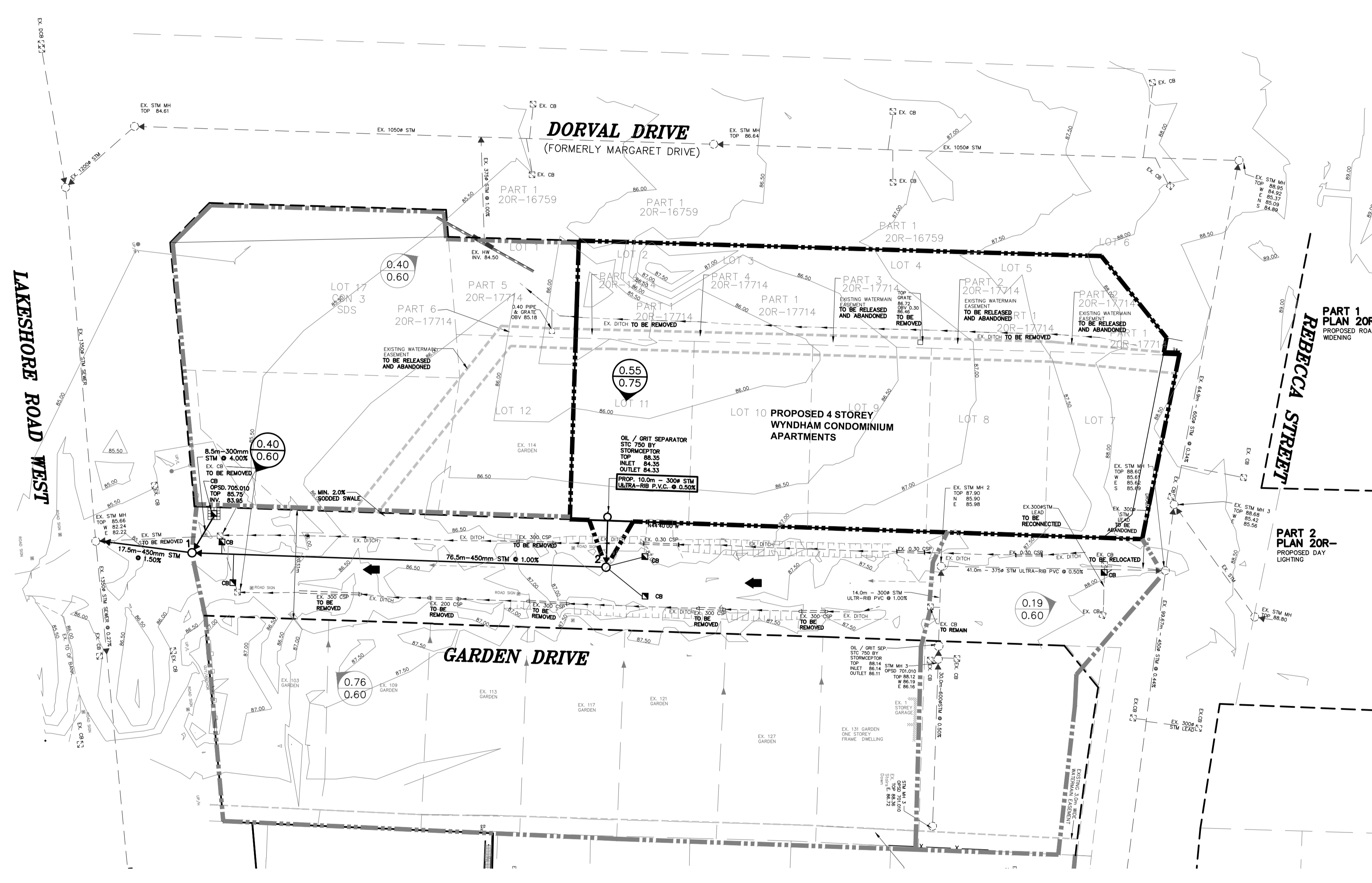


NOTE: **Limitation of Report**

*This report was prepared by **Skira & Associates Ltd.** for **Plaza Corp.** for review and approval by government agencies only.*

*In light of the information available at the time of preparation of this report, any use by a **Third Party** of this report are solely the responsibility of such **Third Party** and **Skira & Associates Ltd.** accepts no responsibility for any damages, if any, suffered by the **Third Party**.*

APPENDIX A
GARDEN DR. STORM DRAINAGE PLAN
MAURICE DR. WATERMAIN RECONSTRUCTION PLAN



KEY PLAN (N.T.S.)

LEGEND

- 0.55 AREA (HECTARES)
- 0.75 RUN-OFF COEFFICIENT
- SINGLE CATCH-BASIN
- DOUBLE CATCH-BASIN
- CATCH-BASIN WITH SEDIMENT CONTROL WITH SALT FENCE + STORE MANHOLE
- DIRECTION OF FLOW
- OVERLAND FLOW ROUTE
- EXISTING OVERLAND FLOW ROUTE
- DRAINAGE AREA BOUNDARY
- EXISTING DRAINAGE AREA BOUNDARY

NOTES

- FOR GENERAL NOTES SEE DWG. No. 1.
- FOR STANDARD DETAILS SEE DWG. No. 7 & 8.

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTING UNDERGROUND & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING. FOR STAKE OUT, THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES.

No	DATE	BY	REVISIONS	
DESIGN	Z.S.	CHECKED	R.K.	DATE
DRAWN	M.B.	CHECKED	R.K.	

BENCHMARK No.: OBM-008 ELEV. 86.68m
 DESCRIPTION: EASTERLY CORNER OF CONCRETE BASE OF LIGHT STANDARD ON THE NORTH SIDE OF SOUTHERLY DRIVEWAY TO ST. THOMAS AQUINAS HIGH SCHOOL (124 MARGARET DR.)

FIRST	SECOND	INTERIM	PRE-SER	FINAL
DATE SEPT. 16/10	DATE MAR. 17/11	DATE DEC. 08/11	DATE	DATE FEB. 27/12

SCALE: HOR 1:500

0 5 10 15 20 25

APPROVALS

MUNICIPAL APPROVED IN PRINCIPLE SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO TOWN OF OAKVILLE STANDARDS AND SPECIFICATIONS.

REGIONAL DESIGN OF SANITARY AND WATER SERVICES APPROVED SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO HALTON REGION STANDARD AND SPECIFICATIONS AND LOCATION APPROVAL FROM AREA MUNICIPALITY.

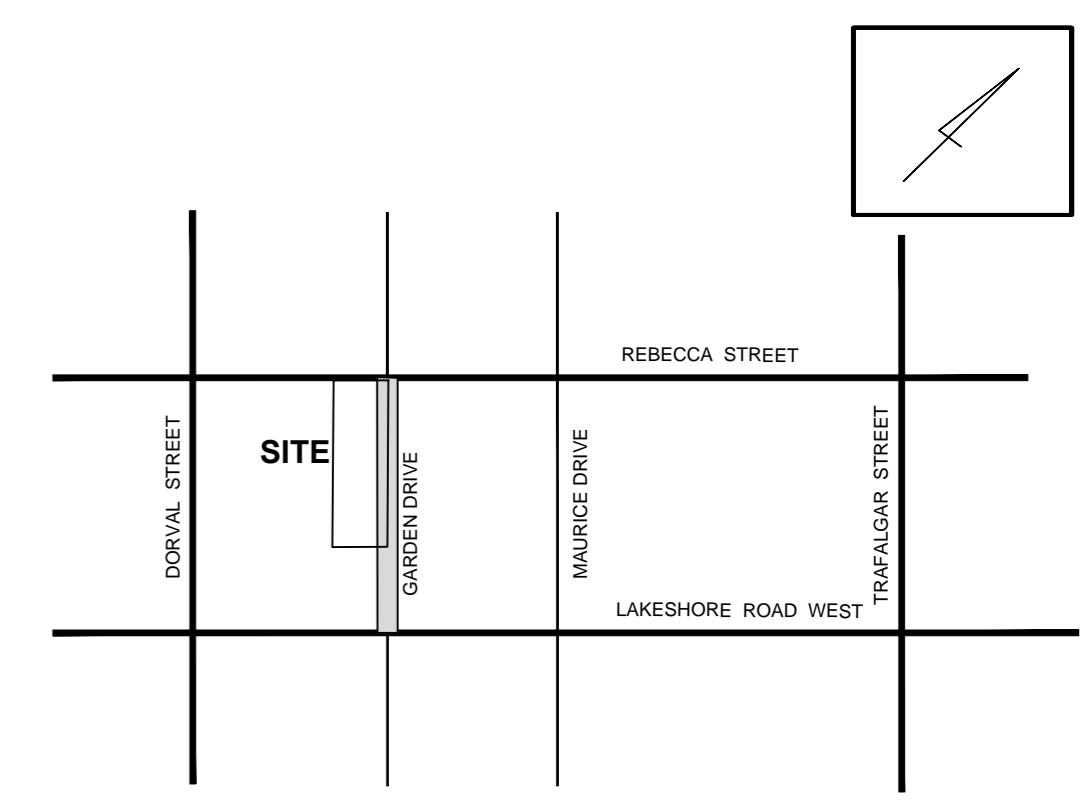
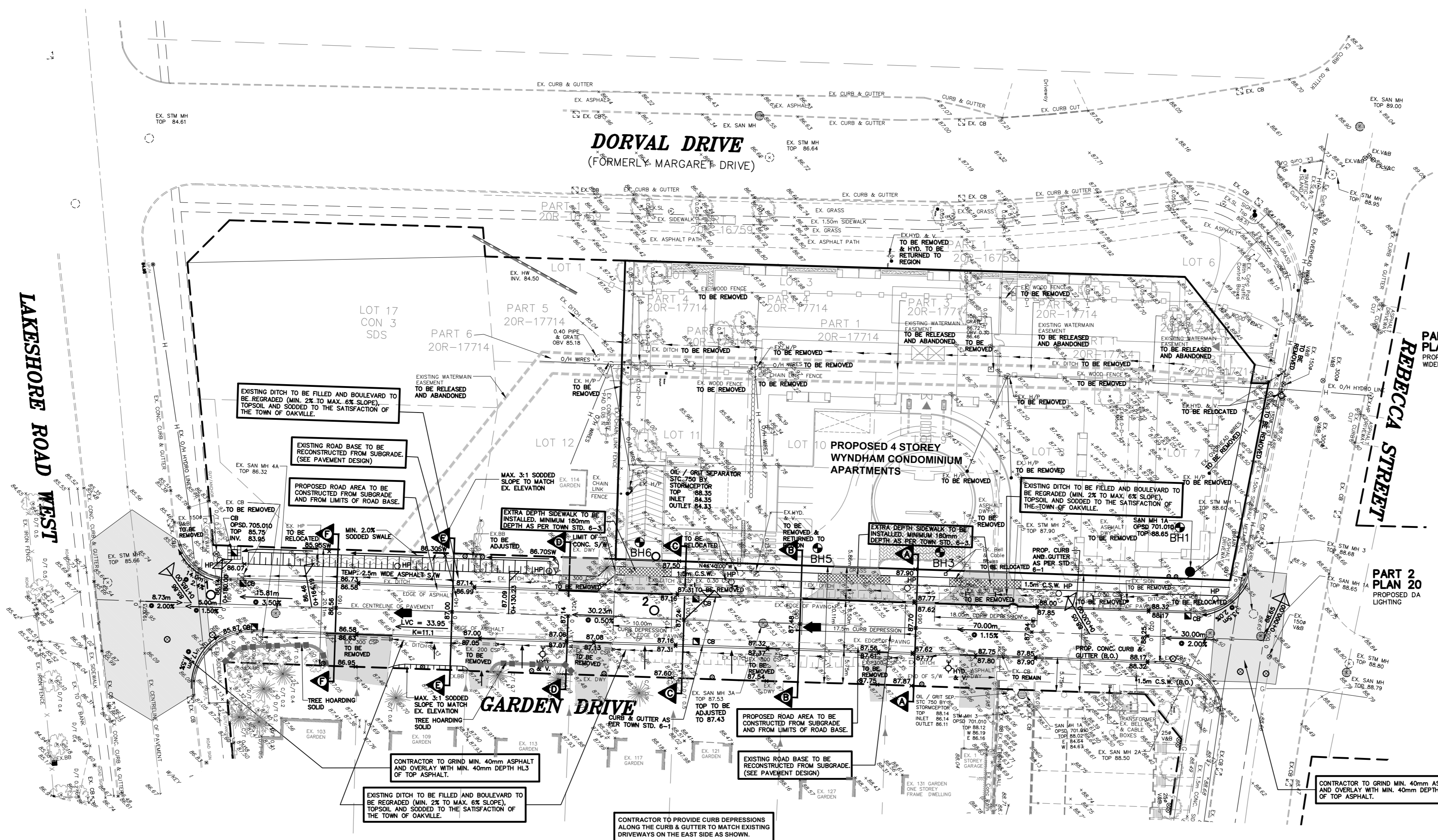
PROFESSIONAL ENGINEER: ROMAN T. KERKUSZ, FEB. 27/12, PROVINCE OF ONTARIO

CONSULTANT: **SKIRA & ASSOCIATES LTD.**
 CONSULTING ENGINEERS
 3464 Semenyk Court, Suite 100, Mississauga, Ontario L5C 4P8
 Tel. (905) 276-5100 Fax. (905) 270-1936 Email - info@skiraconsult.ca

MUNICIPALITY: **TOWN OF OAKVILLE**
 The Regional Municipality Of Halton

TITLE: **VANDYK - WYNDHAM PLACE LTD. STORM DRAINAGE PLAN**
 (SHEET 1 OF 1)

MUNICIPAL DRAWING NO. R-481-11	REGIONAL DRAWING NO. DO-695
PROJECT NO. 210-OK22	DRAWING NO. 3
SHEET 3 OF 8	



LEGEND

198.05 (200.00) 126.25 199.45 198.50 198.50 198.50	<ul style="list-style-type: none"> - EXIST. ELEVATION - EXIST. ELEVATION TO REMAIN - PROP. ELEVATION - PROP. ELEVATION BY OTHERS - PROP. FRONT BUILDING LINE ELEVATION - PROP. REAR BUILDING LINE ELEVATION - PROP. SWALE ELEVATION - FUTURE ELEVATION - DIRECTION OF SURFACE FLOW - EXISTING CONTOURS - MAX. 5:1 SLOPE - LOT NUMBER - PROP. GRADING TYPE - OVERLAND FLOW ROUTE - EX-TREE TO REMAIN - EX-TREE TO BE REMOVED - EX-TREE TO BE RELOCATED - BOREHOLE - HYDRO TRANSFORMER - PAD MOUNTED SWITCHGEAR 	<ul style="list-style-type: none"> - SINGLE CATCHBASIN - DOUBLE CATCHBASIN - CATCHBASIN WITH SEGMENT CONTROL WITH 5:1 FENCE - STORM MANHOLE - SANITARY MANHOLE - HYDRANT & VALVE - VALVE & BOX - ACOUSTICAL FENCE (REFER TO LANDSCAPE ARCHITECT DWG.) - BLACK VINYL CHAIN LINK FENCE - WOOD SCREEN FENCE (REFER TO LANDSCAPE ARCHITECT DWG.) - TOP OF FENCE OR BOTTOM OF WALL - TOP OF CURB OR BOTTOM OF CURB - TOP OF BERM - WALKOUT BASEMENT - EX ASPHALT DRIVEWAY - ENGINEERED FILL AREA
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NOTES
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No	DATE	BY	REVISIONS
1			

DESIGN	Z.S.	CHECKED	R.K.	DATE
DRAWN	G.G.	CHECKED	R.K.	

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FIRST	SECOND	INTERIM	PRE-SER	FINAL
DATE	DATE	DATE	DATE	DATE
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SCALE
 HOR 1:500
 0 5 10 15 20 25

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REGIONAL
 DESIGN OF SANITARY AND WATER SERVICES APPROVED SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO HALTON REGION STANDARD AND SPECIFICATIONS AND LOCATION APPROVAL FROM AREA MUNICIPALITY.



CONSULTANT
SKIRA & ASSOCIATES LTD.
 CONSULTING ENGINEERS
 3464 Semenyk Court, Suite 100, Mississauga, Ontario L5C 4P8
 Tel. (905) 276-5100 Fax. (905) 270-1936 Email - info@skiraconsult.ca

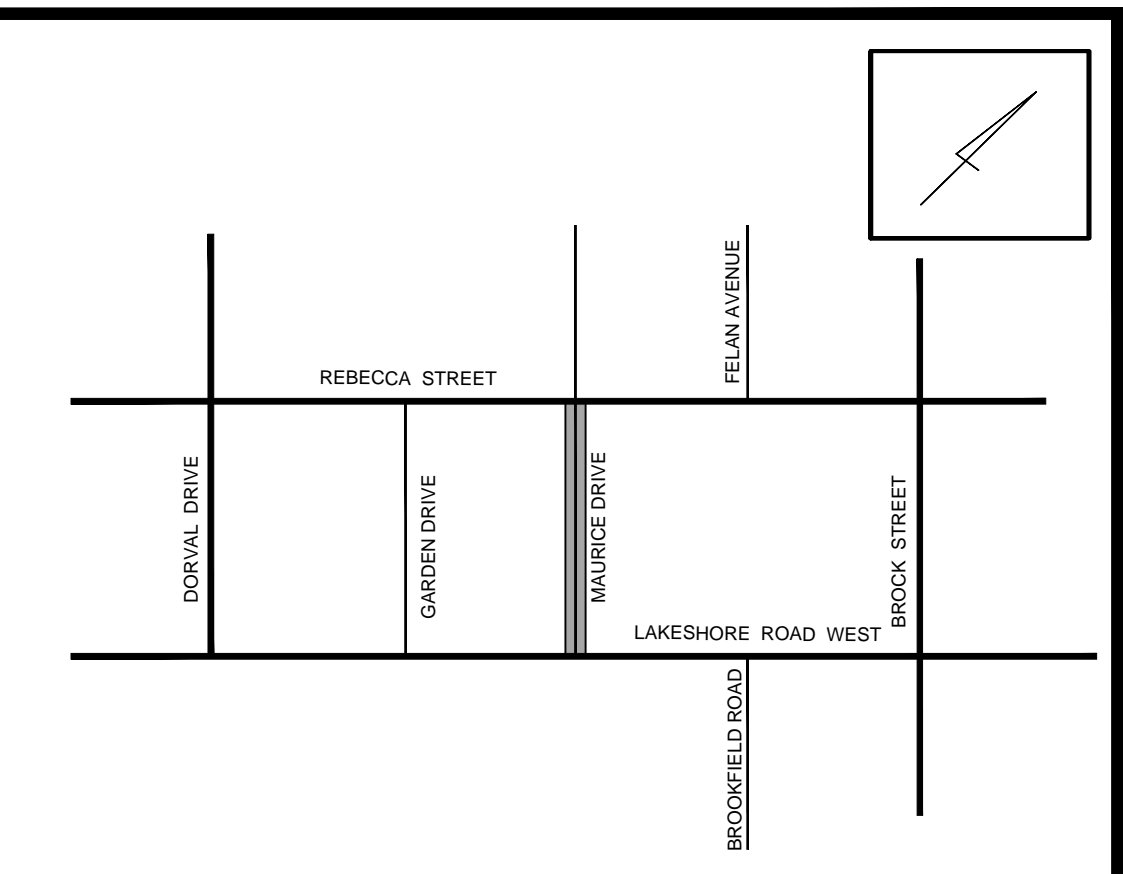
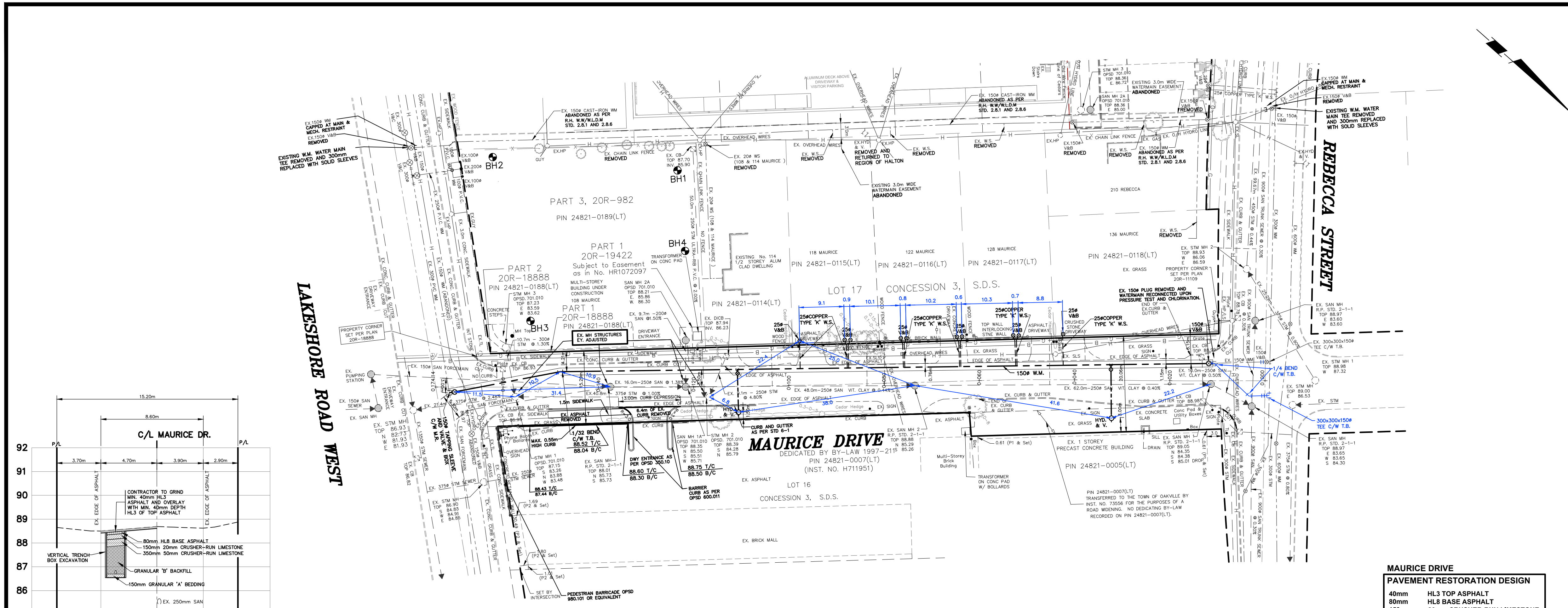
MUNICIPALITY
TOWN OF OAKVILLE
 The Regional Municipality of Halton

TITLE
VANDYK - WYNDHAM PLACE LTD.
GRADING PLAN
 (SHEET 1 OF 1)

MUNICIPAL DRAWING NO. R-481-11	REGIONAL DRAWING NO. DO-695
PROJECT NO. 210-OK22	DRAWING NO. 4
	SHEET 4 OF 8

- NOTE**
- THE ELEVATION OF SIDE SWALE AT THE LOT LINE SHALL BE A MINIMUM OF 150mm BELOW THE BUILDING LINE ELEVATION AT THE CENTRE OF THE LOT.
 - THE DRIVEWAY FROM STREETLINE TO THE GARAGE IS NOT TO EXCEED 8% IN GRADE.
 - NO SODDING ON ANY LOTS OR BLOCKS IS PERMITTED UNTIL PRELIMINARY INSPECTION IS DONE BY BOTH THE ENGINEER AND THE BUILDER.
 - PRIOR TO ANY SODDING, THE BUILDER IS TO ENSURE TO THE SOILS CONSULTANT AND/OR THE ENGINEER THAT THE LOT HAS BEEN GRADED AND TOPSOILED AND SODDED COMPLETELY WITH A MINIMUM DEPTH OF 100mm OF TOPSOIL AND NO. 1 NURSERY SOIL A MINIMUM DEPTH OF 150mm OF CRUSHED STONE IS TO BE PROVIDED ON THE ENTIRE LENGTH OF EACH DRIVEWAY ON A FIRM SUBGRADE AND THE DRIVEWAY IS TO BE PAVED WITH A MINIMUM COMPACTED DEPTH OF 75mm OF ASPHALT BETWEEN THE CURB AND THE GARAGE. PAVING OF THE DRIVEWAY IS TO BE UNDERTAKEN IN TWO SEPARATE PHASES. PHASE 1, BEING THE PLACING OF THE 50mm OF 1/2" ASPHALT IS TO BE COMPLETED AT THE TIME OF SODDING OF THE LOT WHILE PHASE 2, BEING THE PLACING OF 25mm HL3A ASPHALT IS TO BE COMPLETED AT THE TIME OF TOP COURSE ASPHALT PAVEMENT ON THE ROADWAY.
 - ALL BACKYARDS TO HAVE GRADES NO GREATER THAN 5.0% SLOPE AND A MINIMUM OF 2.0% SLOPE
 - ALL REAR LOT CATCHBASINS ARE TO BE TOWN OF OAKVILLE STD. 3-2 & STD. 5-2.
 - THE DIFFERENCE IN GRADE BETWEEN TOP OF SILL OF DOOR AND GROUND ELEVATION SHALL NOT BE GREATER THAN 0.4m.
 - FOUNDATION FOOTINGS ADJACENT TO PROPOSED REARLOT CATCHBASIN LEAD SHALL BE EXTENDED TO UNDISTURBED GROUND AND APPROVED BY SOILS CONSULTANT.

PRIOR TO ANY CONSTRUCTION, THE CONTRACTOR IS TO REFER TO THE TREE PRESERVATION PLAN PREPARED BY THE LANDSCAPE ARCHITECT.



MAURICE DRIVE PAVEMENT RESTORATION DESIGN

40mm	HL3 TOP ASPHALT
80mm	HL8 BASE ASPHALT
150mm	20mm CRUSHER-RUN LIMESTONE
350mm	50mm CRUSHER-RUN LIMESTONE
620mm	TOTAL CONSTRUCTION DEPTH

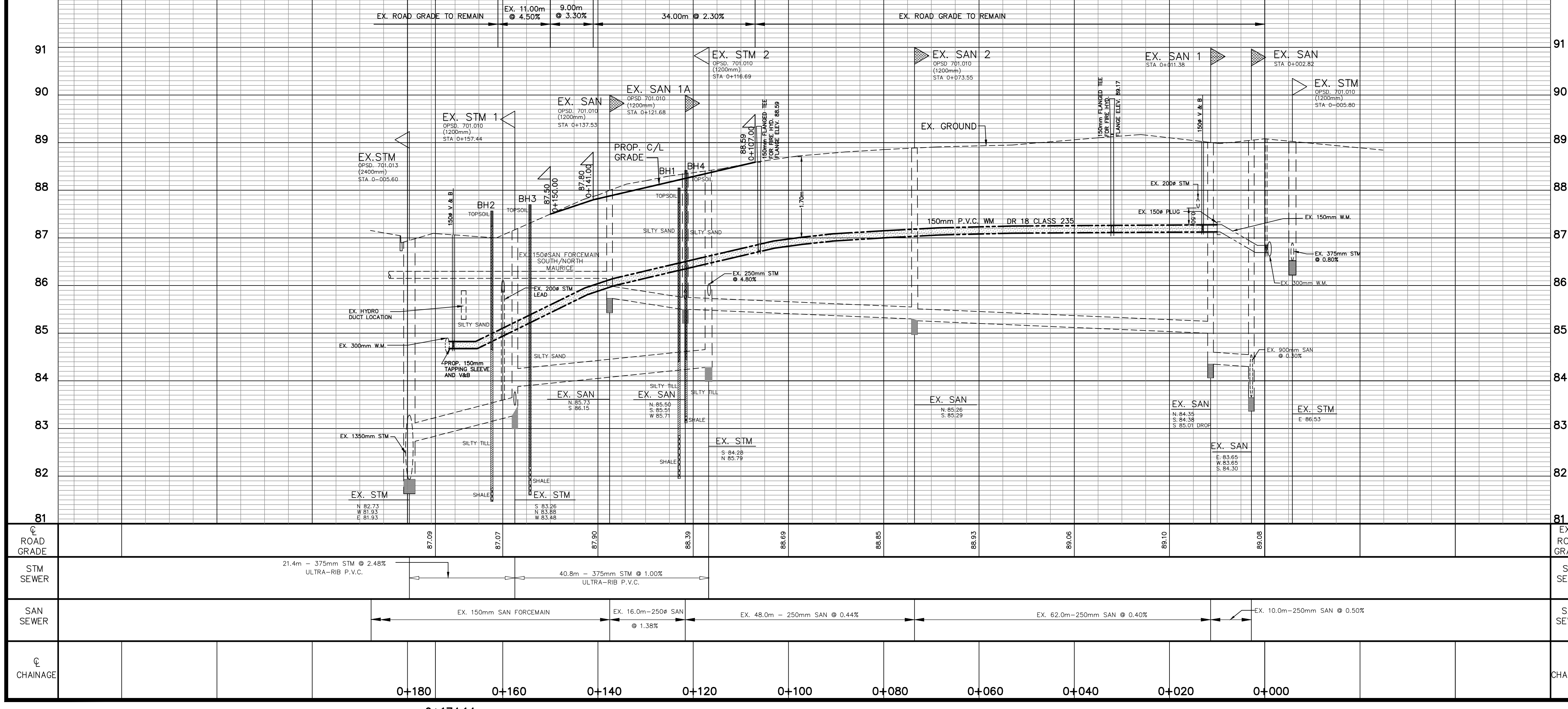
LEGEND

[Symbol]	SIDE INLET CATCHBASIN	[Symbol]	STREET LIGHT POLES
[Symbol]	SINGLE CATCHBASIN	[Symbol]	HALTON BOARD OF EDUCATION (PUBLIC SCHOOL)
[Symbol]	DOUBLE CATCHBASIN	[Symbol]	SEPARATE SCHOOL BOARD
[Symbol]	CATCHBASIN WITH SEDIMENT CONTROL WITH FENCE	[Symbol]	ACoustical FENCE (REFER TO LANDSCAPE ARCHITECTS DWG.)
[Symbol]	STORM MANHOLE	[Symbol]	BLACK VINYL CHAIN LINK FENCE
[Symbol]	SANITARY MANHOLE	[Symbol]	WOOD SCREEN FENCE (REFER TO LANDSCAPE ARCHITECTS DWG.)
[Symbol]	HYDRANT & VALVE	[Symbol]	SILATION CONTROL FENCE
[Symbol]	VALVE & BOX	[Symbol]	SEMI DETACHED DWELLING
[Symbol]	SANITARY & STORM DOUBLE CONNECTION & WATER SERVICE CONNECTION	[Symbol]	EX-TREE TO REMAIN
[Symbol]	CONCRETE ENCASUREMENT	[Symbol]	EX-TREE TO BE REMOVED
[Symbol]	LAND USE SIGN	[Symbol]	EX-TREE TO BE RELOCATED
[Symbol]	UNASSURED ROAD SIGN	[Symbol]	BORERHOLE
[Symbol]	SIDEWALK BARRICADE	[Symbol]	
[Symbol]	TRAFFIC SIGNAL DUCT & HANDSHELL	[Symbol]	
[Symbol]	TRAFFIC SIGNAL POWER PENETRAL	[Symbol]	
[Symbol]	SUPER MAILBOX LOCATION TYPE A	[Symbol]	
[Symbol]	SUPER MAILBOX LOCATION TYPE B	[Symbol]	
[Symbol]	DRIVEWAY LOCATION	[Symbol]	
[Symbol]	HYDRID TRANSFORMER	[Symbol]	
[Symbol]	PAD MOUNTED SWITCHGEAR	[Symbol]	
[Symbol]	V & S	[Symbol]	

NOTES

- FOR GENERAL NOTES SEE DWG. No. 1.
- FOR STANDARD DETAILS SEE DWG. No. 5 & 6.

CONTRACTOR TO BE RESPONSIBLE FOR LOCATION OF ALL EXISTING UNDERGROUND & OVERHEAD UTILITIES. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCE NOTICE PRIOR TO ANY DIGGING. FOR STAKE OUT, THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES.



2	JUN.05.2017	M.K.	AS CONSTRUCTED - WM
1	OCT.20.2016	M.J.	ISSUED FOR CONSTRUCTION

No	DATE	BY	REVISIONS
DESIGN	Z.S.	CHECKED	R.K.
DATE			
DRAWN	M.B.	CHECKED	R.K.
DATE			

BENCHMARK No.: OBM-008 ELEV. 86.68m
DESCRIPTION: EASTERLY CORNER OF CONCRETE BASE OF LIGHT STANDARD ON THE NORTH SIDE OF SOUTHERLY DRIVEWAY TO ST. THOMAS AQUINAS HIGH SCHOOL (124 MARGARET DR.)

FIRST	SECOND	INTERIM	PRE-SER	FINAL
DATE	DATE	DATE	DATE	DATE
JUNE 10/13	JULY 10/15			SEPT 28/16

APPROVALS

MUNICIPAL APPROVED IN PRINCIPLE SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO TOWN OF OAKVILLE STANDARDS AND SPECIFICATIONS.

ORIGINAL SIGNED BY: [Signature] Date: [Date]
DIR. OF PLANNING SERVICES - TOWN OF OAKVILLE

REGIONAL DESIGN OF SANITARY AND WATER SERVICES APPROVED SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO HALTON REGION STANDARD AND SPECIFICATIONS AND LOCATION APPROVAL FROM AREA MUNICIPALITY.

ORIGINAL SIGNED BY: [Signature] Date: OCT.26.2016
LEGISLATIVE & PLANNING SERVICES

SKIRA & ASSOCIATES LTD.
CONSULTING ENGINEERS
3464 Semenyk Court, Suite 100, Mississauga, Ontario L5C 4P8
Tel. (905) 276-5100 Fax. (905) 270-1936 Email - info@skiraconsult.ca

TOWN OF OAKVILLE
The Regional Municipality Of Halton

EX. C/L ROAD GRADE	87.09	87.07	87.90	88.39	88.69	88.85	88.93	89.05	89.10	89.08
STM SEWER	21.4m - 375mm STM @ 2.48% ULTRA-RIB P.V.C.		40.8m - 375mm STM @ 1.00% ULTRA-RIB P.V.C.							
SAN SEWER	EX. 150mm SAN FORCEMAIN		EX. 16.0m-250 SAN @ 1.38%		EX. 48.0m - 250mm SAN @ 0.44%		EX. 62.0m-250mm SAN @ 0.40%		EX. 10.0m-250mm SAN @ 0.50%	
CHAINAGE	0+180	0+160	0+140	0+120	0+100	0+080	0+060	0+040	0+020	0+000

MUNICIPAL DRAWING NO.	REGIONAL DRAWING NO.
R-	DO-1024
PROJECT NO.	DRAWING NO.
212-OK86	4
SHEET 4 OF 5	

APPENDIX B
ORIFICE CONTROL CALCULATIONS
FLOW MASTER OUTUT FILE

WORKSHEET for Circular Orifice

Project Description	
Worksheet	Orifice - 1
Type	Circular Orifice
Solve For	Diameter

Input Data	
Discharge	0.095 m ³ /s
Headwater Elevation	86.65 m
Centroid Elevation	84.17 m
Tailwater Elevation	84.02 m
Discharge Coefficient	0.63

Results	
Diameter	166 mm
Headwater Height Above	2.48 m
Tailwater Height Above	0.15 m
Flow Area	2.16E-02 m ²
Velocity	6.98 m/s

APPENDIX C
OIL/GRIT SEPARATOR CALCULATIONS



Hydroworks Sizing Summary

109 Garden Drive

Oakville, Ontario

05-30-2024

Recommended Size: HydroDome HD 6

Hydroworks Sizing Program Version 5.8.5

A HydroDome HD 6 is recommended to provide 80 % annual TSS removal based on a drainage area of .4989 (ha) with an imperviousness of 72 % and Toronto Central, Ontario rainfall for the ETV particle size distribution.

The recommended HydroDome HD 6 treats 100 % of the annual runoff and provides 83 % annual TSS removal for the Toronto Central rainfall records and ETV particle size distribution.

The HydroDome has a siphon which creates a discontinuity in headloss. The given peak flow of .096 (m³/s) is less than the full pipe flow of .29 (m³/s) indicating free flow in the pipe during the peak flow assuming no tailwater condition. Partial pipe flow was assumed for the headloss calculations. The headloss was calculated to be 273 (mm) above the crown of the 450 (mm) outlet pipe.

This summary report provides the main parameters that were used for sizing. These parameters are shown on the summary tables and graphs provided in this report.

If you have any questions regarding this sizing summary please do not hesitate to contact Hydroworks at 888-290-7900 or email us at support@hydroworks.com.

The sizing program is for sizing purposes only and does not address any site specific parameters such as hydraulic gradeline, tailwater submergence, groundwater, soils bearing capacity, etc. Headloss calculations are not a hydraulic gradeline calculation since this requires a starting water level and an analysis of the entire system downstream of the HydroDome .

TSS Removal Sizing Summary

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

Site Parameters
 Area (ha)
 Imperviousness (%)

Units
 U.S.
 Metric

Rainfall Station
 Toronto Central Ontario
 1982 To 1999 Rainfall Timestep = 15 min.

Project Title
 (2 lines)

ETV Lab Testing Results Post Treatment Recharge

Outlet Pipe
 Diam. (mm) Peak Design Flow (m3/s)
 Slope (%)

HydroDome Annual Sizing Results				
Model #	Qlow (m3/s)	Qtot (m3/s)	Flow Capture (%)	TSS Removal (%)
Unavailable	.096	.096	100 %	67 %
HD 4	.096	.096	100 %	74 %
HD 5	.096	.096	100 %	79 %
HD 6	.096	.096	100 %	83 %
Unavailable	.096	.096	100 %	86 %
HD 8	.096	.096	100 %	89 %
HD 10	.096	.096	100 %	93 %
HD 12	.096	.096	100 %	96 %

Particle Size Distribution		
Size (um)	%	SG
1	5	2.65
4	5	2.65
6	5	2.65
7	5	2.65
18	15	2.65
45	10	2.65
70	5	2.65
90	10	2.65
125	15	2.65
200	15	2.65

Note: Results vary significantly based on particle size distribution

TSS Particle Size Distribution

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

TSS Particle Size Distribution		
Size (um)	%	SG
▶ 1	5	2.65
4	5	2.65
6	5	2.65
7	5	2.65
18	15	2.65
45	10	2.65
70	5	2.65
90	10	2.65
125	15	2.65
200	15	2.65
400	5	2.65
850	5	2.65
*		

Notes:

- To change data just click a cell and type in the new value(s)
- To add a row just go to the bottom of the table and start typing.
- To delete a row, select the row by clicking on the first pointer column, then press delete
- To sort the table click on one of the column headings

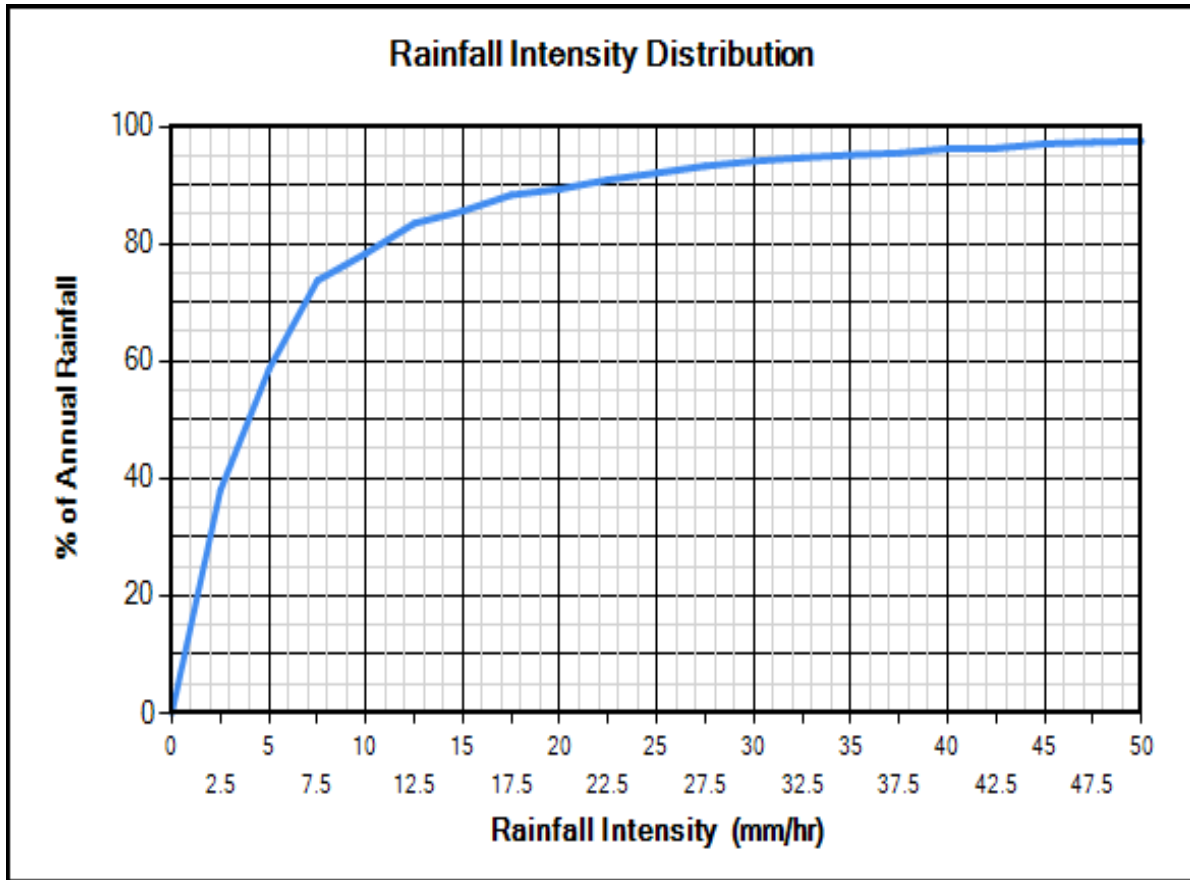
TSS Distributions

ETV Canada
 Standard HDS Design
 Alden Laboratory
 OK110
 Toronto
 Ontario Fine
 ETV Canada (Calgary)
 Calgary Forebay
 Kitchener
 User Defined

You must select a particle size distribution for TSS to simulate TSS removal

Water Temp (C)

Rainfall Station - Toronto Central, Ontario(1982 To 1999)



Site Physical Characteristics

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main | Dimensions | Rainfall | Site | TSS PSD | TSS Load | Site Storage | By-Pass | Custom | CAD | Video | Other

Catchment Parameters

Width (m) Imperv. Mannings n Maintenance Frequency (months)

Perv Mannings n

Slope (%) Imp. Depress. Storage (mm)

Perv. Depress. Storage (mm)

Daily Evaporation (mm/day)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	2.54	2.54	3.81	3.81	3.81	2.54	2.54	0	0

Infiltration

Max. Infiltration Rate (mm/hr)

Min. Infiltration Rate (mm/hr)

Infiltration Decay Rate (1/s)

Infiltration Regen. Rate (1/s)

Catch Basins

of Catch basins

Constant Baseflow

Roof Runoff (m3/s)

Dimensions And Capacities

Hydroworks Siphon Separator Sizing Program - HydroDome

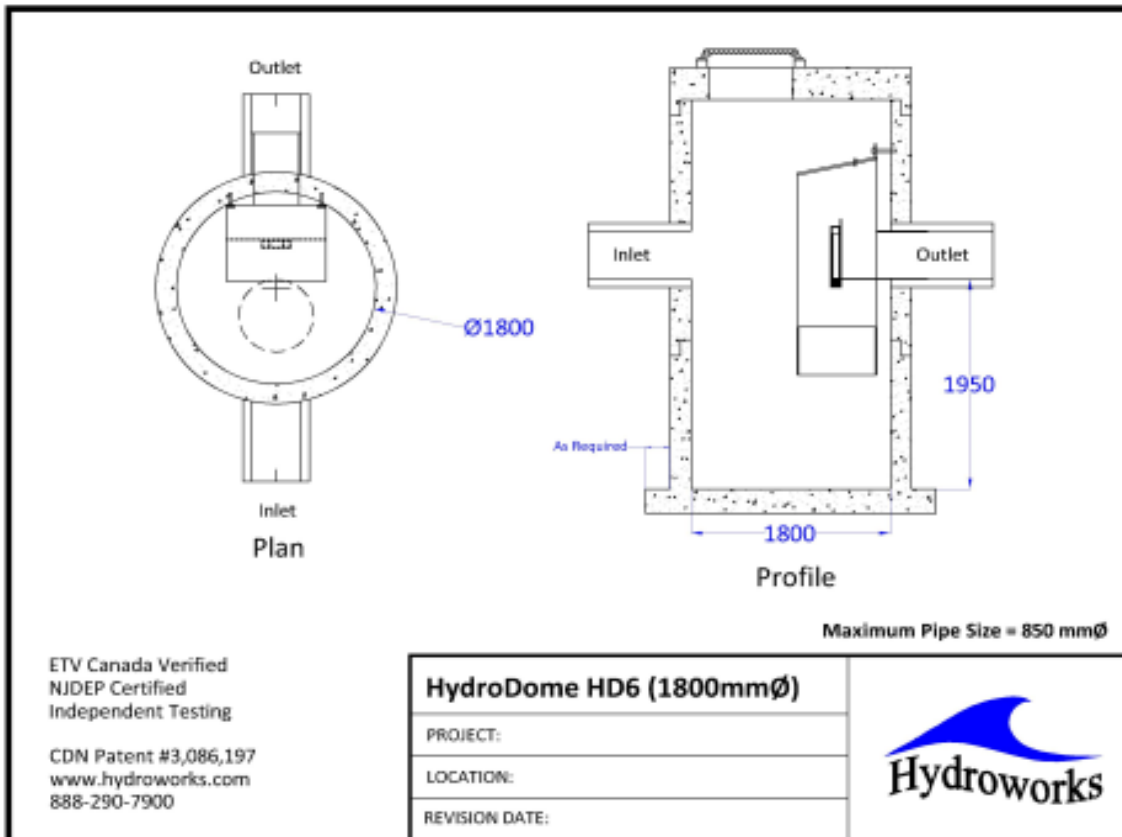
File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

Dimensions and Capacities					
Model	Diam. (m)	Depth (m)	Float. Vol. (L)	Sediment Vol. (m3)	Total Vol. (m3)
HD 3	0.91	1.22	123	0.5	0.8
HD 4	1.22	1.37	266	0.9	1.6
HD 5	1.52	1.68	483	1.7	3.1
HD 6	1.83	1.98	803	2.9	5.2
HD 7	2.13	2.29	1226	4.6	8.2
HD 8	2.44	2.59	1863	6.8	12.1
HD 10	3.05	3.2	3617	13	23.3
HD 12	3.66	3.81	6224	22.2	40

Depth = Depth from outlet invert to inside bottom of tank

Generic HD 6 CAD Drawing



TSS Buildup And Washoff

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

TSS Buildup

Power Linear
 Exponential
 Michaelis-Menton
 No Buildup Required

TSS Washoff

Power-Exponential
 Rating Curve (no upper limit)
 Rating Curve (limited to buildup)
 Event Mean Concentration

Street Sweeping

Efficiency (%)

Start Month

Stop Month

Frequency (days)

Available Fraction

Soil Erosion

Add Erosion to TSS

Reset to Default Values

TSS Buildup Parameters

Limit (kg/ha)

Coeff (kg/ha)

Exponent

TSS Washoff Parameters

Coefficient

Exponent

TSS Buildup

Based on Area
 Based on Curb Length

Upstream Quantity Storage

Hydroworks Siphon Separator Sizing Program - HydroDome

File Product Units CAD Video Help

Main Dimensions Rainfall Site TSS PSD TSS Load Site Storage By-Pass Custom CAD Video Other

Quantity Control Storage

	Storage (m3)	Discharge (m3/s)
▶	0	0
*		

Clear

Other Parameters

The screenshot shows the 'Hydroworks Siphon Separator Sizing Program - HydroDome' window. The 'Other' tab is selected, displaying several parameter groups:

- Scaling Law:**
 - Peclet Scaling based on diameter x depth
 - Peclet Scaling based on surface area (diameter x diameter)
- HydroDome Design:**
 - High Flow Weir
 - Flow Control (parking lot storage)
Must add Quantity Storage Table
- TSS Removal Extrapolation:**
 - Extrapolate TSS Removal for flows lower than tested
 - No TSS Removal extrapolation for flows lower than tested
 - No TSS Removal extrapolation for lower flows or inter-event periods
- HD Hydraulics:**
 - HD Model: HD 6
 - Custom Insert Size
- Lab Testing:**
 - Use NJDEP Lab Testing Results
 - Use ETV Canada Lab Testing Results
- TSS Removal Results:**
 - Required TSS Removal
 - Choose Model #
 - TSS Removal Required:**
 - TSS Removal (%):
 - Enter required TSS Removal (%)

Flagged Issues

If there is underground detention storage upstream of the HydroDome please contact Hydroworks to ensure it has been modeled correctly.

Hydroworks Sizing Program - Version 5.8.5

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1-800-290-7900

www.hydroworks.com

APPENDIX D
CULTEC SYSTEM CALCULATIONS



Project Information: _____ Date: _____

Number of Rows -
Total number of chambers -
HVLV FC-48 Feed Connectors -
Stone Void -
Stone Base -
Stone Above Units -
Area -
Base of Stone Elevation-

3	units
36	units
4	units
40	%
152	mm
152	mm
83.43	m ²
90.60	m

[Click for Imperial](#)

83.43 Min. Area Required

Note: Min. Area required is based on 305mm around the system and typ. spacing

CULTEC Recharger 360HD Incremental Storage Volumes

Height of System	End Cap Volume	Chamber Volume	HVLV FC-48 Feed Connector Volume	Stone Volume	Cumulative Storage Volume	Total Cumulative Storage Volume	Elevation
mm	m ³	m ³	m ³	m ³	m ³	m ³	m
1219	0.00	0.00	0.00	0.85	0.85	63.83	91.82
1194	0.00	0.00	0.00	0.85	0.85	62.98	91.79
1168	0.00	0.00	0.00	0.85	0.85	62.14	91.77
1143	0.00	0.00	0.00	0.85	0.85	61.29	91.74
1118	0.00	0.00	0.00	0.85	0.85	60.44	91.72
1092	0.00	0.00	0.00	0.85	0.85	59.59	91.69
1067	0.00	0.08	0.00	0.81	0.90	58.75	91.67
1041	0.00	0.17	0.00	0.78	0.95	57.85	91.64
1016	0.01	0.26	0.00	0.74	1.01	56.89	91.62
991	0.01	0.44	0.00	0.67	1.11	55.89	91.59
965	0.01	0.55	0.00	0.62	1.18	54.78	91.57
940	0.01	0.64	0.00	0.59	1.24	53.59	91.54
914	0.01	0.71	0.00	0.56	1.28	52.35	91.51
889	0.01	0.77	0.00	0.53	1.32	51.07	91.49
864	0.02	0.83	0.00	0.51	1.35	49.76	91.46
838	0.02	0.88	0.00	0.49	1.38	48.40	91.44
813	0.02	0.92	0.00	0.47	1.41	47.02	91.41
787	0.02	0.96	0.00	0.46	1.44	45.61	91.39
762	0.02	1.00	0.00	0.44	1.46	44.17	91.36
737	0.03	1.03	0.00	0.42	1.48	42.71	91.34
711	0.03	1.06	0.00	0.41	1.50	41.23	91.31
686	0.03	1.09	0.00	0.40	1.52	39.73	91.29
660	0.03	1.12	0.00	0.39	1.54	38.21	91.26
635	0.03	1.15	0.00	0.38	1.56	36.67	91.24
610	0.03	1.17	0.00	0.37	1.57	35.11	91.21
584	0.03	1.20	0.00	0.36	1.59	33.54	91.18
559	0.04	1.22	0.00	0.35	1.60	31.96	91.16
533	0.04	1.24	0.00	0.34	1.61	30.36	91.13
508	0.04	1.26	0.00	0.33	1.62	28.75	91.11
483	0.04	1.27	0.00	0.32	1.64	27.12	91.08
457	0.04	1.29	0.00	0.31	1.65	25.48	91.06
432	0.04	1.31	0.00	0.31	1.66	23.84	91.03
406	0.04	1.32	0.01	0.30	1.67	22.18	91.01
381	0.04	1.34	0.01	0.29	1.68	20.51	90.98
356	0.05	1.35	0.01	0.29	1.69	18.82	90.96
330	0.05	1.36	0.01	0.28	1.70	17.13	90.93
305	0.05	1.38	0.01	0.27	1.71	15.44	90.90
279	0.05	1.39	0.01	0.27	1.71	13.73	90.88
254	0.05	1.40	0.01	0.26	1.72	12.01	90.85
229	0.05	1.41	0.01	0.26	1.73	10.29	90.83
203	0.05	1.42	0.01	0.26	1.73	8.56	90.80
178	0.06	1.43	0.01	0.25	1.74	6.83	90.78
152	0.00	0.00	0.00	0.85	0.85	5.09	90.75
127	0.00	0.00	0.00	0.85	0.85	4.24	90.73
102	0.00	0.00	0.00	0.85	0.85	3.39	90.70
76	0.00	0.00	0.00	0.85	0.85	2.54	90.68
51	0.00	0.00	0.00	0.85	0.85	1.70	90.65
25	0.00	0.00	0.00	0.85	0.85	0.85	90.63
							90.60