FUNCTIONAL SERVICING REPORT

Water, Sanitary, and Stormwater Management

PROPOSED SIKH TEMPLE ADDITION

2403 KHALSA GATE
TOWN OF OAKVILLE

OUR FILE: 1853

PREPARED FOR OAKVILLE GURDWARA

SEPTEMBER 2024

(905) 338-3366 #1-481 Morden Road, Oakville, ON, L6K 3W6 www.trafalgareng.com

REVISION HISTORY

DATE	REVISION	SUBMISSION
September 2024	1	Issued for OPA/ZBA

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Scope of Functional Servicing Report

This report has been prepared in support of an Official Plan and Zoning By-law Amendment application for the proposed expansion of the existing Gurdwara building at 2403 Khalsa Gate. The scope of the report is limited to addressing the water, sanitary, and stormwater servicing for the subject lands.

1.2 Site Location and Description

The site is approximately 1.88 ha in area and is currently zoned Future Development. The site is located at the southeast corner of Pine Glen Drive and Khalsa Gate, with driveway access from both streets. The existing building footprint is approximately 0.052 ha and is located roughly in the centre of the lot. There is an existing garage on the north side of the lot, a small office building on the south side of the lot, and a few portables around the property. There is asphalt parking surrounding all sides of the building.

1.3 Proposed Development

The development consists of an addition onto the existing Sikh Temple on the property. The existing auxiliary buildings will be demolished. The existing driveway access on Khalsa Gate will remain and a relocated access off of Pine Glen Road is proposed. The proposed building has a total footprint of approximately 2535 m^2. Refer to the Site Plan prepared by Technoarch included in Appendix ‘A’ for additional detail.

2.0 MUNICIPAL WATER AND WASTEWATER

Municipal water and wastewater services for the subject site are to be designed in accordance with the Region of Halton’s “Water and Wastewater Linear Design Manual” 2010 (“Region’s Manual”) and the Ontario Building Code.

2.1 Water

Development of the subject site will require adequately sized water services that comply with the Ontario Building Code (OBC) and Region of Halton Standards.

Plans obtained from the Region of Halton and the Town of Oakville indicated that there is an existing 300mm diameter watermain that runs along Khalsa Gate as well as a 400mm watermain on Pine Glen Road. There are currently two service connections to the site off of the 300mm watermain on Khalsa Gate.

Per the Region's Manual, for Community Services, the equivalent population density is 40 persons per hectare. Based on this density, the site would have an equivalent of 75 persons (40 persons/ha x 1.88 ha).

Using the development area and Region of Halton design criteria, the domestic water usage has been estimated.

The fire flow is estimated for demand purposes only using the Fire Underwriter's Survey methodology. Fire flows should be confirmed at the building permit stage by the sprinkler consultant. The estimated flows are summarized below, with detailed calculations shown in Appendix 'B'. A hydrant flow test will be undertaken at the site plan stage.

Table 1: Estimated Water Demands

Average Daily Demand	10	(L/min)
Minimum Hourly Demand	10	(L/min)
Maximum Hourly Demand	22	(L/min)
Maximum Daily Demand	22	(L/min)
Estimated Fire Demand (FUS 1999)	8,000	(L/min)
Maximum Daily Plus Fire Demand	8,022	(L/min)

The proposed temple building will remain connected to the existing 300mm watermain on Khalsa Gate with a 100mm domestic water line as in the existing condition. The existing office building on the property located southwest of the temple is serviced through a 19mm copper water service connecting to the main building which will be disconnected.

2.2 Wastewater

Record drawings show that there is an existing 300mm diameter sanitary sewer that runs south along Khalsa Gate. There are currently two service connections to the site, with one servicing the existing building with a 200mm diameter sewer into the existing mechanical room. The second connection is north of the building and will be disconnected at the main in accordance with Region requirements.

Using the development area and the Region's Manual for Community Services, an equivalent population density of 40 persons per/ha is used to calculate sewage flows. The results are as summarized below with calculations attached in Appendix 'B'.

Table 2: Estimated Proposed Wastewater Flow (L/s)

Average Daily Dry Weather Flow	0.239	(L/s)
Modified Harmon Peaking Factor	4.28	
Infiltration Allowance (0.286 L/s-ha)	0.538	(L/s)
Peak Daily Flow	1.561	(L/s)

The proposed sanitary sewer flows demonstrate no change to the existing flows from the site. The proposed development will have no significant impact on the downstream sewer flows. The existing sanitary connection is adequately sized and will be maintained.

3.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

3.1 Existing Storm Drainage

The topographic survey indicates that the site is relatively flat in the existing condition. The overland flow is generally north-to-south, east-to-west. There is a swale on the south side of the property that was constructed to support a small external drainage area along the south property limit. See Appendix ‘A’ for design drawings by R.J. Burnside.

Drainage is captured by catchbasins around the site which ultimately outlet to a ditch located on the east side of the Khalsa Gate right-of-way. The site consists of mainly gravel and asphalt parking in the existing condition.

3.2 Proposed Storm Drainage

The proposed condition is such that the site is mainly occupied by the building and parking lot, with some grassed areas along its frontages and scattered within the site.

Drainage from impervious areas will be managed by a traditional piped sewer system consisting of catch basin inlets, maintenance holes, and pipes. The drainage system will also consist of quantity control elements, discussed in further detail in the Stormwater Management section of this report. The site storm sewer will remain in its existing condition with an outlet at the south-east corner of the site.

The Town of Oakville has indicated that there are future plans to urbanize Khalsa Gate and add a municipal storm sewer. When more information is available, the Khalsa Gate design drawings will be reviewed to ensure that the site’s storm sewer network can connect to the future municipal storm sewer system.

3.3 Stormwater Management

3.3.1 Quantity Control

Stormwater quantity controls must be provided such that the post-development runoff does not exceed the pre-development levels for all storms up to and including the 100-year event.

Based on the existing topographic survey, a pre-development composite runoff coefficient was developed for the subject site. In calculating the runoff coefficient, C=0.25 was used for pervious areas and C=0.90 was used for impervious areas. Using a similar method, a post-development composite runoff coefficient was developed using the proposed site plan.

The overall imperviousness of the site will experience a notable increase, as the proposed asphalt parking lot will span majority of the property. The pre-development composite runoff coefficient was found to be C=0.55, and the post-development runoff coefficient was calculated as C=0.75. A small external drainage area of approximately 0.014 ha contributes flow from the south of the property, having a runoff coefficient of C=0.25. Supporting calculations can be found in Appendix 'C'.

Using the Town of Oakville IDF Curves and the Rational Method, flows were calculated for the site for various return periods. The following table provides a comparison between the pre-development and the post-development flows.

Table 3: Pre- and Post-Development Peak Flows

Return	Pre-Dev Total (L/s)	Post-Dev Total (L/s)	Percent Change
2-yr	236	365	55%
5-yr	328	506	54%
10-yr	387	596	54%
25-yr	513	789	54%
50-yr	628	957	52%
100-yr	721	1060	47%

As shown in the above table, there is a notable increase in flows when comparing the pre- and post-development conditions. Based on the increase in flows, approximately 538 m^3 of storage will be required on site. Refer to calculations in Appendix 'C' for further detail.

To reduce the post-development flows to pre-development levels, a combination of roof storage with roof controls, a Stormbrixx system, and an orifice control will be used.

Two control flow roof drains (Zurn ZCF121) are proposed to reduce the expected flows from the building roof. In the 100-year event, the roof controls will provide a maximum release rate of 6.0 L/s, a total storage volume of 128.7 m^3, and a maximum ponding depth of 150 mm. Detailed roof control calculations can be found in Appendix 'C' and a summary is provided below.

For the remaining 409.4 m^3 of the storage volume requirement, a Stormbrixx system is proposed. The Stormbrixx will operate as online storage connected to the storm sewer system, with a 300 mm orifice tube on the east inlet to the existing property line manhole to control flows to the 5-year pre-development release rate. Further details of the Stormbrixx system will be provided at the site plan stage. Note that the ability to store flows from storm events above the 5-year on the parking lot surface will also be explored at the site plan stage.

3.3.2 External Drainage

As previously mentioned, there is a small external drainage area from the Peppergate development to the south contributing flows to the existing swale at the south property limit of the subject lands. Some modifications will be made to the swale to suit proposed grading on the property while ensuring that the existing drainage patterns are not impeded.

3.3.3 Quality Control

Quality control for the site is currently provided by the existing Stormceptor 750 located at the southwest corner of the property. In order to achieve 80% TSS removal as required by the Town of Oakville, a treatment train approach is used. A Stormceptor EFO10 is proposed upstream of the Stormbrixx system which can provide 62% TSS removal. In combination with existing Stormceptor 750, 80% TSS removal can be achieved.

3.3.4 Water Balance

The Town of Oakville requires developments to consider storing stormwater from the 25mm event to be re-used or infiltrated on site. Based on the site area, a storage volume of 469.5 m^3 is required. A best-efforts approach will be used. Methods for re-use will be explored at the site plan stage.

3.3.5 Erosion and Sediment Control (Construction Phase)

On-site controls will be required to mitigate sediment transport. Prior to any construction activity, all sediment and erosion control measures shall be implemented. These measures include sediment control fence and routine 'housekeeping' such as sweeping and flushing of the surrounding roads.

All controls shall be inspected on a regular basis and after rainfall events that generate runoff. An Erosion and Sediment Control Plan will be provided at the site plan stage.

4.0 CONCLUSION

Based on the above, we conclude that the proposed development can be adequately serviced for water, sanitary, and storm drainage. The existing sanitary, water, and storm connections will remain in place and have adequate capacity to serve the proposed addition.

A combination of roof controls, a Stormbrixx system, and an orifice tube are proposed to mitigate the increase in flows from the site as a result of the increase in impervious area. These measures will be used to collect a runoff volume of approximately 538.1 m^3 from the site.

A Stormceptor EFO10 is proposed upstream of the Stormbrixx system to provide 80% TSS removal in combination with the existing Stormceptor 750 on site.

PREPARED BY TRAFALGAR ENGINEERING LTD.

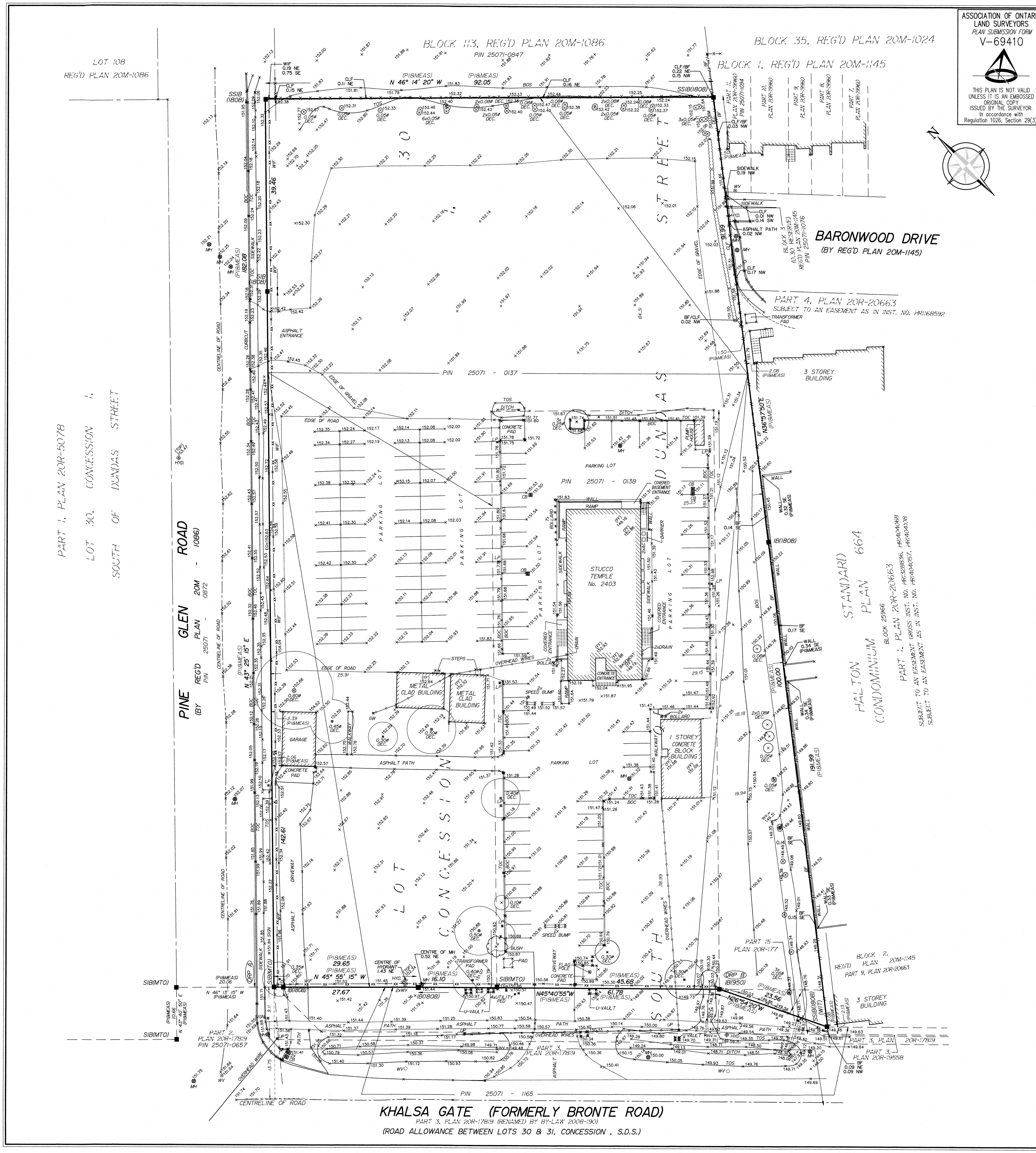
Digitally signed by James Tarleton Nelson -- P.Eng. - PEO
Date: 2024.09.18 17:40:46 -04'00'

LICENSED PROFESSIONAL ENGINEER
J.T. NELSON
100199369
PROVINCE OF ONTARIO

Mary Fornasier, EIT
Intermediate Designer

J.T. Nelson, P.Eng.
Principal, Design Services

APPENDIX ‘A’



ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-69410

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR.
In accordance with Regulation 1026, Section 29(3).

SURVEYOR'S REAL PROPERTY REPORT – PART 1

PLAN OF SURVEY AND TOPOGRAPHY OF

PART OF LOT 30
CONCESSION 1,
SOUTH OF DUNDAS STREET

(FORMERLY TOWNSHIP OF TRAFALGAR, COUNTY OF HALTON)

TOWN OF OAKVILLE

REGIONAL MUNICIPALITY OF HALTON

5 0 5 10 20 30 m

SCALE 1 : 400

J. H. Gelbloom Surveying Limited
Ontario Land Surveyor 2024

SURVEYOR'S REAL PROPERTY REPORT – PART 2

REGISTERED EASEMENTS AND/OR RIGHT-OF-WAY
None

NOTABLES
- Note the location of the fences around the Subject Property.
- Note the location of the Fire Hydrant and Water Valve and Maintenance Hole along the Southwesterly Limit of Subject Property.
- Note the location of the Sidewalk and Asphalt Path within the Vicinity of Baronwood Drive.

LEGEND

■	Survey Monument Found
□	Survey Monument Set
SIB	Standard Iron Bar
IB	Iron Bar
RIB	Round Iron Bar
(OU)	Origin Unknown
MTO	Ministry of Transportation Ontario
760	K.H. McConnell, O.L.S.
950	Conningham McConnell Ltd., O.L.S.
1808	J.H. Gelbloom Surveying Ltd., O.L.S.
PI	Plan of Survey by J.H. Gelbloom Surveying Ltd., O.L.S., dated January 10, 2018
ORP	Observed Reference Point
BF	Board Fence
CLF	Chain Link Fence
FF	Finished Floor
EG	Established Grade
UP	Utility Pole
LP	Light Pole
DEC.	Deciduous
CON.	Coniferous
INV.	Invert
CB	Catch Basin
MH	Maintenance Hole
HYD	Hydrant
WIF	Wrought Iron Fence
TOS	Top of Slope
BOS	Bottom of Slope
TOC	Top of Curb
BOC	Bottom of Curb
HH	Hand Hole
AC	Air Conditioner
GW	Guy Wire
U-VAULT	Utility Vault

N	Denotes North
S	Denotes South
E	Denotes East
W	Denotes West

BENCHMARK
Elevations are Referred to Geodetic Survey of Canada Benchmark No. 272, having an Elevation of 151.637 m.

NOTE
This REPORT can be updated by this office, however NO ADDITIONAL PRINTS of this ORIGINAL REPORT will be issued, subsequent to the DATE OF CERTIFICATION.
All building ties are from the foundation and are perpendicular to property lines unless otherwise noted.

This REPORT was prepared for Dhan Dhan Baba Budha Ji Gurdwara Sahib and the undersigned accepts no responsibility for use by other parties.

NOTE
Distances shown on this plan are in metres and can be converted to feet by dividing by 0.3048.

BEARING NOTE

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, UTM ZONE 17 NORTH, NAD83 (CSRS) (2010)

OBSERVED REFERENCE POINTS (ORPs): UTM ZONE 17 NORTH, NAD83 (CSRS) (2010). COORDINATE VALUES TO ACCURACY IN ACCORDANCE WITH SEC. 14(2) OF O.REG. 216/10

POINT ID	NORTHING	EASTING
ORP A	4 809 664.03	599 322.01
ORP B	4 809 600.21	599 387.65

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

Distances shown on this plan are Ground Distances and can be converted to Grid Distances by Multiplying the Combined Scale Factor of 0.999703

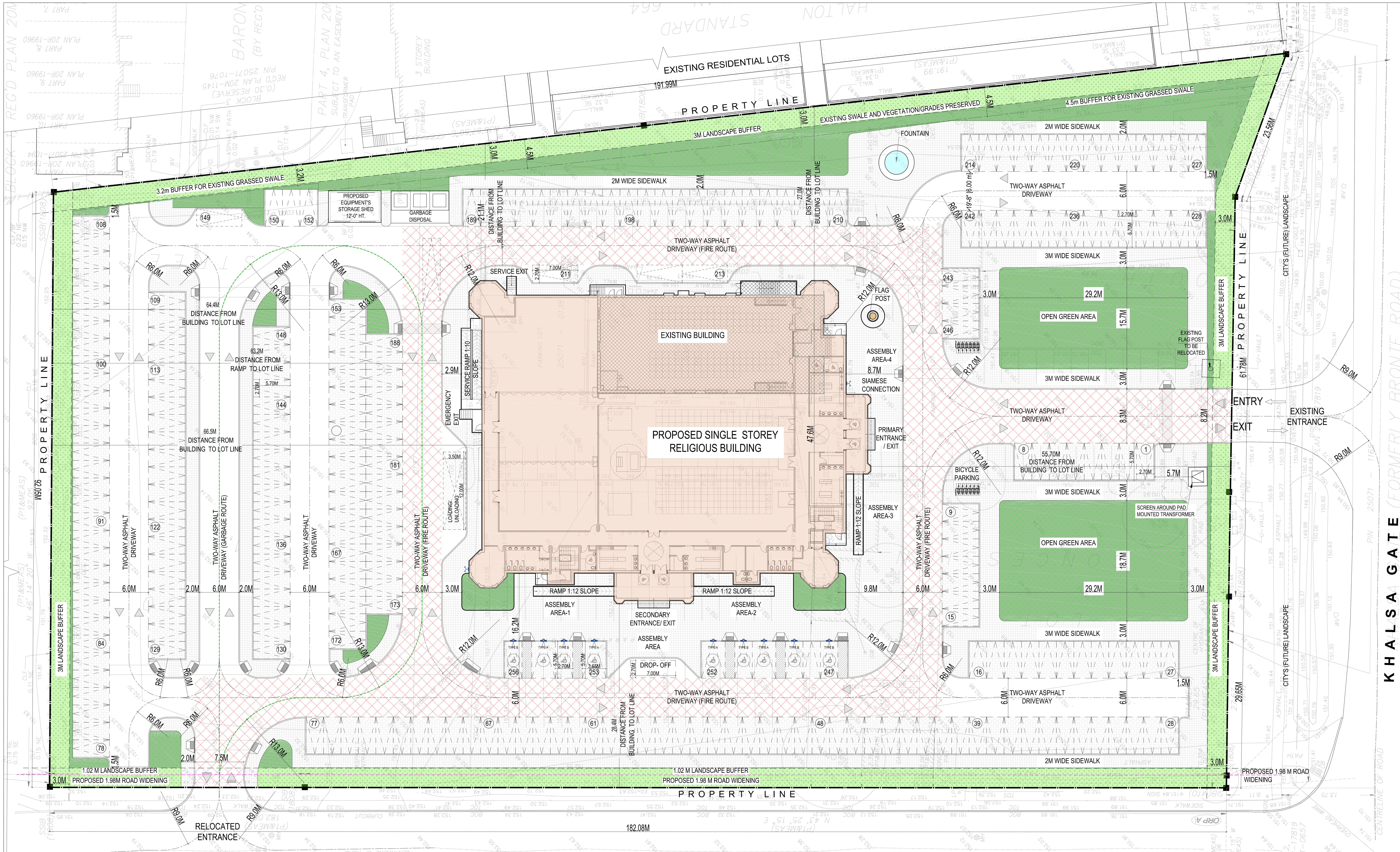
SURVEYOR'S CERTIFICATE
I certify that:
1: This survey and plan are correct and in accordance with the surveys act, the surveyors act, and the regulations made under them.
2: The survey was completed on the 11th day of April, 2024.

April 22, 2024
Date

Ashraf Rizk, O.L.S.

Party Chief:	Drawn By:	Checked By:	Project:
D.L.	R.H./M,K,	A.R.	24–047

J. H. Gelbloom Surveying Limited
Ontario Land Surveyor
476 Morden Road, Unit 102, Oakville, Ont., L6K 3W4
office@jhgsurveying.ca
Phone:(905) 338-8210



1 **SITE PLAN**
1:300

SITE SUMMARY:		
LOT AREA:	4.64 ACRE (202016.7 SQ.FT.) (18767.97 SQ.M)	
CURRENT ZONING:	FD (FUTURE DEVELOPMENT)	
PROPOSED ZONING:	INSTITUTIONAL & COMMUNITY USE ZONE (I) (CU) UNDER PLACE OF WORSHIP	
ZONING REQUIREMENTS:		
CATEGORY	PROVIDED / EXISTING	BY LAW REQUIREMENTS (TAKEN AS/PROPOSED ZONING)
- USE	PLACE OF WORSHIP	PLACE OF WORSHIP
- LOT AREA	4.64 ACRES(18767.97SQ.M)	N/A
- LOT FRONTAGE	(29.65M + 61.78M + 23.56M)	N/A

-SETBACKS:		
- FRONT YARD: (WEST SIDE)	55.7 M FROM BUILDING LINE	6.0 M
- REAR YARD: (EAST SIDE)	66.5 M FROM BUILDING LINE	7.5 M
- INTERIOR SIDE YARD (SOUTH SIDE)	21.1 m FROM BUILDING LINE	4.5 M
- EXTERIOR YARD (NORTH SIDE)	28.4 M FROM BUILDING LINE	6.0 M
- PROPOSED BUILDING HEIGHT TILL PARAPET	8.53 M (28'-0")	N/A
- PROPOSED BUILDING HEIGHT TILL ARCHITECTURAL FEATURE	22.86 M (75'-0")	N/A

AREA SUMMARY	
EXISTING BUILDING AREA	5605.74 SQ.FT (520.79 SQ.M)
EXISTING ENCLOSED STAIRS ON RIGHT SIDE	206.62 SQ.FT (19.19 SQ.M)
PROPOSED ADDITION	21676.35 SQ.FT. (2013.80 SQ.M)
NEW STORAGE SHED AREA	427.50 SQ.FT.(39.72 SQ.M)
TOTAL BUILDING AREA	27488.71 SQ.FT. (2553.78 SQ.M)
LOT COVERAGE	$\frac{\text{TOTAL BUILDING AREA}}{\text{LOT AREA}} \times 100$ $\frac{2553.78\text{ SQ.M}}{18767.97\text{ SQ.M}} \times 100 = 13.60\%$

PARKING SUMMARY

PARKING REQUIRED:
PARKING REQUIRED FOR PLACE OF WORSHIP:
1 / 5 PERSONS CAPACITY + 1 / 22 SQ.M OF NET FLOOR AREA

HALL AREA: (NON-FIXED SEATING)	1046.56 SQ.M
OCCUPANT LOAD:	252 + 148 = 400
PARKING REQUIRED (A):	400 / 5 80 PARKING SPACES
NET FLOOR AREA:	3185.46 SQ.M
PARKING REQUIRED (B):	3185.46 / 22 =145
BARRIER FREE CAR SPACES:	= 2 + 2% OF TOTAL CAR SPACES = 7 CAR PARKING
TOTAL PARKING REQUIRED:	232 **SPACES**
TOTAL PARKING PROVIDED:	**256 CAR PARKING SPACES** (INCLUDING 9 BARRIER FREE CAR SPACES)

BICYCLE PARKING:
1 PER 500 SQ. M OF NET FLOOR AREA
REQUIRED : 07 PROVIDED : 12

FIRE ROUTE | PEDESTRIAN | LANDSCAPE AREA

- PROPERTY LINE
- PROPOSED BUILDING HATCH
- EXISTING BUILDING HATCH (TO BE REMAIN AS IS)
- NO PARKING SPACE
- GARBAGE TRUCK ROUTE
- PROPOSED 1.98 M ROAD WIDENING
- TACTILE SURFACE
- SIAMESE CONNECTION (FOR DETAILS REFER SITE SERVICING DRAWING)
- TYPE A — VAN ACCESSIBLE PARKING 3.65M X 5.7M
- TYPE B — ACCESSIBLE PARKING 2.7M X 5.7M
- TYPICAL PARKING 2.7M X 5.7M

KEY PLAN

TRUE NORTH | PROJECTED NORTH

REV	ISSUED FOR	DATE
00	ZBA / OPA	2024-08-20
RO	PRE-CON	2023-12-15

PROJECT NAME AND ADDRESS :
PROPOSED RE-DEVELOPMENT OF RELIGIOUS BUILDING (PLACE OF WORSHIP), AT 2403 KHALSA GATE, OAKVILLE, ON.

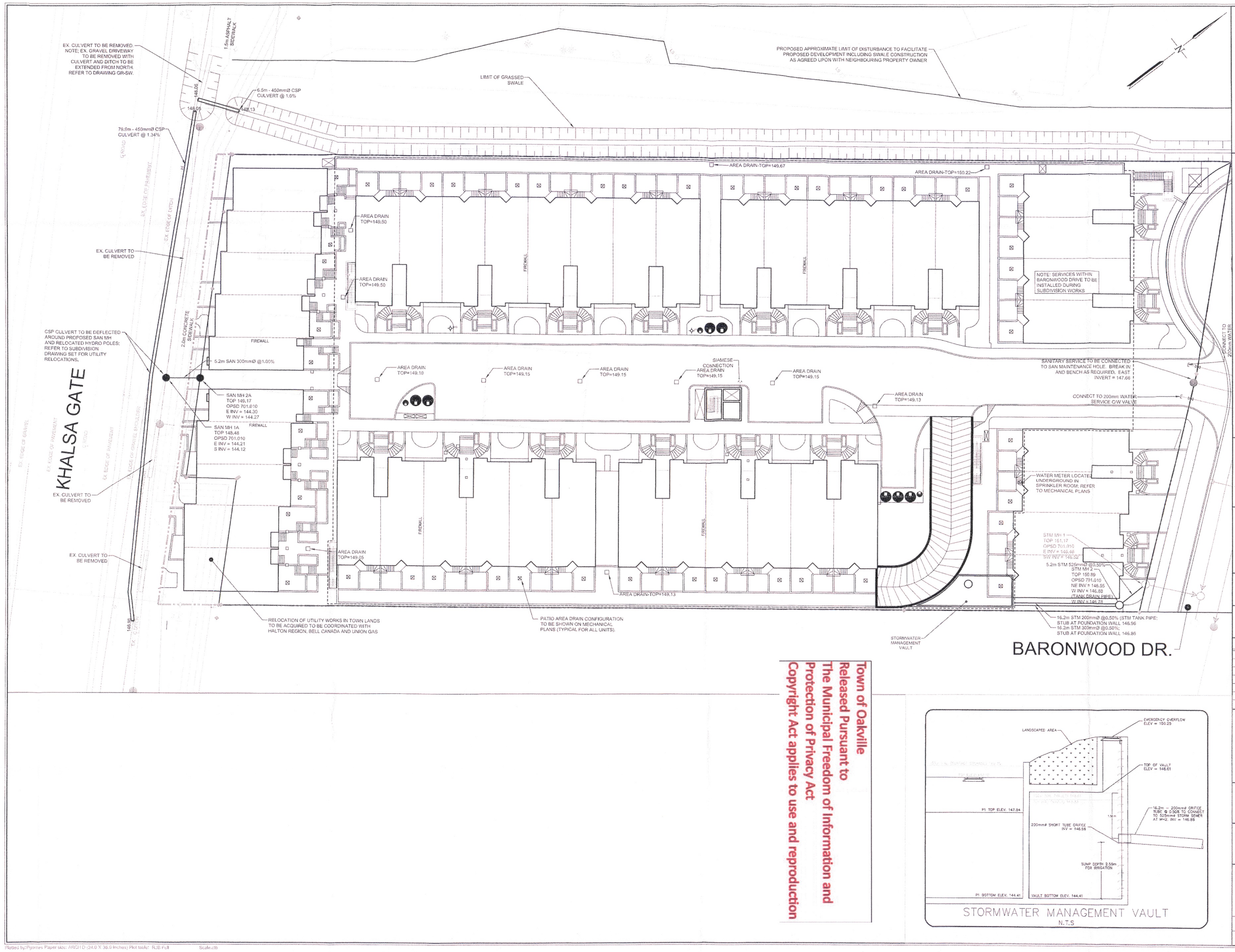
LEAD CONSULTANT :
technoarch architects + designers
UNIT 214 - 2550 MATHESON BLVD EAST
MISSISSAUGA, ONTARIO, CANADA L4W 4Z1
Tel: +1-905-792-0038
Cell: +1-905-238-0039
Email: hbhons@technoarch.ca
www.technoarch.ca

STRUCTURAL CONSULTANT :

MEP CONSULTANT :

DRAWING TITLE :
SITE PLAN

DRAWN BY	EM
CHECKED BY	JK
APPROVED BY	HB
SCALE 1:300	SIZE A1
SHEET NO A1.0	STAGE ZBA / OPA
PHASE 00	REV 00
ISSUED DATE	2024-08-20



No.	Issue / Revision	Date	Auth.
1	ISSUED FOR SPA	APRIL 1, 2013	PAG
2	RE-ISSUED FOR SPA	SEPT. 24, 2013	PAG

LICENSED PROFESSIONAL ENGINEER
M.T. COLERIDGE
100011229
Sep 24 2013
PROVINCE OF ONTARIO

HARMONY
OAKVILLE

BURNSIDE

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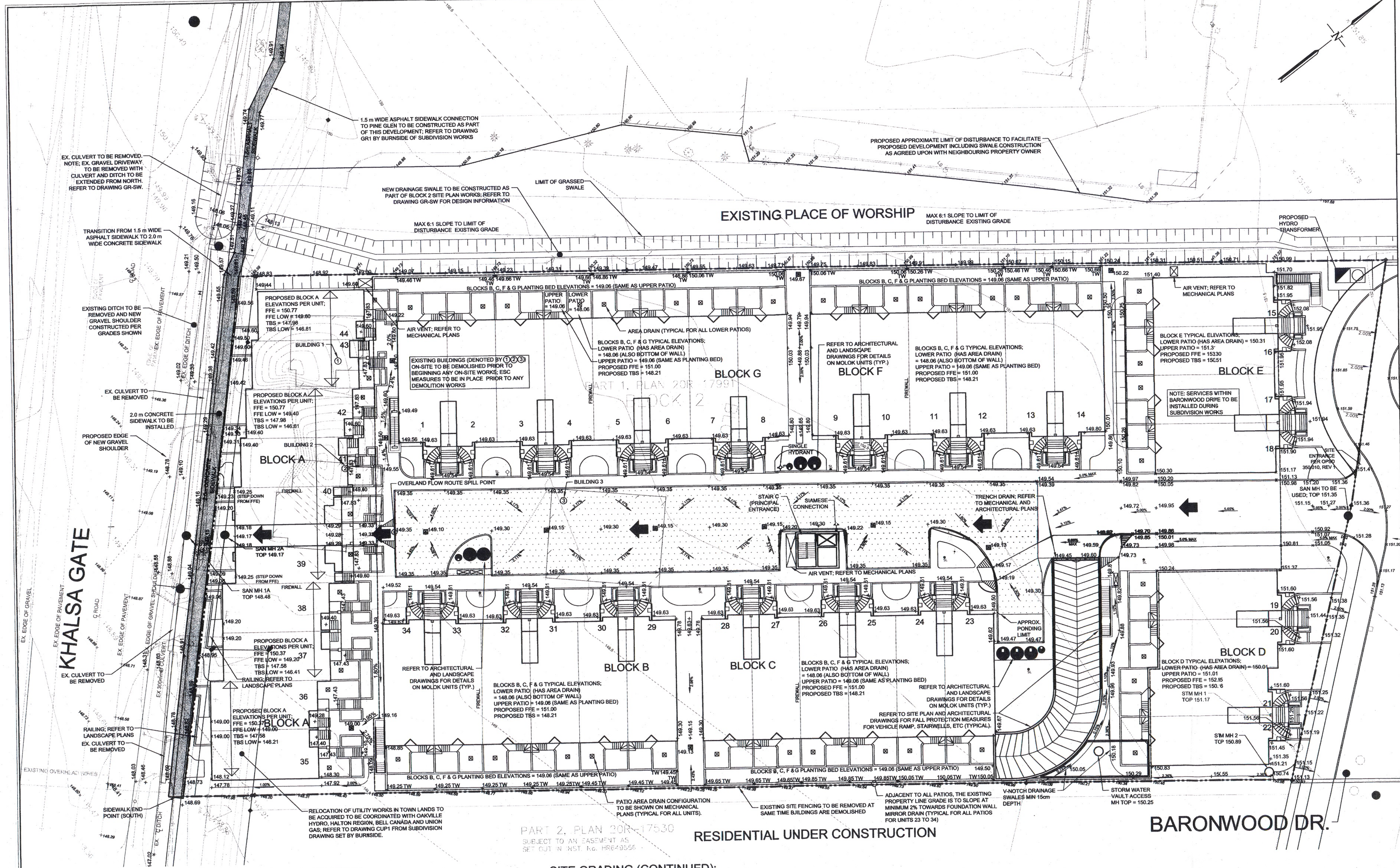
6990 Creditview Road, Unit 2
Mississauga, Ontario, L5N 8R9
telephone (905) 821-1800
fax (905) 821-1809
web www.rjburnside.com

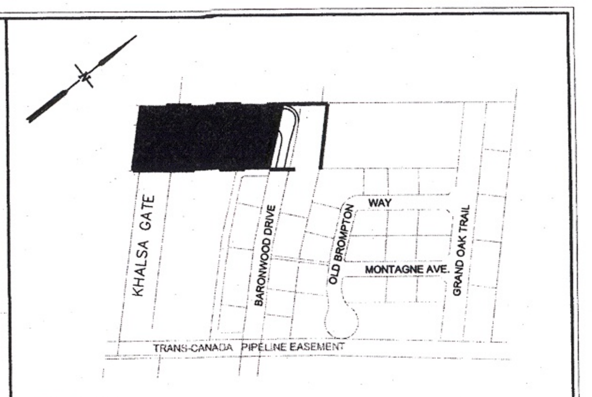
Owner
PEPPERGATE DEVELOPMENTS INC.
1 YORKDALE ROAD, SUITE 214
TORONTO, ONTARIO, M6A 3A1
TEL: 416-229-9757 FAX: 416-229-9735

Drawing Title
HARMONY OAKVILLE
BARONWOOD DRIVE
TOWN OF OAKVILLE, ONTARIO

SERVICING PLAN

Drawn	Checked	Designed	Checked	Date	Drawing No.
P.A.G.	M.T.C.	P.A.G.	M.T.C.	MAR 2013	S1
Scale: 1:250		Project No.: PEB020588		Revision: 1	





KEY PLAN
SCALE: N.T.S.

LEGEND:

- SITE PROPERTY LINE
- PROPOSED EASEMENT
- CONCRETE CURB
- DEPRESSED CONCRETE CURB
- UNDERGROUND PARKING FOUNDATION WALL
- MAX SLOPED GRADE PER NOTE ON PLAN
- 100 YEAR STORM EVENT PONDING AREA
- 172.40 EXISTING ELEVATION
- ×173.00 PROPOSED ELEVATIONS
- ×173.00 TW/TC TOP OF WALL / TOP OF CURB
- ×173.00 FUTURE KHALSA GATE ELEVATIONS
- ×173.00 MATCH EXISTING ELEVATIONS
- OVERLAND FLOW ROUTE
- 2.00% PROPOSED SLOPES
- PROPOSED SIAMESE CONNECTION
- EXISTING WATER VALVE
- PROPOSED WATER VALVE
- EXISTING HYDRANT
- PROPOSED HYDRANT
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- EXISTING STORM MANHOLE
- PROPOSED CATCH BASIN (OR AREA DRAIN; REFER TO MECHANICAL AND STRUCTURAL PLANS FOR AREA DRAIN LOCATIONS)

GENERAL NOTES:

1. ALL WORK TO CONFORM TO THE LATEST TOWN OF OAKVILLE STANDARD DRAWINGS AND SPECIFICATIONS AS WELL AS THE LATEST ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS.
2. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CURRENT "OCCUPATIONAL HEALTH AND SAFETY ACT". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
3. ALL TEMPORARY TRAFFIC CONTROL AND SIGNAGE DURING CONSTRUCTION AND SHALL BE IN ACCORDANCE WITH CURRENT ONTARIO TRAFFIC MANUAL FOR BOOK 7 TEMPORARY CONDITIONS FIELD EDITION.
4. ALL TRENCHES WITHIN EXISTING R.O.W. SHALL BE BACKFILLED WITH UNSHRINKABLE FILL.
5. THE CONTRACTOR SHALL RECTIFY ALL DISTURBED AREAS TO THE ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE EXECUTIVE DIRECTOR OF TECHNICAL SERVICES.
6. THIS DRAWING IS THE EXCLUSIVE PROPERTY OF R.J. BURNSIDE & ASSOCIATES LIMITED. THE REPRODUCTION OF ANY PART WITHOUT PRIOR WRITTEN CONSENT OF THIS OFFICE IS STRICTLY PROHIBITED.
7. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
8. THIS DRAWING IS TO BE READ AND UNDERSTOOD IN CONJUNCTION WITH ALL OTHER PLANS AND DOCUMENTS APPLICABLE TO THIS PROJECT.

SITE GRADING:

1. ALL AREA GRADING AND RESULTING DRAINAGE PATTERNS SHALL NOT ADVERSELY AFFECT ADJACENT LANDS.
2. THE STORM DRAINAGE SHALL BE SELF CONTAINED WITHIN THE SUBJECT PROPERTY UNTIL IT CAN BE DISCHARGED, REUSED, INFILTRATED AND/OR EVAPOTRANSPIRED IN A MANNER ACCEPTABLE TO THE TOWN.
3. MINIMUM GENERALLY ACCEPTED GRADIENT - 2.0%.
4. MAXIMUM GENERALLY ACCEPTABLE GRADIENT - 5.0%.
5. NO ALTERATIONS TO EXISTING BOUNDARY ELEVATIONS OR ADJACENT LANDS SHALL BE UNDERTAKEN UNLESS WRITTEN AGREEMENT WITH THE ADJACENT PROPERTY OWNER IS OBTAINED AND SUBMITTED IN A FORMAT ACCEPTABLE TO THE TOWN.
6. THE MINIMUM GRADIENT ON ANY DRIVEWAY SHALL BE NO LESS THAN 1.0% AND NO GREATER THAN 7.0%.
7. PROPOSED SPOT ELEVATIONS SHOWN ARE ON ASPHALT, LANDSCAPE OR CONCRETE AREAS. UNLESS OTHERWISE NOTED TOP OF CURB ELEVATIONS ARE 0.15m ABOVE ASPHALT ELEVATIONS EXCEPT AT CURB DEPRESSIONS, TOE WALLS AND WHEEL CHAIR RAMPS.
8. WHERE NEW ASPHALT MATCHES EXISTING ASPHALT, GRIND EXISTING ASPHALT A MINIMUM OF 300mm WIDE AND 40mm DEEP FOR KEYING. APPLY HOT RUBBER SEALING COMPOUND IN ACCORDANCE WITH OPSS 1212. ALL SURFACES TO BE TACK COATED WITH SS-1.
9. THE CONTRACTOR SHALL REFER TO THE ONTARIO TRAFFIC MANUAL BOOK 7, TEMPORARY CONDITIONS FOR TEMPORARY CONSTRUCTION SIGNAGE.
10. CONTRACTOR SHALL VERIFY AND MATCH EXISTING PAVEMENT STRUCTURE IN DEPTH AND MATERIAL. ANY DISCREPANCIES SHALL BE REPORTED TO THE CONSULTANT PRIOR TO COMMENCEMENT OF CONSTRUCTION AND APPROPRIATE ACTION TAKEN TO THE SATISFACTION OF THE TOWN OF OAKVILLE.
11. ANY DAMAGE TO PROPERTY ADJACENT TO THE CONSTRUCTION SITE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

SITE GRADING (CONTINUED):

12. ALL SURVEY POINTS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE LAYOUT SHALL BE REPORTED TO THE CONSULTANT AND THE CONSULTANT SHALL NOTIFY THE TOWN OF THE NECESSARY CHANGES.
13. MINIMUM PAVEMENT REQUIREMENTS ARE AS FOLLOWS:
    ASPHALT PAVING (DRIVE AISLE WITHIN SITE BOUNDARY) MATERIALS TO FOLLOW ONTARIO PROVINCIAL STANDARDS SPECIFICATIONS (OPSS);
    40mm - HL3 ASPHALTIC CONCRETE (SURFACE)
    65mm - HL8 ASPHALTIC CONCRETE (BINDER)
    250mm - 19mm CRUSHER RUN LIMESTONE
    100mm - FREE DRAINING SAND
14. UNLESS INDICATED OTHERWISE, ALL WORK WITHIN THE CITY RIGHT-OF-WAY SHALL BE UNDERTAKEN IN ACCORDANCE WITH TOWN OF OAKVILLE DESIGN STANDARDS AND SPECIFICATION AND THE UNDERTAKING. ONTARIO PROVINCIAL STANDARDS MAY, SUBJECT TO THE APPROVAL OF THE TOWN OF OAKVILLE, BE USED WHERE NO STANDARD OR SPECIFICATION IS NOTED.
15. ANY DISCREPANCIES BETWEEN SITE CONDITIONS AND THE DRAWINGS MUST BE REPORTED TO THE CONSULTANT PRIOR TO COMMENCEMENT OF CONSTRUCTION AND APPROPRIATE ACTION TAKEN TO THE SATISFACTION OF THE TOWN OF OAKVILLE.
16. ALL AREAS DISTURBED DURING CONSTRUCTION WITHIN THE TOWN'S RIGHT-OF-WAY SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION.

Notes
1. This drawing is the exclusive property of R. J. Burnside & Associates Limited. The reproduction of any part without prior written consent of this office is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

RECEIVED
OCT 24 2014
PLANNING SERVICES DEPT.

0 2.5 5.0 7.5 10.0 12.5 15.0 17.0 20.0
METERS 1:250

No.	Issue / Revision	Date	Auth.
1	ISSUED FOR SPA	APRIL 1, 2013	PAG
2	RE-ISSUED FOR SPA	SEPT. 24, 2013	PAG
3	RE-ISSUED FOR SPA — CONSULTANT COORDINATION	JANUARY 20, 2014	PAG
4	ISSUED FOR UNDERGROUND CONSTRUCTION	APRIL 14, 2014	PAG
5	RE-ISSUED FOR SPA	JULY 23, 2014	PAG
6	ISSUED FOR FINAL SPA	SEPT. 30, 2014	PAG

LICENSED PROFESSIONAL ENGINEER
M. T. COLERIDGE
100011229
SEP 30, 2014
PROVINCE OF ONTARIO

HARMONY
OAKVILLE

BURNSIDE

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6990 Creditview Road, Unit 2
Mississauga, Ontario, L5N 8R9
telephone (905) 821-1800
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web www.rjburnside.com

Owner
PEPPERGATE DEVELOPMENTS INC.
1 YORKDALE ROAD, SUITE 214
TORONTO, ONTARIO, M6A 3A1
TEL: 416-229-9757 FAX: 416-229-9735

pursuant to the Planning Act
MAR 31 2015
Planning Services Department
Town of Oakville

Drawing Title
HARMONY OAKVILLE
BARONWOOD DRIVE
TOWN OF OAKVILLE, ONTARIO
OAKVILLE SITE PLAN FILE No.: SP # 1430.040/01
HALTON REGION FILE No.: SP1546

GRADING PLAN

Drawn	Checked	Designed	Checked	Date	Drawing No.
P.A.G.	M.T.C.	P.A.G.	M.T.C.	MAR 2013	G1
Scale		Project No.		Revision	
1:250		PEB020588		4	

Plotted by: Pgomes Paper size: ARCH D (24.0 X 36.0 Inches) Plot table: RJB Full Scale.ctb

APPENDIX ‘B’

TRAFALGAR ENGINEERING LTD.

ESTIMATED WATER DEMAND

Project: 2403 Khalsa Gate
Desc: Sikh Temple

Project No.: 1853
Prepared By: MF
Checked By: JN

Land Use / Occupancy Type	Area (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/cap. Day)	Average Daily Demand (L/min)	Min. Hour	Peak Hour	Max. Daily	Min. Hour Demand (L/min)	Max. Hour Demand (L/min)	Max. Daily Demand (L/min)
	Occupancy Data					**Peaking Factors**			**Demand Flow**		
Community Services	1.880	40.0	75	191	10	1.00	2.25	2.25	10	22	22
TOTAL	**2**		**75**		**10**				**10**	**22**	**22**

Average Daily Demand: **10 (L/min)**
Minimum Hourly Demand: **10 (L/min)**
Maximum Hourly Demand: **22 (L/min)**
Maximum Daily Demand: **22 (L/min)**
Max. Daily Plus Fire: **8022 (L/min)**

<u>Fire Flow</u>
Using Fire Underwriters Survey Methodology:

1. **An estimate of the fire flow is given by the formula** $F = 220C\sqrt{A}$

Where:
F = The required fire flow in litres per minute
C = Coefficient related to the type of construction
A = The total floor area in square metres (including all storeys but excluding basements at least 50% below grade)

Type of Construction: Ordinary   Coefficient: 1.00   Total Floor Area: 2535 (m^2)

F = 11000 (L/min)   Adequately Protected Vertical Openings: No

Area Note: For fire resistive buildings, consider the two largest adjoining floors plus 50% of the remaining floors up to eight, when openings are inadequately protected. For adequately protected vertical openings consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors

2. **Adjust the value in No. 1 for occupancy surcharge/reduction**

Occupancy Contents: Combustible   Factor: 0%

F = 11000 (L/min)

3. **Adjust the value in No. 2 for sprinkler**

NFPA 13 Sprinkler:	Yes	Reduction:	20%
Standard Water Supply:	Yes	Reduction:	10%
Fully Supervised:	Yes	Reduction:	10%
		Total Reduction:	**40%**
		Sprinkler Reduction:	**4400 (L/min)**

4. **Adjust the value in No. 2 for exposure**

	Separation (m)	Charge
North	81.9	0%
East	228.1	0%
South	29.9	10%
West	97.7	0%
	Total Charge:	**10%**
	Exposure Charge:	**1100 (L/min)**

5. **Estimated Fire Flow is value in No. 2 less *Sprinkler Reduction* plus *Exposure Charge*, rounded to the nearest 1000**

F = 8000 (L/min)

TRAFALGAR ENGINEERING LTD.

ESTIMATED SANITARY FLOW

Project: 2403 Khalsa Gate
Desc: Sikh Temple

Project No.: 1853
Prepared By: MF
Checked By: JN

Land Use / Occupancy Type	Area (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/cap./day)	Average Daily Dry Weather Flow (L/s)
TOTAL	**0.000**		**0**		**0.00**

Industrial / Commercial / Institutional

Land Use / Occupancy Type	Area (ha)	Population Density (pers/ha)	Eq. Population (cap.)	Per Cap. Demand (L/cap./Day)	Average Daily Dry Weather Flow (L/s)
Community Services	1.88	40.0	75	275	0.239
TOTAL	**2**		**75**		**0**

Residential Peaking Factor:	4.50	
ICI Peaking Factor:	4.28	
Include ICI Peaking?	Yes	
Tributary Area:	1.880	(ha)
Infiltration Allowance:	0.286	(L/s ha)
Residential Average Daily Flow:	0.000	(L/s)
ICI Average Daily Flow:	0.239	(L/s)
Total Average Flow:	**0.239**	**(L/s)**
Residential Peak Flow:	0.000	(L/s)
ICI Peak Flow:	1.023	(L/s)
Infiltration:	0.538	(L/s)
Design Flow:	**1.561**	**(L/s)**

APPENDIX ‘C’

TRAFALGAR ENGINEERING LTD.

COMPOSITE RUNOFF COEFFICIENT

Project:	Sikh Temple	**Project No.:**	1853
Desc:	2403 Khalsa Gate	**Prepared By:**	MF
		Checked By:	JN

Pre-Development Composite Runoff Coefficient

Surface	'A' (m^2)	'C'	'AC'	% Imp	'AI'
Asphalt	6394	0.90	5755	100%	6394
Gravel	4174	0.60	2504	100%	4174
Grass	8200	0.25	2050	0%	-
			-		-
			-		-
Totals	**18768**		**10309**		**10568**
		C = 'AC'/'A'= 0.55		**%I = 'AI'/'A' = 56%**	

External Drainage Area Composite Runoff Coefficient

Surface	'A' (m^2)	'C'	'AC'	% Imp	'AI'
South Drainage	144	0.25	36	0%	-
			-		-
			-		-
			-		-
			-		-
Totals	**144**		**36**		**-**
		C = 'AC'/'A'= 0.25		**%I = 'AI'/'A' = -**	

Post-Development Controlled Area Composite Runoff Coefficient

Surface	'A' (m^2)	'C'	'AC'	% Imp	'AI'
Impervious Areas	15241	0.90	13717	100%	15241
Pervious Areas	3527	0.25	882	0%	-
			-		-
			-		-
			-		-
Totals	**18768**		**14599**		**15241**
		C = 'AC'/'A'= 0.75		**%I = 'AI'/'A' = 81%**	

Post-Development Uncontrolled Area Composite Runoff Coefficient

Surface	'A' (m^2)	'C'	'AC'	% Imp	'AI'
			-		-
			-		-
			-		-
			-		-
			-		-
Totals	**-**		**-**		**-**
		C = 'AC'/'A'= -		**%I = 'AI'/'A' = -**	

TRAFALGAR ENGINEERING LTD.

RATIONAL METHOD FLOWS

Based on Town of Oakville IDF Data

Project:	Sikh Temple	**Project No.:**	1853
Desc:	2403 Khalsa Gate	**Prepared By:**	MF
		Checked By:	JN

Pre-Development Parameters

	Site	External	Total
'C'	0.549	0.250	0.547
'A' (ha)	1.877	0.014	1.891
'AC'	1.031	0.004	1.034

Pre-Development Flow

Return	Intensity (mm/hr)	Site Flow (L/s)	External Flow (L/s)	Total Flow (L/s)
2-yr	82.2	235	1	236
5-yr	114.2	327	1	328
10-yr	134.8	386	1	387
25-yr	162.2	511	2	513
50-yr	182.1	626	2	628
100-yr	200.8	719	2	721

Flows have been adjusted using 25-, 50-, and 100-yr factors of 1.1, 1.2, and 1.25 (To a maximum C of 1.0)

Post-Development Parameters

	Controlled	Uncontrolled	External	Total
'C'	0.840	0.000	0.250	0.836
'A' (ha)	1.877	0.000	0.014	1.891
'AC'	1.577	0.000	0.004	1.580

Post-Development Flow

Return	Intensity (mm/hr)	Peak Inflow (L/s)	Uncontrolled Flow (L/s)	Peak Rooftop Flow (L/s)	External Flow (L/s)	Total Flow (L/s)
2-yr	82.2	360	0	8	1	369
5-yr	114.2	500	0	9	1	510
10-yr	134.8	590	0	10	1	601
25-yr	162.2	781	0	10	2	793
50-yr	182.1	949	0	11	2	962
100-yr	200.8	1047	0	11	2	1060

Flows have been adjusted using 25-, 50-, and 100-yr factors of 1.1, 1.2, and 1.25 (To a maximum C of 1.0)

Post-to-Pre Comparison*

Return	Pre-Dev Total (L/s)	Post-Dev Total (L/s)	Percent Change
2-yr	236	369	56%
5-yr	328	510	55%
10-yr	387	601	55%
25-yr	513	793	55%
50-yr	628	962	53%
100-yr	721	1060	47%

*Storage may be required, refer to Modified Rational Method Storage Calculation and Summary sheets if applicable

TRAFALGAR ENGINEERING LTD.

MODIFIED RATIONAL METHOD STORAGE

Based on Town of Oakville IDF Data

Project: Sikh Temple
Desc: 2403 Khalsa Gate

Project No.: 1853
Prepared By: MF
Checked By: JN

Pre-Development

Catchment Area (ha)	1.8768
Runoff Coefficient	0.55
TC (min)	10
Control Level	5-Yr

Pre-Development Peak Intensity: 114.2 mm/hr
Pre-Development Peak Discharge: 0.327 (cms)

Post-Development Uncontrolled

Catchment Area (ha)	0.0000
Runoff Coefficient	0.00
TC (min)	10
Control Level	100-Yr

Uncontrolled Peak Discharge: 0 (cms)

External Drainage

Catchment Area (ha)	0.014
Runoff Coefficient	0.31
TC (min)	10
Control Level	**100-Yr**

External Peak Discharge: 0.002 (cms)

Post-Development Controlled

Catchment Area (ha)	1.8768
Runoff Coefficient	1.00 (1.25 Adj. Factor)
Time of Concentration	10
Control Level	100-Yr

Post-Development Peak Intensity: 200.8 mm/hr
Post-Development Peak Discharge: 1.047 (cms)
Allowable Release Rate: 0.33 (cms)

Storm Duration T_D (min)	Intensity $i = A \times T_D^{-C}$ (mm/hr)	Inflow Rate $Q_P = CiA/360$ (m^3/s)	Average Roof Discharge (m^3/s)	Max. Release Rate $Q_A = Ci_{2YR}A$ (m^3/s)	Inflow Volume $V_I = 60Q_PT_D$ (m^3)	Outflow Volume $V_O = 30Q_A(T_D+T_C)$ (m^3)	Storage $S = V_I - V_O$ (m^3)
10	200.80	1.049	0.000	0.330	629.6	197.7	431.9
15	158.27	0.827	0.000	0.330	744.3	247.1	497.2
20	131.37	0.686	0.000	0.330	823.7	296.6	527.2
25	112.72	0.589	0.000	0.330	883.5	346.0	537.6
30	98.99	0.517	0.000	0.330	931.1	395.4	535.7
35	88.43	0.462	0.000	0.330	970.3	444.8	525.5
40	80.03	0.418	0.000	0.330	1003.7	494.3	509.4
45	73.19	0.382	0.000	0.330	1032.6	543.7	488.9
50	67.49	0.353	0.000	0.330	1058.0	593.1	464.9
55	62.68	0.328	0.000	0.330	1080.8	642.5	438.3
60	58.55	0.306	0.000	0.330	1101.4	692.0	409.4
90	42.35	0.221	0.000	0.330	1195.1	988.5	206.6
120	33.49	0.175	0.000	0.330	1260.0	1285.1	0

TRAFALGAR ENGINEERING LTD.

CONTROL-FLOW ROOF DRAINS
MODIFIED RATIONAL METHOD
Based on Town of Oakville IDF Data

Project: Sikh Temple
Desc: 2403 Khalsa Gate

Project No.: 1853
Prepared By: MF
Checked By: JN

Hydrology

Catchment Area (ha)	0.2535
Runoff Coefficient	1
TC (min)	10
Storm Return	5-Yr

Peak Intensity: 114.2 mm/hr
Peak Inflow: 0.08 (cms)

Conventional Roof Data

Roof Area (m^2)	2535	
Maximum Rise (mm)	150	
Number of Notches	4	(# Notches Assumed)
Average Discharge (L/s)	4.9	
Total Storage (m^3)	129.2	

Green Roof Data

Green Roof Area (m^2)	0
Green Roof Storage (m^3)	0
Storage Cell Depth (mm)	0

Storm Duration T_D (min)	Intensity $i = A \times T_D^{-C}$ (mm/hr)	Inflow Rate $Q_P = CiA/360$ (m^3/s)	Inflow Volume $V_I = 60Q_PT_D$ (m^3)	Average Release Rate, Q_A (L/s)	Outflow Volume $V_O = 60Q_A(T_D)$ (m^3)	Depth (mm)	Storage $S = V_I - V_O$ (m^3)
10	114.21	0.080	48.3	4.2	2.5	107	45.7
15	90.59	0.064	57.4	4.5	4.0	113	53.4
20	75.54	0.053	63.8	4.6	5.5	117	58.3
25	65.06	0.046	68.7	4.7	7.0	119	61.7
30	57.31	0.040	72.6	4.7	8.5	120	64.1
35	51.33	0.036	75.9	4.8	10.0	121	65.9
40	46.57	0.033	78.7	4.8	11.6	122	67.1
45	42.67	0.030	81.1	4.8	13.1	123	68.1
50	39.43	0.028	83.3	4.9	14.6	123	68.7
55	36.67	0.026	85.2	4.9	16.1	123	69.2
60	34.31	0.024	87.0	4.9	17.5	124	69.4
90	25.00	0.018	95.1	4.9	26.2	123	68.8
120	19.87	0.014	100.7	4.8	34.5	122	66.2
150	16.59	0.012	105.1	4.7	42.4	119	62.8
180	14.30	0.010	108.8	4.6	49.8	117	58.9
210	12.61	0.009	111.8	4.5	56.9	114	55.0
240	11.30	0.008	114.5	4.4	63.3	112	51.2
270	10.25	0.007	116.9	4.3	69.4	109	47.5
300	9.40	0.007	119.1	4.2	75.2	106	43.9
360	8.08	0.006	122.9	4.0	85.6	100	37.3
420	7.11	0.005	126.1	3.7	94.3	95	31.8
480	6.36	0.004	129.0	3.5	102.1	90	26.9
540	5.77	0.004	131.5	3.4	108.6	85	22.9
600	5.28	0.004	133.9	3.2	114.3	81	19.6
720	4.53	0.003	137.9	2.9	123.6	73	14.4
960	3.56	0.003	144.6	2.4	136.3	60	8.2
1200	2.96	0.002	149.9	2.0	144.9	51	5.0
1440	2.54	0.002	154.3	1.7	150.8	44	3.5

TRAFALGAR ENGINEERING LTD.

CONTROL-FLOW ROOF DRAINS
MODIFIED RATIONAL METHOD
Based on Town of Oakville IDF Data

Project: Sikh Temple | **Project No.:** 1853
Desc: 2403 Khalsa Gate | **Prepared By:** MF
Checked By: JN

Hydrology

Catchment Area (ha)	0.2535
Runoff Coefficient	1
TC (min)	10
Storm Return	10-Yr

Peak Intensity: 134.8 mm/hr
Peak Inflow: 0.095 (cms)

Conventional Roof Data

Roof Area (m^2)	2535	
Maximum Rise (mm)	150	
Number of Notches	4	(# Notches Assumed)
Average Discharge (L/s)	5.2	
Total Storage (m^3)	129.2	

Green Roof Data

Green Roof Area (m^2)	0
Green Roof Storage (m^3)	0
Storage Cell Depth (mm)	0

Storm Duration T_D (min)	Intensity $i = A \times T_D^{-C}$ (mm/hr)	Inflow Rate $Q_P = CiA/360$ (m^3/s)	Inflow Volume $V_I = 60Q_PT_D$ (m^3)	Average Release Rate, Q_A (L/s)	Outflow Volume $V_O = 60Q_A(T_D)$ (m^3)	Depth (mm)	Storage $S = V_I - V_O$ (m^3)
10	134.79	0.095	56.9	4.5	2.7	114	54.3
15	106.76	0.075	67.7	4.7	4.3	120	63.4
20	88.94	0.063	75.2	4.9	5.8	123	69.3
25	76.53	0.054	80.8	5.0	7.5	126	73.4
30	67.37	0.047	85.4	5.0	9.1	128	76.3
35	60.30	0.042	89.2	5.1	10.7	129	78.5
40	54.67	0.038	92.4	5.1	12.3	130	80.1
45	50.07	0.035	95.2	5.1	13.9	130	81.3
50	46.24	0.033	97.7	5.2	15.5	131	82.2
55	42.99	0.030	99.9	5.2	17.1	131	82.8
60	40.20	0.028	101.9	5.2	18.6	131	83.3
90	29.24	0.021	111.2	5.2	27.9	131	83.2
120	23.21	0.016	117.7	5.1	36.9	130	80.8
150	19.36	0.014	122.7	5.1	45.5	128	77.2
180	16.67	0.012	126.8	5.0	53.6	126	73.2
210	14.68	0.010	130.3	4.9	61.3	123	69.0
240	13.15	0.009	133.3	4.8	68.5	121	64.8
270	11.93	0.008	136.0	4.7	75.4	118	60.6
300	10.93	0.008	138.5	4.6	81.9	115	56.5
360	9.39	0.007	142.8	4.3	93.6	110	49.1
420	8.25	0.006	146.4	4.1	104.0	105	42.4
480	7.38	0.005	149.7	3.9	113.1	100	36.5
540	6.69	0.005	152.5	3.7	120.9	95	31.6
600	6.12	0.004	155.1	3.6	128.0	90	27.1
720	5.25	0.004	159.7	3.2	139.2	82	20.5
960	4.12	0.003	167.1	2.7	155.1	68	12.1
1200	3.41	0.002	173.1	2.3	165.4	58	7.6
1440	2.93	0.002	178.1	2.0	173.1	51	4.9

TRAFALGAR ENGINEERING LTD.

CONTROL-FLOW ROOF DRAINS
MODIFIED RATIONAL METHOD

Based on Town of Oakville IDF Data

Project: Sikh Temple
Desc: 2403 Khalsa Gate

Project No.: 1853
Prepared By: MF
Checked By: JN

Hydrology

Catchment Area (ha)	0.2535
Runoff Coefficient	1
TC (min)	10
Storm Return	25-Yr

Peak Intensity: 162.2 mm/hr
Peak Inflow: 0.114 (cms)

Conventional Roof Data

Roof Area (m^2)	2535	
Maximum Rise (mm)	150	
Number of Notches	4	(# Notches Assumed)
Average Discharge (L/s)	5.5	
Total Storage (m^3)	129.2	

Green Roof Data

Green Roof Area (m^2)	0
Green Roof Storage (m^3)	0
Storage Cell Depth (mm)	0

Storm Duration T_D (min)	Intensity $i = A \times T_D^{-C}$ (mm/hr)	Inflow Rate $Q_P = CiA/360$ (m^3/s)	Inflow Volume $V_I = 60Q_PT_D$ (m^3)	Average Release Rate, Q_A (L/s)	Outflow Volume $V_O = 60Q_A(T_D)$ (m^3)	Depth (mm)	Storage $S = V_I - V_O$ (m^3)
10	162.17	0.114	68.5	4.8	2.9	121	65.6
15	128.00	0.090	81.1	5.0	4.5	128	76.6
20	106.39	0.075	89.9	5.2	6.2	132	83.7
25	91.40	0.064	96.5	5.3	7.9	134	88.6
30	80.36	0.057	101.9	5.4	9.6	136	92.2
35	71.85	0.051	106.3	5.4	11.4	137	94.9
40	65.09	0.046	110.0	5.5	13.1	138	96.9
45	59.58	0.042	113.3	5.5	14.8	139	98.5
50	54.99	0.039	116.2	5.5	16.5	140	99.6
55	51.10	0.036	118.7	5.5	18.2	140	100.5
60	47.77	0.034	121.1	5.5	19.9	140	101.2
90	34.67	0.024	131.8	5.5	29.9	141	101.9
120	27.48	0.019	139.3	5.5	39.7	140	99.7
150	22.90	0.016	145.2	5.4	48.9	138	96.2
180	19.71	0.014	149.9	5.4	57.8	136	92.1
210	17.35	0.012	154.0	5.3	66.3	134	87.6
240	15.53	0.011	157.5	5.2	74.5	131	83.0
270	14.08	0.010	160.6	5.1	82.3	129	78.4
300	12.90	0.009	163.5	5.0	89.6	126	73.8
360	11.07	0.008	168.4	4.8	103.0	121	65.3
420	9.73	0.007	172.6	4.6	115.2	116	57.4
480	8.70	0.006	176.3	4.4	126.0	111	50.4
540	7.87	0.006	179.7	4.2	135.5	106	44.2
600	7.21	0.005	182.7	4.0	144.2	102	38.5
720	6.18	0.004	187.9	3.7	158.2	93	29.8
960	4.84	0.003	196.5	3.1	178.4	79	18.1
1200	4.01	0.003	203.3	2.7	191.7	68	11.7
1440	3.44	0.002	209.1	2.3	201.2	59	7.9

TRAFALGAR ENGINEERING LTD.

CONTROL-FLOW ROOF DRAINS
MODIFIED RATIONAL METHOD

Based on Town of Oakville IDF Data

Project: Sikh Temple
Desc: 2403 Khalsa Gate

Project No.: 1853
Prepared By: MF
Checked By: JN

Hydrology

Catchment Area (ha)	0.2535
Runoff Coefficient	1
TC (min)	10
Storm Return	50-Yr

Peak Intensity: 182.1 mm/hr
Peak Inflow: 0.128 (cms)

Conventional Roof Data

Roof Area (m^2)	2535	
Maximum Rise (mm)	150	
Number of Notches	4	(# Notches Assumed)
Average Discharge (L/s)	5.8	
Total Storage (m^3)	129.2	

Green Roof Data

Green Roof Area (m^2)	0
Green Roof Storage (m^3)	0
Storage Cell Depth (mm)	0

Storm Duration T_D (min)	Intensity $i = A \times T_D^{-C}$ (mm/hr)	Inflow Rate $Q_P = CiA/360$ (m^3/s)	Inflow Volume $V_I = 60Q_PT_D$ (m^3)	Average Release Rate, Q_A (L/s)	Outflow Volume $V_O = 60Q_A(T_D)$ (m^3)	Depth (mm)	Storage $S = V_I - V_O$ (m^3)
10	182.06	0.128	76.9	5.0	3.0	126	73.9
15	143.68	0.101	91.1	5.2	4.7	133	86.3
20	119.36	0.084	100.9	5.4	6.5	137	94.4
25	102.47	0.072	108.2	5.5	8.3	140	100.0
30	90.02	0.063	114.1	5.6	10.0	142	104.1
35	80.44	0.057	119.0	5.6	11.8	143	107.1
40	72.82	0.051	123.1	5.7	13.6	144	109.4
45	66.61	0.047	126.6	5.7	15.4	145	111.2
50	61.43	0.043	129.8	5.7	17.2	145	112.6
55	57.06	0.040	132.6	5.7	19.0	146	113.6
60	53.30	0.038	135.1	5.8	20.7	146	114.4
90	38.57	0.027	146.7	5.8	31.2	147	115.5
120	30.51	0.021	154.7	5.7	41.3	146	113.4
150	25.38	0.018	160.8	5.7	51.1	144	109.7
180	21.81	0.015	165.8	5.6	60.5	142	105.3
210	19.17	0.013	170.1	5.5	69.6	140	100.5
240	17.14	0.012	173.8	5.4	78.2	138	95.6
270	15.52	0.011	177.0	5.3	86.3	135	90.7
300	14.20	0.010	180.0	5.2	94.1	133	85.9
360	12.17	0.009	185.1	5.0	108.8	128	76.3
420	10.68	0.008	189.5	4.8	121.7	123	67.8
480	9.53	0.007	193.3	4.6	133.5	118	59.8
540	8.62	0.006	196.7	4.4	144.0	113	52.7
600	7.88	0.006	199.8	4.3	153.2	108	46.6
720	6.75	0.005	205.2	3.9	169.1	99	36.1
960	5.28	0.004	214.0	3.3	191.6	84	22.4
1200	4.36	0.003	220.9	2.9	206.5	73	14.5
1440	3.73	0.003	226.8	2.5	217.1	64	9.6

TRAFALGAR ENGINEERING LTD.

CONTROL-FLOW ROOF DRAINS
MODIFIED RATIONAL METHOD

Based on Town of Oakville IDF Data

Project: Sikh Temple
Desc: 2403 Khalsa Gate

Project No.: 1853
Prepared By: MF
Checked By: JN

Hydrology

Catchment Area (ha)	0.2535
Runoff Coefficient	1
TC (min)	10
Storm Return	100-Yr

Peak Intensity: 200.8 mm/hr
Peak Inflow: 0.141 (cms)

Conventional Roof Data

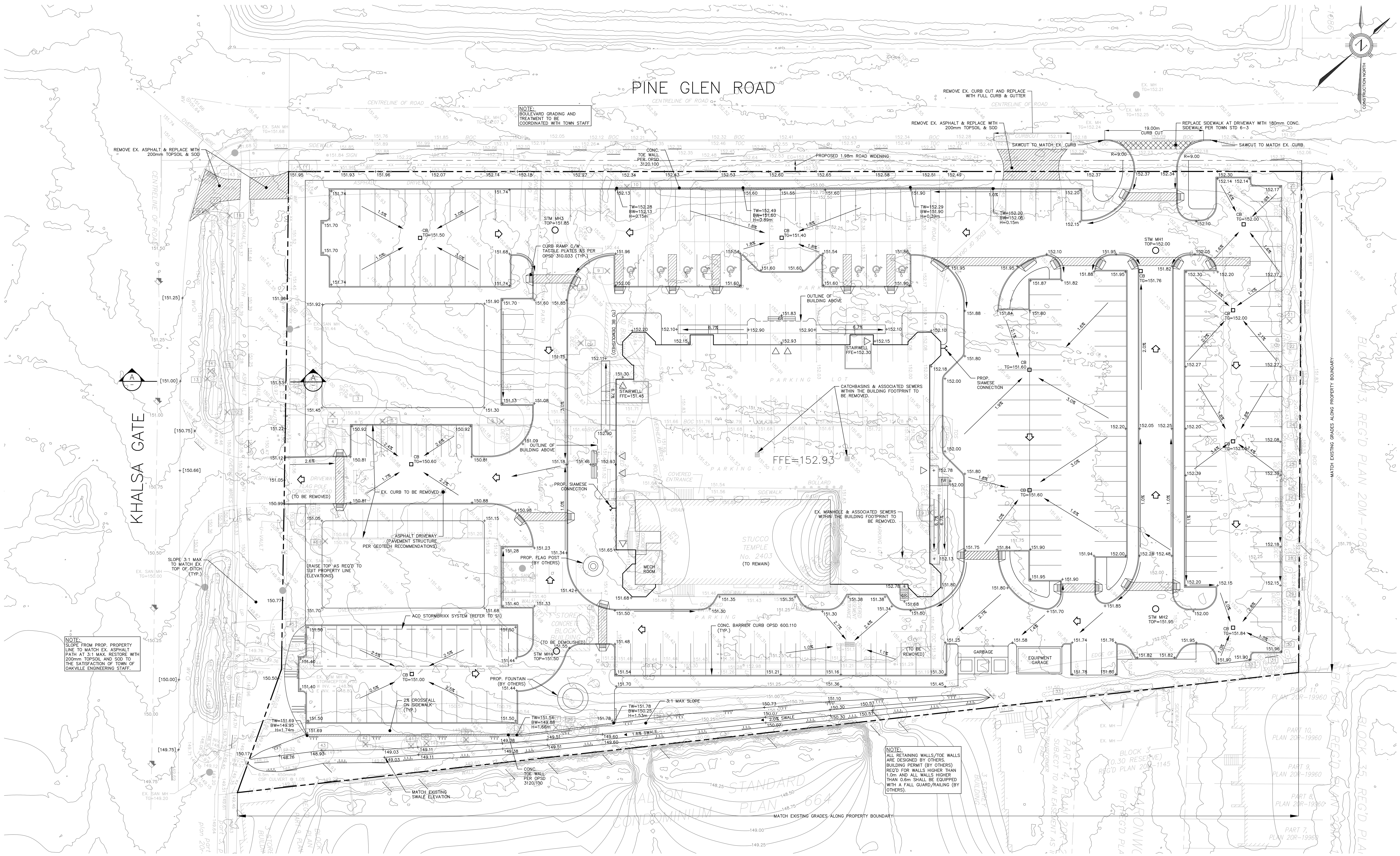
Roof Area (m^2)	2535	
Maximum Rise (mm)	150	
Number of Notches	4	(# Notches Assumed)
Average Discharge (L/s)	6.0	
Total Storage (m^3)	129.2	

Green Roof Data

Green Roof Area (m^2)	0
Green Roof Storage (m^3)	0
Storage Cell Depth (mm)	0

Storm Duration T_D (min)	Intensity $i = A \times T_D^{-C}$ (mm/hr)	Inflow Rate $Q_P = CiA/360$ (m^3/s)	Inflow Volume $V_I = 60Q_PT_D$ (m^3)	Average Release Rate, Q_A (L/s)	Outflow Volume $V_O = 60Q_A(T_D)$ (m^3)	Depth (mm)	Storage $S = V_I - V_O$ (m^3)
10	200.80	0.141	84.8	5.1	3.1	131	81.8
15	158.27	0.111	100.3	5.4	4.9	138	95.4
20	131.37	0.093	111.0	5.6	6.7	142	104.3
25	112.72	0.079	119.1	5.7	8.5	144	110.5
30	98.99	0.070	125.5	5.8	10.4	146	115.1
35	88.43	0.062	130.8	5.8	12.2	148	118.5
40	80.03	0.056	135.3	5.9	14.1	149	121.2
45	73.19	0.052	139.1	5.9	15.9	150	123.2
50	67.49	0.048	142.6	5.9	17.8	150	124.8
55	62.68	0.044	145.6	6.0	19.6	151	126.0
60	58.55	0.041	148.4	6.0	21.5	151	126.9
90	42.35	0.030	161.0	6.0	32.4	152	128.7
120	33.49	0.024	169.8	6.0	43.0	151	126.8
150	27.85	0.020	176.5	5.9	53.2	150	123.3
180	23.93	0.017	182.0	5.8	63.0	148	119.0
210	21.04	0.015	186.7	5.8	72.5	146	114.2
240	18.81	0.013	190.7	5.7	81.6	144	109.1
270	17.03	0.012	194.3	5.6	90.4	142	103.9
300	15.58	0.011	197.5	5.5	98.8	139	98.7
360	13.35	0.009	203.1	5.3	114.3	134	88.8
420	11.72	0.008	207.9	5.1	128.5	129	79.4
480	10.46	0.007	212.1	4.9	141.3	124	70.8
540	9.46	0.007	215.8	4.7	152.8	120	63.1
600	8.65	0.006	219.2	4.5	163.3	115	55.9
720	7.40	0.005	225.2	4.2	180.8	106	44.3
1200	4.78	0.003	242.4	3.1	224.0	79	18.4
1440	4.09	0.003	248.8	2.7	236.1	69	12.6

APPENDIX ‘D’



KEY PLAN

LEGEND

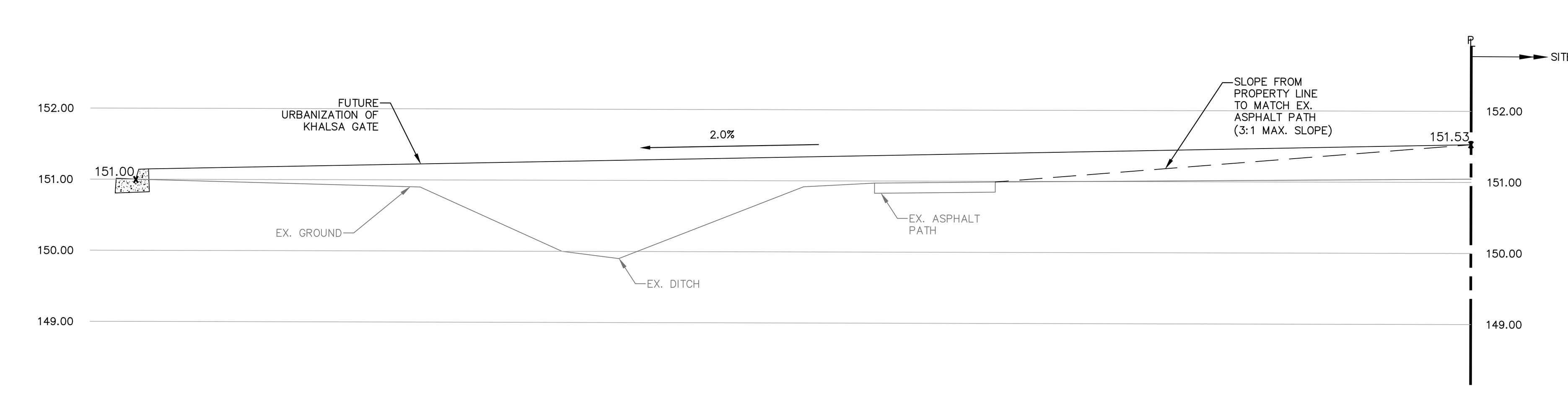
- +100.00 PROPOSED ELEVATION
- + 113.96 EXISTING ELEVATION
- + 113.96 EXISTING ELEVATION TO REMAIN
- +[100.00] INTERPOLATED ELEVATION TO REMAIN
- 150.00 EXISTING CONTOUR INTERVALS (EVERY 0.25m – DERIVED FROM LIDAR)
- PROPOSED CATCHBASIN
- PROPERTY BOUNDARY
- 2.0% PROPOSED DRAINAGE DIRECTION
- PROPOSED SLOPE
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- PROPOSED ENTRANCE ARROW
- 30 TREE NUMBER (REFER TO ARBORIST REPORT)
- TREE TO BE REMOVED
- EXISTING WATER VALVE
- PROPOSED OVERLAND FLOW DIRECTION
- EXISTING OVERLAND FLOW DIRECTION
- PROPOSED RETAINING WALL

GENERAL NOTES

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS OF THE REGIONAL MUNICIPALITY OF HALTON (INCLUDING REGION OF HALTON'S CONTRACTOR INFORMATION PACKAGE), TOWN OF OAKVILLE AND THE ONTARIO BUILDING CODE (PART 7). ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS (OPSS & OPSD) SHALL BE USED IN ABSENCE OF LOCAL STANDARDS.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL, MECHANICAL AND LANDSCAPE DRAWINGS.
3. ALL INFORMATION SHOWN REGARDING THE LOCATION AND SIZE OF EXISTING UTILITIES AND/OR SERVICES HAS NOT BEEN VERIFIED. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING LOCATION OF UTILITIES PRIOR TO CONSTRUCTION AND PROTECTING AND MAINTAINING DURING CONSTRUCTION.
4. THE CONTRACTOR SHALL CHECK AND VERIFY ALL GIVEN GRADES AND ELEVATIONS, PRIOR TO CONSTRUCTION AND REPORT ALL DISCREPENCIES TO THE ENGINEER.
5. ALL GRADING CHANGES SHALL BE APPROVED BY THE ENGINEER AND TOWN OF OAKVILLE PRIOR TO IMPLEMENTATION.
6. THE CONTRACTOR SHALL CLEAN ALL MUD TRACKED ON TO ADJACENT ROADWAYS.
7. THE CONTRACTOR IS RESPONSIBLE FOR RESTORING DISTURBED AREAS. AREAS WITHIN THE MUNICIPAL RIGHT OF WAY SHALL BE RESTORED TO THE TOWN OF OAKVILLE AND REGION OF HALTON SATISFACTION.
8. CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY TRAFFIC CONTROLS, PER MTO BOOK 7.
9. CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION LAYOUT, WITH CONTROL BARS PROVIDED BY THE OWNER. PROTECTION OF CONTROL BARS IS THE RESPONSIBILITY OF THE CONTRACTOR.
10. CONTRACTOR IS RESPONSIBLE TO VERIFY THE SIZE AND LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION, INCLUDING VAC TRUCK AND RESTORATION AS REQUIRED.
11. CONTRACTOR SHALL PROVIDE THIRD–PARTY DIGITAL AS–BUILTS IN CAD, TO INCLUDE ALL NEW SITE SERVICING INCLUDING TOPS AND INVERTS, AND FINISHED GRADES, INCLUDING PAVED AREAS, SWALES, CURBS, SIDEWALKS AND AND RETAINING WALLS, TO THE SATISFACTION OF THE ENGINEER.
12. CONTRACTOR SHALL FLUSH AND VIDEO ALL EXISTING SEWERS PRIOR TO AND AFTER CONNECTION, AND NEW AND DISTURBED SEWERS UPON INSTALLATION AND LATER UPON COMPLETION OF TOP WORKS AND LANDSCAPING, PER OPSS 409. VIDEOS TO BE PROVIDED TO THE ENGINEER FOR REVIEW AND APPROVAL.

GRADING NOTES

1. SEDIMENT CONTROL MEASURES INCLUDING SILT FENCE AND MUD PAD ETC. SHALL BE INSTALLED PRIOR TO START OF CONSTRUCTION, CHECKED AND REPAIRED ON A REGULAR BASIS AND LEFT IN PLACE UNTIL PAVING AND LANDSCAPING IS COMPLETED. SEDIMENT CONTROL WHEN REMOVED SHALL BE DISPOSED OFF–SITE.
2. ALL TOPSOIL SHALL BE STRIPPED PRIOR TO GRADING.
3. ALL FILL PLACEMENT SHALL BE DONE IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERS RECOMMENDATIONS.
4. RETAINING WALLS WITH A HEIGHT GREATER THAN 0.6m ARE TO BE DESIGNED AND STAMPED BY A PROFESSIONAL ENGINEER.
5. ALL DISTURBED AREAS TO BE RESTORED WITH 200mm TOPSOIL AND SOD.
6. ALL DISTURBED AREAS WITH IN PUBLIC R.O.W TO BE REINSTATED TO THE SATISFACTION OF THE ENGINEERING & CONSTRUCTION DEPARTMENT. EXISTING BLVD. AREAS TO BE REINSTATED WITH 200mm TOPSOIL AND SOD.



SECTION A–A: KHALSA GATE BOULEVARD GRADING DETAIL
1:50

NO.	YY/MM/DD	BY/DRAWN	REVISIONS
1	24/09/17	MF	ISSUED FOR OPA/ZBA

CAD FILE: 1853GS mf.dwg | PLOT SCALE: 1:1 | PLOT DATE: Sep 18, 2024

BENCHMARK

TOPOGRAPHIC INFORMATION MEASURED APRIL 11TH 2024, COMPLETED BY J.H. GELBLOOM SURVEYING LIMITED. PROJECT NO. 24–047

ELEVATIONS SHOWN ARE GEODETIC IN NATURE AND REFER TO SURVEY OF CANADA BENCHMARK NO 272, HAVING AN ELEVATION OF 151.637m

LICENSED PROFESSIONAL ENGINEER
J. T. NELSON
100199369
20 SEPT 2024
PROVINCE OF ONTARIO

DESIGNED BY

APPROVED BY

CONSULTANT

TRAFALGAR ENGINEERING
#1-481 MORDEN ROAD, OAKVILLE, ON, L6K 3W6
www.trafalgareng.com

PROJECT TITLE

SIKH TEMPLE
PROPOSED RELIGIOUS BUILDING

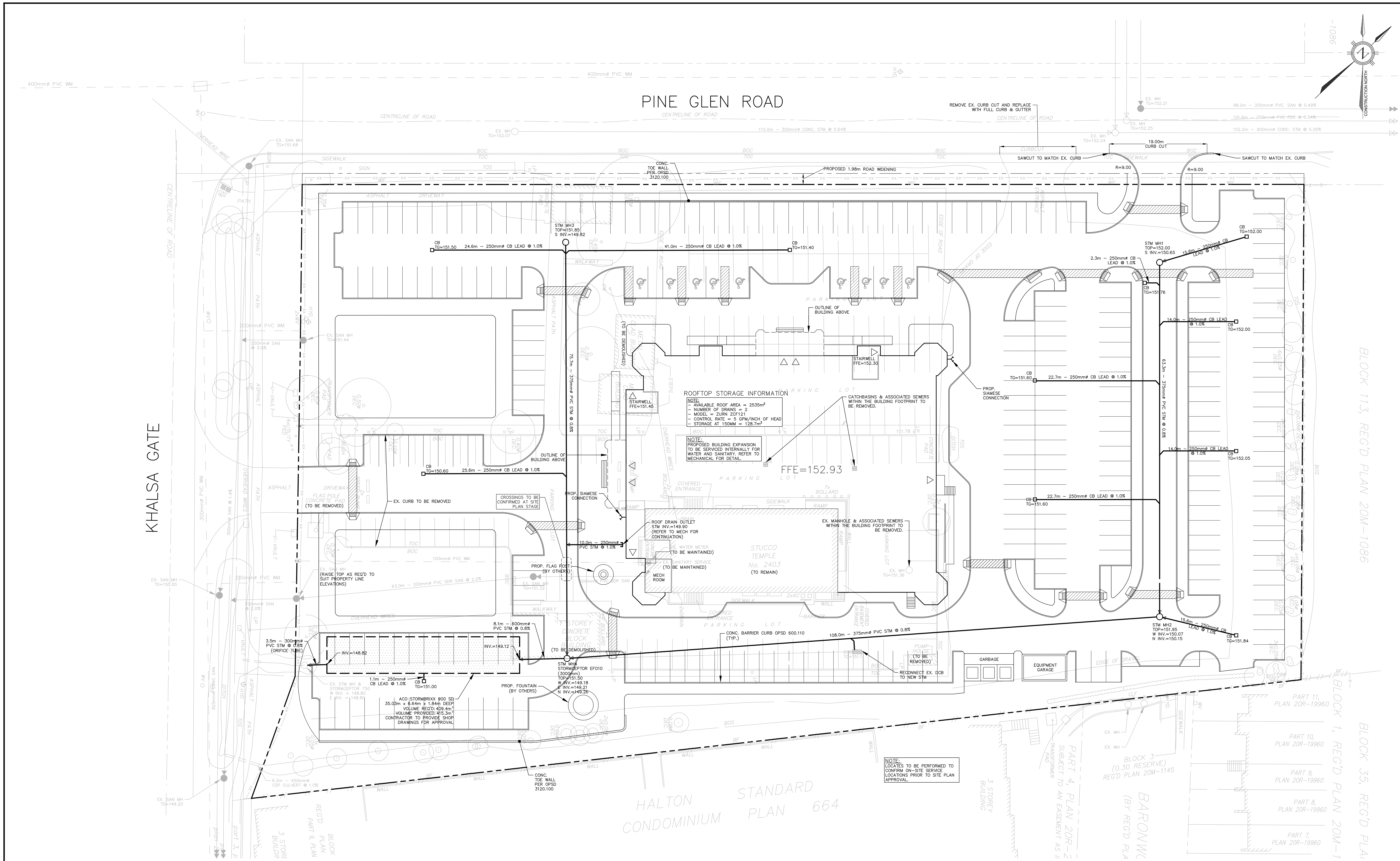
LOCATION

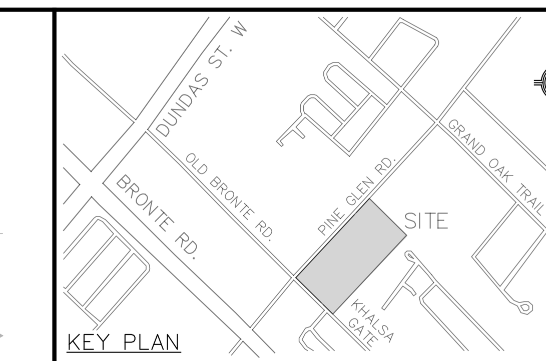
2403 KHALSA GATE
OAKVILLE, ON

DRAWING TITLE

GRADING PLAN

SCALE	1:250	DESIGN BY	JN	PROJECT No.	1853
DRAWN BY	ZI	CHECKED BY	MF	PLAN No.	G1
DATE	2024/02/22	SHEET	1 OF 1		





LEGEND

- PROPOSED CATCHBASIN
- PROPOSED DOUBLE CATCHBASIN
- PROPOSED STORM MANHOLE
- PROPOSED FIRE HYDRANT
- PROPOSED VALVE AND BOX
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED PLUG
- PROPOSED WATER METER
- EXISTING STORM MANHOLE
- EXISTING SANITARY MANHOLE
- EXISTING WATERMAIN
- EXISTING SANITARY
- PROPERTY BOUNDARY

GENERAL NOTES

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST STANDARDS OF THE REGIONAL MUNICIPALITY OF HALTON (INCLUDING REGION OF HALTON'S CONTRACTOR INFORMATION PACKAGE), TOWN OF OAKVILLE AND THE ONTARIO BUILDING CODE (PART 7). ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS (OPSS & OPSD) SHALL BE USED IN ABSENCE OF LOCAL STANDARDS.
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12. CONTRACTOR SHALL FLUSH AND VIDEO ALL EXISTING SEWERS PRIOR TO AND AFTER CONNECTION, AND NEW AND DISTURBED SEWERS UPON INSTALLATION AND LATER UPON COMPLETION OF TOP WORKS AND LANDSCAPING, PER OPSS 409. VIDEOS TO BE PROVIDED TO THE ENGINEER FOR REVIEW AND APPROVAL.

SERVICING NOTES

1. ALL UTILITIES SHALL BE BACKFILLED WITH GRANULAR BACKFILL COMPACTED TO 98% S.P.M.D.D. NATIVE BACKFILL MAY BE USED WITH THE PERMISSION OF THE GEOTECHNICAL CONSULTANT. BEDDING AND COVER MATERIAL SHALL BE PER THE GEOTECHNICAL CONSULTANTS RECOMMENDATIONS.
2. BACKFILLING AND RESTORATION WITHIN THE PUBLIC ROW SHALL BE IN ACCORDANCE WITH THE TOWN OF OAKVILLE ROAD CUT PERMIT AND TO THE SATISFACTION OF THE ENGINEERING & CONSTRUCTION DEPARTMENT.
3. SURROUND ALL MANHOLES WITH A MINIMUM OF 1.5m COMPACTED GRANULAR 'C' BACKFILL.
4. ALL ENDS OF SERVICE CONNECTIONS SHALL BE MARKED WITH 50x100 LUMBER PLACED FROM INVERT OF SERVICE TO 1.0m ABOVE GRADE.

STORM SEWERS

1. ALL STORM SEWERS 600 mm AND SMALLER SHALL BE PVC SDR35 OR ULTRA RIBBED PVC CSA B182.2 WITH BEDDING PER OPSD 802.010 UNLESS OTHERWISE NOTED.
2. ALL STORM SEWERS 675 mm AND LARGER SHALL BE REINFORCED CONCRETE PIPE CLASS 65-D CSA A257.2 COMPLETE WITH BEDDING PER OPSD 802.030.
3. CATCHBASIN SHALL BE PER OPSD 705.010, DOUBLE CATCHBASIN PER OPSD 705.020 C/W GRATE PER OPSD 400.020
4. CATCHBASINS IN LANDSCAPED AREAS SHALL BE SUMPLESS AND C/W BEEHIVE TOP AS PER TOWN STD. 5-2
5. ALL CB'S IN LANDSCAPED AREAS SHALL BE INSTALLED WITH A SUB-DRAIN AS NOTED ON THE SERVICING PLAN. SUB-DRAIN TO BE 100mm PERFORATED PIPE C/W FILTER SOCK SURROUNDED BY 13mm CLEAR STONE AS PER SUB-DRAIN DETAIL
6. ALL CB LEADS SHALL BE 250mmø AT 1.0% UNLESS OTHERWISE NOTED.
7. ALL CATCHBASIN MANHOLES SHALL BE BENCHED.
8. ALL STORM MANHOLES SHALL BE 1200mmø PER OPSD 401.010 UNLESS OTHERWISE NOTED.
9. ALL CATCHBASIN AND CATCHBASIN MANHOLES IN PAVED AREAS SHALL BE INSTALLED WITH 3.0m – 100mmø PERFORATED PIPE C/W FILTER SOCK EXTENDING OUT FROM THE CATCHBASIN AND LOCATED BELOW THE SUBGRADE SURROUNDED BY 150mm GRANULAR 'A'
10. ALL CATCHBASINS TO BE FITTED WITH CB SHIELD.

WATERMAINS

1. 100mm AND LARGER SERVICES SHALL BE PVC, C-900, CLASS 150, SDR18 c/w MECHANICAL RESTRAINTS & TRACER WIRE PER REGION OF HALTON REQUIREMENTS.
2. 50mm AND SMALLER SERVICE SHALL BE TYPE "K" SOFT COPPER TUBING.
3. BEDDING ON WATER SERVICE SHALL BE PER OPSD 802.010*.
4. VALVE AND BOX FOR 100mm TO 300mm WATER SERVICE PER REGION OF HALTON STDS.
5. COVER SHALL BE 1.7m MIN. UNLESS OTHERWISE NOTED.
6. CONNECTION TO EXISTING WATERMAIN SHALL BE PER REGION OF HALTON STD RH 409.010.
7. WATER SYSTEM SHALL BE PRESSURE TESTED TO 150 PSI FOR 3 HRS AND WITNESSED BY REGION OF HALTON.
8. HYDRANTS SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA C502 AND SHALL HAVE STEAMER PORTS AS PER REGION STANDARD SPECIFICATIONS (SEE NOTE 12). ALL HYDRANTS SHALL BE INSTALLED AS PER OPSD 1105.010*. IF HYDRANT BARREL DEPTH EXCEEDS 1.7m A HYDRANT THAT CAN BE RAISED FROM THE BOTTOM WITHOUT INCREASING ROD LENGTH IS TO BE USED.
9. * INDICATES O.P.S.D. CAN BE USED AS MODIFIED BY REGION OF HALTON.
10. MINIMUM LATERAL SEPARATION FROM OTHER UTLITIES IS 2.5m
11. WATERMAINS MUST HAVE A MINIMUM VERTICAL CLEARNACE OF 0.30m (12 INCHES) OVER, 0.50m (20 INCHES) UNDER SEWERS AND ALL OTHER UTILITIES.
12. STORZ PUMPER CONNECTION FOR HYDRANTS AS FOLLOWS:
    TWO (2) 63.5mm (2 1/2") WITH CSA STANDARD THREAD, 63.5mm I.D., 5 THREADS PER 25mm, 31.75mm SQUARE OPERATING NUT; AND STORZ CAP PAINTED GLOSS BLACK.
13. WATER SERVICES/MAINS SHALL BE TESTED & DISINFECTED AS PER ANSI/AWWA C651-99 AND REGION OF HALTON REQUIREMENTS.

SANITARY SEWERS

1. SANITARY MANHOLE SHALL BE AS PER OPSD 701.010* C/W "TYPE A" COVER PER OPSD 401.010* AND FULL BENCHING.
2. * INDICATES O.P.S.D. CAN BE USED MODOFIED BY REGION OF HALTON.

NO.	DATE	BY/DRAWN	REVISIONS
1	24/09/17	MF	ISSUED FOR OPA/ZBA

CAD FILE: 1853GS mf.dwg | PLOT SCALE: 1:1 | PLOT DATE: Sep 18, 2024

BENCHMARK

TOPOGRAPHIC INFORMATION MEASURED APRIL 11TH 2024, COMPLETED BY J.H. GELBLOOM SURVEYING LIMITED. PROJECT NO. 24-047

ELEVATIONS SHOWN ARE GEODETIC IN NATURE AND REFER TO SURVEY OF CANADA BENCHMARK NO 272, HAVING AN ELEVATION OF 151.637m

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PROJECT TITLE

SIKH TEMPLE
PROPOSED RELIGIOUS BUILDING

LOCATION

2403 KHALSA GATE
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DRAWING TITLE

SERVICING PLAN

SCALE	1:250	DESIGN BY	JN	PROJECT No.	1853
DRAWN BY	ZI	CHECKED BY	MF	PLAN No.	S1
DATE	2024/02/22	SHEET	1 OF 1		

FILENAME: P:\1853 Sikh Temple\04-CAD\03-Site Plan\1853GS mf.dwg
PLOTDATE: Sep 18, 2024 - 4:58pm

Stormceptor® Rinker MATERIALS

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/18/2024

Province:	Ontario
City:	Oakville
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	1.88
Runoff Coefficient 'c':	0.75

Project Name:	Khalsa Gate
Project Number:	65301
Designer Name:	Mary Fornasier
Designer Company:	Trafalgar Engineering Ltd.
Designer Email:	mfornasier@trafalgareng.com
Designer Phone:	289-981-8760
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0
Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	43.85
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	872

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	43
EFO6	52
EFO8	58
EFO10	62
EFO12	64

Recommended Stormceptor EFO Model: EFO10

Estimated Net Annual Sediment (TSS) Load Reduction (%): 62

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® Rinker MATERIALS™

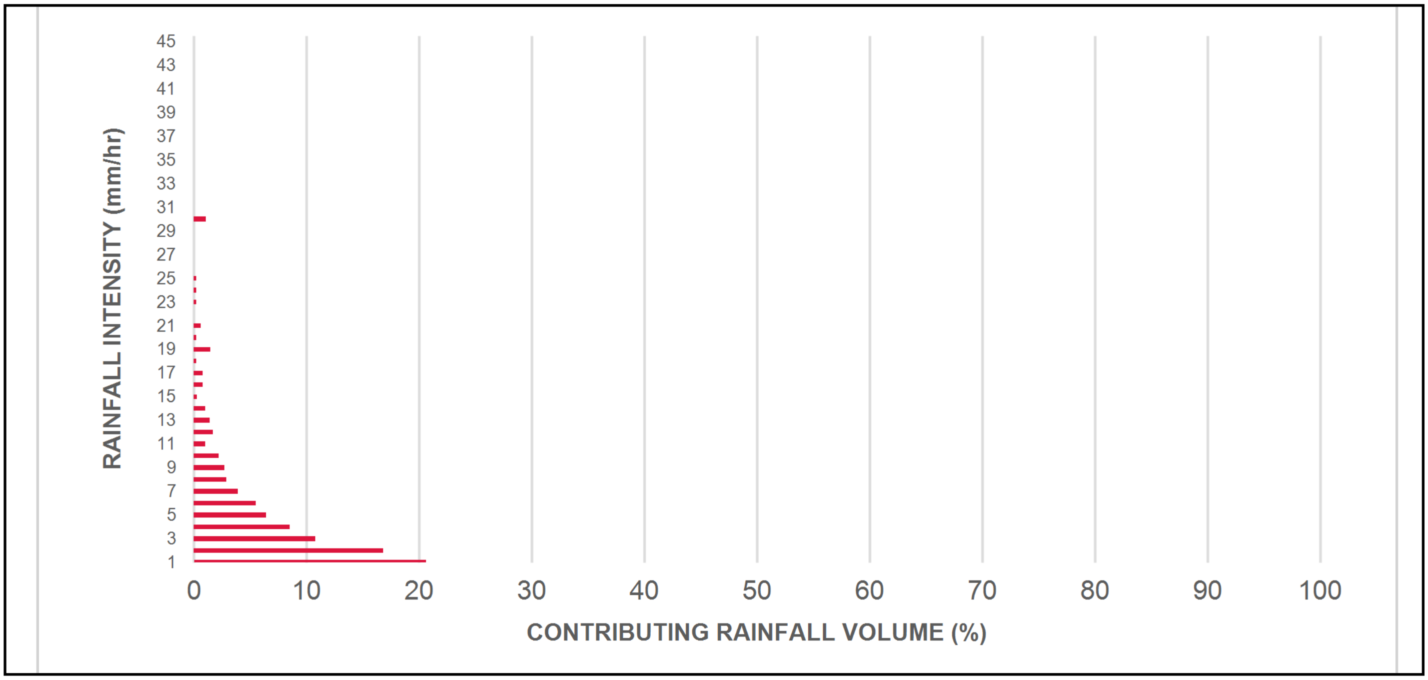
Stormceptor® EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	1.96	118.0	16.0	70	6.0	6.0
1.00	20.6	29.1	3.92	235.0	32.0	70	14.5	20.5
2.00	16.8	45.9	7.84	470.0	64.0	67	11.3	31.8
3.00	10.8	56.7	11.76	706.0	97.0	63	6.8	38.6
4.00	8.5	65.2	15.68	941.0	129.0	61	5.1	43.7
5.00	6.4	71.6	19.60	1176.0	161.0	57	3.7	47.4
6.00	5.5	77.0	23.52	1411.0	193.0	55	3.0	50.4
7.00	3.9	81.0	27.44	1646.0	226.0	53	2.1	52.5
8.00	2.9	83.9	31.36	1882.0	258.0	53	1.5	54.0
9.00	2.7	86.5	35.28	2117.0	290.0	51	1.4	55.4
10.00	2.2	88.7	39.20	2352.0	322.0	50	1.1	56.5
11.00	1.0	89.7	43.12	2587.0	354.0	50	0.5	57.0
12.00	1.7	91.3	47.04	2822.0	387.0	49	0.8	57.8
13.00	1.4	92.8	50.96	3057.0	419.0	48	0.7	58.5
14.00	1.0	93.7	54.88	3293.0	451.0	47	0.5	58.9
15.00	0.3	94.0	58.80	3528.0	483.0	46	0.1	59.0
16.00	0.8	94.8	62.72	3763.0	515.0	45	0.4	59.4
17.00	0.8	95.7	66.64	3998.0	548.0	44	0.4	59.8
18.00	0.2	95.8	70.56	4233.0	580.0	43	0.1	59.8
19.00	1.5	97.3	74.48	4469.0	612.0	42	0.6	60.5
20.00	0.2	97.5	78.40	4704.0	644.0	42	0.1	60.6
21.00	0.6	98.2	82.32	4939.0	677.0	42	0.3	60.8
22.00	0.0	98.2	86.24	5174.0	709.0	42	0.0	60.8
23.00	0.2	98.4	90.16	5409.0	741.0	41	0.1	60.9
24.00	0.2	98.6	94.08	5645.0	773.0	41	0.1	61.0
25.00	0.2	98.9	98.00	5880.0	805.0	41	0.1	61.1
30.00	1.1	100.0	117.59	7056.0	967.0	40	0.5	61.6
35.00	0.0	100.0	137.19	8232.0	1128.0	38	0.0	61.6
40.00	0.0	100.0	156.79	9408.0	1289.0	36	0.0	61.6
45.00	0.0	100.0	176.39	10583.0	1450.0	33	0.0	61.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**62 %**

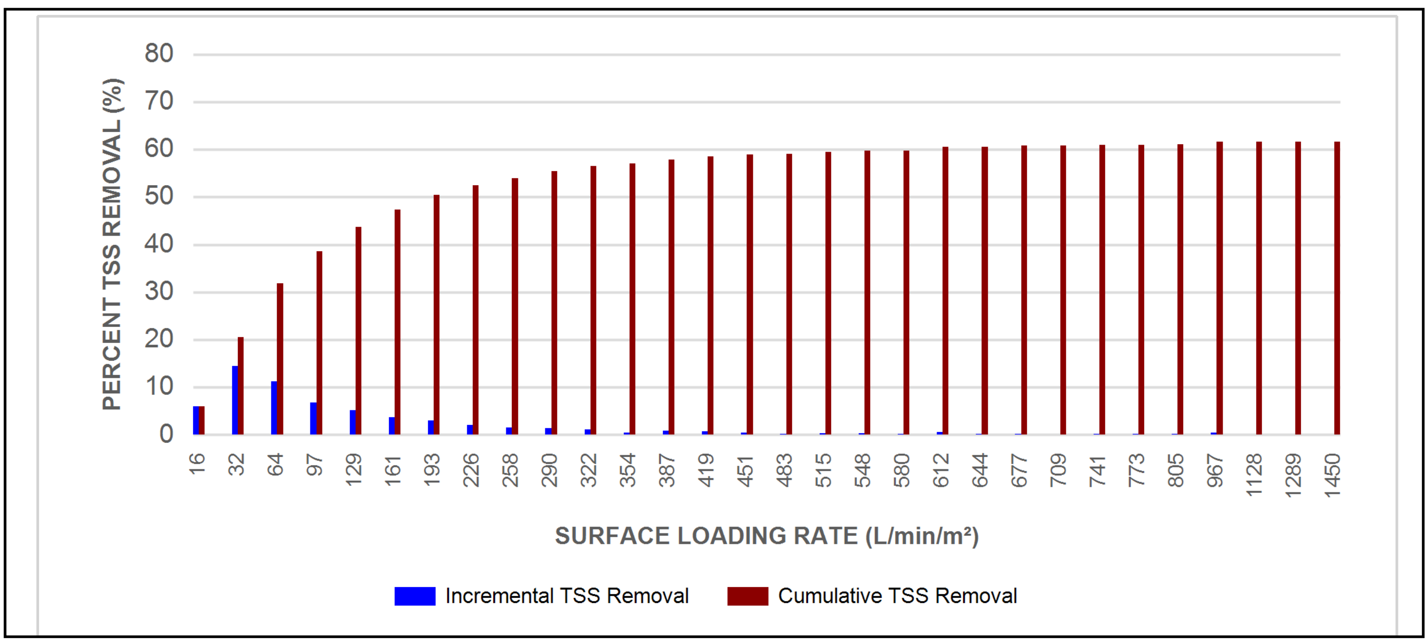
Climate Station ID: 6158731 *Years of Rainfall Data*: 20

imbrium

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

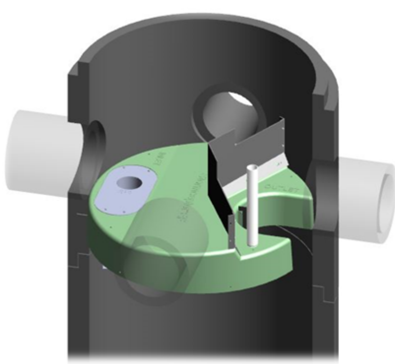
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

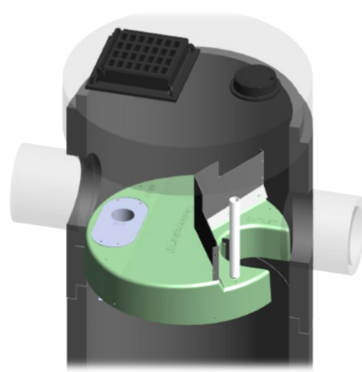
DESIGN FLEXIBILITY

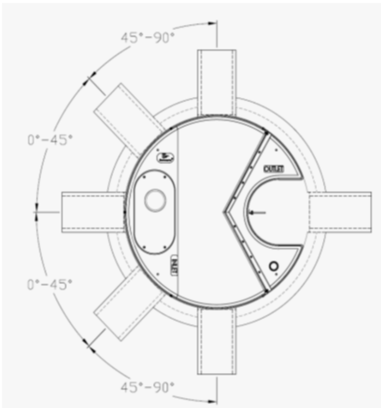
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR
"OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.