`

STORMWATER MANAGEMENT REPORT

PROPOSED ISLAMIC CENTRE
6735 CALEDONIA STREET
CITY OF NIAGARA FALLS

NOVEMBER 10, 2025

PREPARED BY

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PROPOSED ISLAMIC CENTRE
6735 CALEDONIA STREET
CITY OF NIAGARA FALLS, ONTARIO

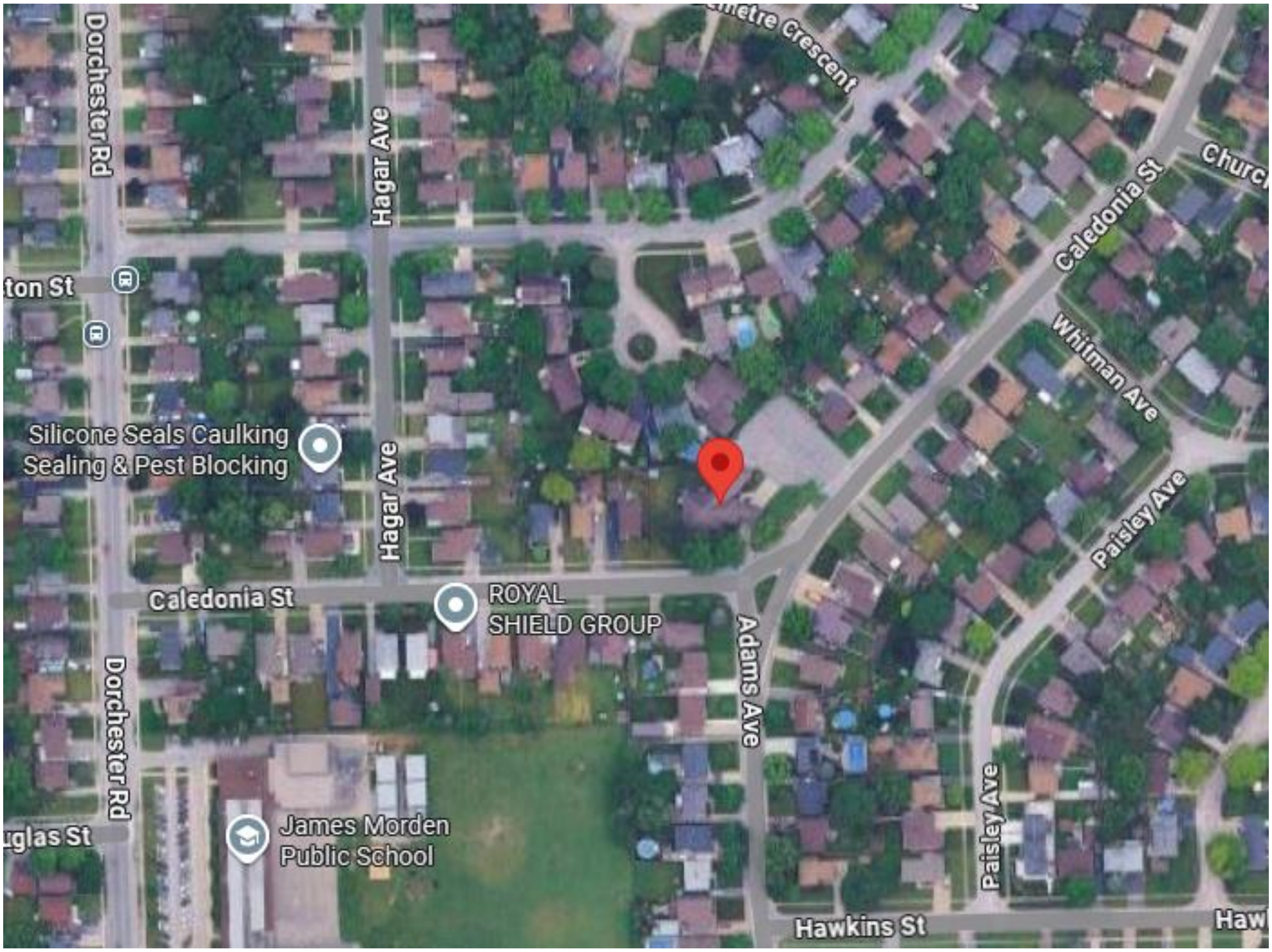
November 10, 2024

1.0 INTRODUCTION

The owner of 6735 Islamic Centre is proposing to redevelop the existing one mosque to a new two story Islamic centre, which includes an educational . The existing building on the lot will be demolished(**Figure 1**). The proposed development will consist of 2 story building with a mezzanine. The includes a prayer hall, gym, youth room, toddler facility and daycare. The proposed daycare will have 10 infants, 15 toddlers, 6 staff. Floor area for infant room will be 61m^2 and for toddler room 74m^2. The owner has acquired two residential lots north of the property to fulfill the needs of the center. The existing lot area of site 6735 Caledonia is 3071.5m^2. After adding two lots the new area will be 4659.4m^2. The new Islamic Centre building will cover an area of 1331.4m^2. The purpose of this report is to identify the requirements for stormwater management and to demonstrate how this site will function during 5-Post Development Condition.

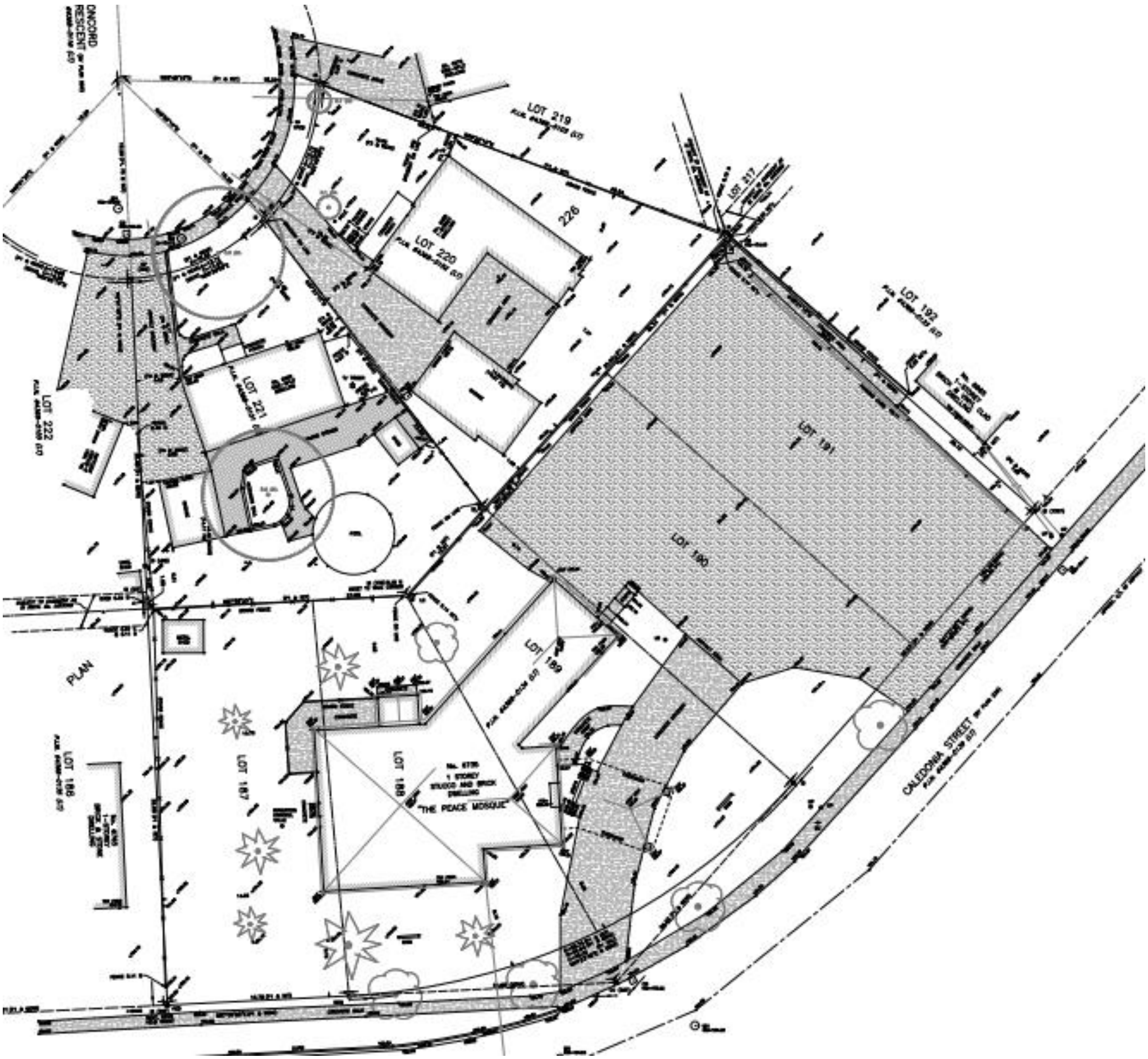
The subject property is fully serviced by storm, sanitary and water. There is a 150 diameter water main, 375mm sanitary sewer and a 1200mm storm sewer trunk.

Figure 1



SATELLITE IMAGE OF THE SUBJECT SITE
AND IT'S SURROUNDING AREA

Figure 2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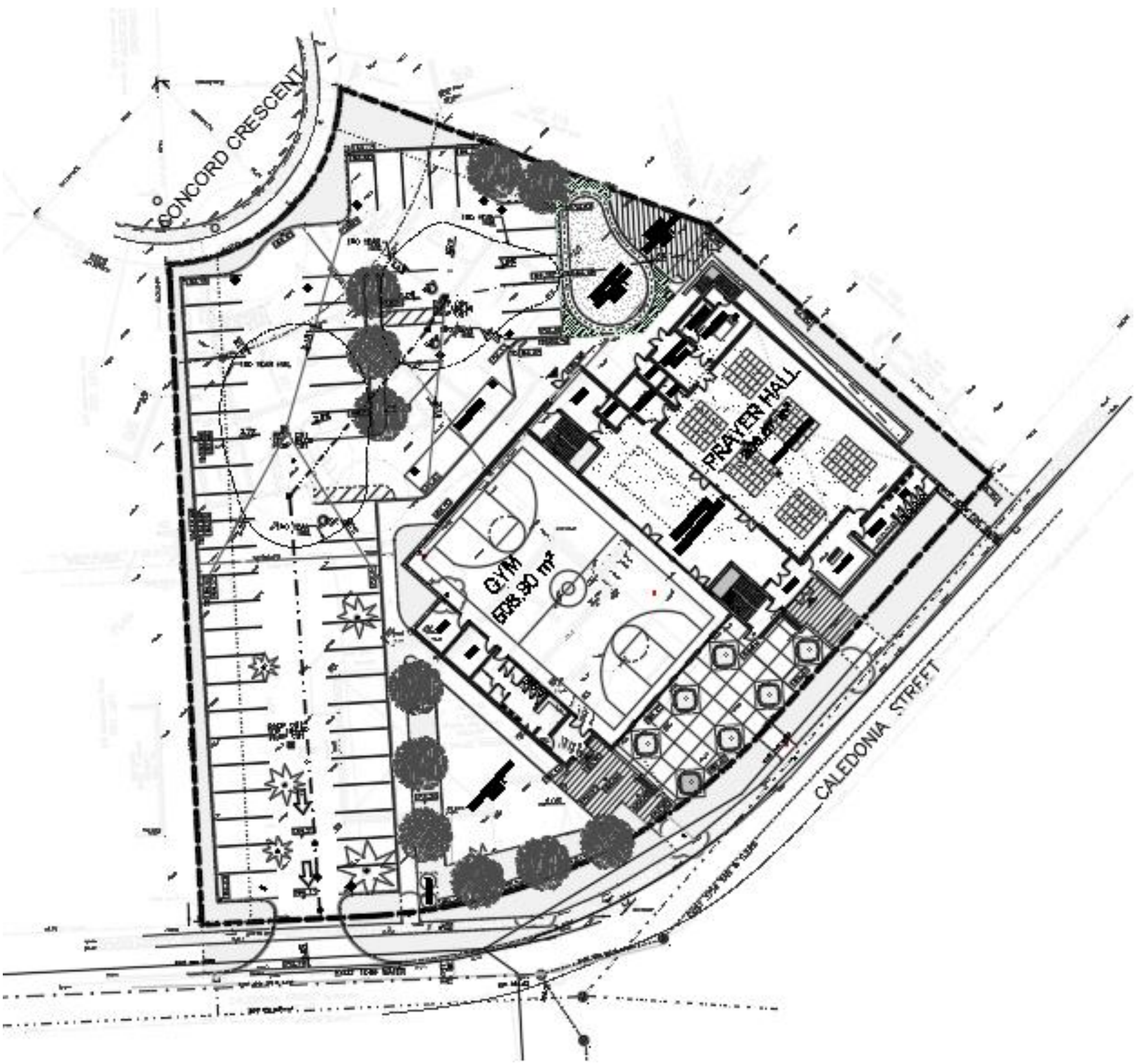
"THE PEACE MOSQUE"
CALEDONIA STREET
PLAN
226

EXISTING DEVELOPMENT

Figure 3



PROPOSED DEVELOPMENT

2. EXISTING SITE DRAINAGE

The natural ground is sloping in North South directions. Only a small portion of the overall site is sloping in the north direction Toward Concord Crescent.

3. STORMWATER MANAGEMENT CRITERIA AND METHODOLGY

Following design criteria and methodology had been adopted.

- 5-Year Post- Development flows should not increase respective 5-Year Pre-Development flows
- Return Period for Overland flow from the site= 5 Year
- Minor storm system for the site is designed based on 5 Year Return Period Storm.
- Stormwater quantity issue to be addressed through the implementation of temporary runoff detention in the open asphalt parking areas and landscape areas.
- Quality Control measurements to be provided. A Quality Treatment Unit to be provided to remove 80% of total suspended particles prior to discharging to municipal infrastructure.

4. PROPOSED STORM DRAINAGE SCHEME

The proposed storm drainage scheme is summarized as follows:

- Accomplishment of a minor and major drainage system consisting of an onsite storm drainage system and overland flow route, respectively.
- Limit the 5-Year post-development runoff rate from the site to less than or `equal to the 5-Year pre-development runoff flow with the implementation of detention at parking spaces and paved access areas.
- Installation of Stormwater quality treatment unit to remove 80% of the total suspended particles.

4.1 PROPOSED MINOR STORM DRAINAGE SCHEME

The proposed storm sewer system within the site has been designed using the 5 Year IDF curve for Niagara Falls. The site will be serviced by a minor drainage system consisting of a network of catch basins connected to on-site storm sewers. The Storm Design Sheet is shown in **Appendix A.**

The detail will be provided in SWM report. A 5-year post development outflow will be controlled to 5-Year pre-development level or less. Water will be detained temporarily on the parking surface by providing an orifice control tube in the downstream storm manhole for the controlled drainage area. The un-controlled area will be discharged to the street by sheet flow.

5.0 STORMWATER MANAGEMENT

5.1 WEIGHTED RUNOFF COEFFICIENT FOR THE PRE-VELOPMENT

The Drainage Plan is shown in Appendix 'A' The runoff coefficients are calculated below in Tables 5.1 and 5.2 The Drainage Plan is shown in **Appendix 'B1**'

TABLE 5.1 PRE-DEVELOPMENT RUNOFF COEFFICIENT AREA 101

Existing Land Use	Area(m^2)	Runoff Coefficient	Area x Runoff Coefficient
Existing Building	686	0.9	617.4
Paved/Sidewalk	1230	0.9	1107.0
Landscape/Grass	2263.4	0.25	565.85
Total	4159.4		2290.25

Pre-Development Composite Runoff Coefficient(R) **=** 2290.25/4159.4
0.55

TABLE 5.2 PRE-DEVELOPMENT RUNOFF COEFFICIENT AREA 102

Existing Land Use	Area(m^2)	Runoff Coefficient	Area x Runoff Coefficient
Existing Building	100	0.9	90.0
Paved/Sidewalk	115	0.9	103.5
Landscape/Grass	285	0.25	71.25
Total	500		264.75

Pre-Development Composite Runoff Coefficient(R) **=** 264.75/500
0.53

5.2 RUNOFF COEFFICIENT FOR THE POST DEVELOPMENT

First the runoff coefficient and flow without any control will be calculated and incase it is greater than the pre-development flow, we ne need to do quantity control. Post Development Drainage Plan attached in **Appendix B2**

TABLE 5.3 POST-DEVELOPMENT RUNOFF COEFFICIENT FOR THE SITE

Existing Land Use	Area(m^2)	Runoff Coefficient	Area x Runoff Coefficient
Building	1331.4	0.9	1198.26
Paved/Sidewalk	2180	0.9	1757.7
Landscape/Grass	1148	0.25	287
Total	4659.4		3242.96

Pre-Development Composite Runoff Coefficient(R) **=** 3187.21/4659.4
0.70

As the post development cumulative area towards Caledonia Street increased from the pre-development cumulative area, we need to provide quantity control to reduce the runoff equal or less than the pre-development area.

The Post development Drainage Plan is shown in **Appendix 'A2'**. The Catchment **201** and **202** will be controlled, the catchment areas **UNC1** towards Caledonia Street will be uncontrolled.

The runoff coefficients are shown below extracted from Appendix 'D1'

TABLE 5.4 POST-DEVELOPMENT RUNOFF COEFFICIENT AREA 201

Proposed Land Use	Area(m^2)	Runoff Coefficient	Area x Runoff Coefficient
Asphalt Pavement	1820	0.9	1638
Grass	812	0.25	203
Total	2632		1841

Post-Development Composite Runoff Coefficient(R) = 1850.5/2632
= **0.70**

TABLE 5.5 POST-DEVELOPMENT RUNOFF COEFFICIENT (202) CONTROLLED

Proposed Land Use	Area(m^2)	Runoff Coefficient	Area x Runoff Coefficient
Proposed Building Roof	1331.4	0.9	1198.26
Total	1331.4		1198.26

Post-Development Composite Runoff Coefficient(R) = 1198.26/1331.4
= .90

TABLE 5.6 POST-DEVELOPMENT RUNOFF COEFFICIENT AREA (UNC1) UN-CONTROLLED

Proposed Land Use	Area(m^2)	Runoff Coefficient	Area x Runoff Coefficient
Asphalt Pavement/Hard Surface	360	0.9	324
Grass	336	0.25	84
Total	696		408

Post Development Composite Runoff Co-efficient= 408/696
= 0.59

5.3 PEAK RUNOFFS FLOWS

TABLE 11 Intensity-Duration-Frequency, City of Niagara Falls

$I=A/(Tc + B)^c$

Return Period	IDF Parameters			Intensity (mm/hr)
	A	B	C	Tc 10 min
5 Year	719.5	6.34	0.7687	108.82

5.3.1 PRE-DEVELOPMENT RUNOFFS

The runoff calculations are shown below:

AREA 101

Q=2.78RIA
I= 719.5/(6.34+10)$^{0.7687}$
= 84.02 mm/hour
A= 0.4159.4ha
R=0.55

Runoff Flow Q=2.78x0.55x84.02x0.4159
=**53.43 L/sec**

AREA 102

Q=2.78RIA
I= 719.5/(6.34+10)$^{0.7687}$
= 84.02 mm/hour
A= 0.05ha
R=0.53
Runoff Flow Q=2.78x0.53x84.02x0.05
=**6.19 L/sec**

5.3.2 POST-DEVELOPMENT RUNOFFS

The runoff calculations for the whole site without controlled are shown below:

Q=2.78RIA
I= 719.5/(6.34+10)$^{0.7687}$
= 84.02 mm/hr
A=0.4659ha
R=0.70
Runoff Flow Q=2.78x0.70x84.02x0.4659
=**76.17 L/sec > 53.43L/sec(AREA 101)**

A quantity controlled to be provided to bring the post development flows less than the pre-development flows.

5.3.3 POST DEVELOPMENT FLOWS FOR AREAS 201 & 202(CONTROLLED)

The sum of the post development runoffs from **AREA 201, AREA 202** and **UNC1** needs to be less than the pre-development flows. We will first calculate the runoffs from **AREA 202(roof)** and **UNC1(**Uncontrolled) The runoffs from these areas will be deducted from the pre-development flow to get the required flow from **AREA 202**.

5.3.4 POST DEVELOPMENT FLOWS FOR AREA 202(ROOF) CONTROLLED

Four Zurn drains with two notches each are being proposed to control rainwater from the roof. The calculations are shown in Appendix

Release Rate	=17.88 L/Sec
Storage required	=7.93m^3
Storage Provided	= 63.9m^3

5.3.5 POST DEVELOPMENT FLOWS FOR AREA 202(UN-CONTROLLED)

The runoff calculations for the un-controlled are UNC1 are shown below:

Q=2.78RIA
I= 719.5/(6.34+10)$^{0.7687}$
= 84.02 mm/hr
A=0.0696 ha
R=0.59
Runoff Flow Q=2.78x0.59x84.02x0.0696
=**9.59 L/sec**

5.3.6 POST DEVELOPMENT FLOWS FROM THE PARKING AREA(201)

The required flow from the open areas will be calculated by subtracting from pre-development flow the controlled flow from the roof and the flow from the un-controlled area **(UNC1)**

Required flow from the open surface **AREA 201** **=** 53.43-17.88-9.59
= 25.96L/sec

6..0 QUANTITY CONTROL

An Excel spread sheet is used to calculate the storage required to control flow from the site less than the pre-development flow. To control flow to 25.96 L/sec, storage is calculated 11.70m^3. Refer to **Appendix C**-1

The outflow providing minimum size of control orifice of 75mm(See Section 9.0) =25.27 L/sec
The revised storage calculations for 25.6 L/sec = **12.11m^3 (**Refer **Appendix C-2)**

6.1 STORAGE

Rainwater will be detained temporary in oversize storm pipes to control outflow to 5-Year pre-development runoff flow.

Storage Provided:

450mm Storm pipe (33) =0.45x0.45x0.7854x33
=5.24m^3

300mm storm pipe (27m) =0.30x0.30x0.7854x26
=1.9m^3
250mm Storm pipe =0.25x0.25x0.7854
=1.3m^3
Storage in Storm pipes =5.24+1.9+1.3
=8.44m^3
Storm manholes = STM MHCB1 + STM MH2 +STM MH3
=1.2x1.2x0.7854(1.68+2.1+2.52)
=7.13m^3
Detention Pond Storage:
Surface Area = 63m^2(STM MHCB) + 95m^2(CB3)
=158m^2
Maximum Depth =184.10-184.0
=0.10m
Storage =158x0.10/3
=5.2m^3
Total Storage Provided =8.44+7.13+5.2
=**20.77m^3 > 11.91m^3** O.K.

6.2 ORIFICE CONTROL

An orifice pipe of 75mm diameter is being proposed to achieve quantity control, as the minimum size of an orifice allowed is 75mm. The calculations are shown in **Appendix D.** The flow will be **25.60L/sec** with a water head of 2.49m.

7.0 QUALITY CONTROL

We are proposing CDS-PMSU2015-4 to achieve quality level as per city's requirement. The unit will treat 98.8% of the annual rainfall volume and remove 87.8% of the TSS particles. Design Sheet and Operation and Maintenance Guidelines are attached in **Appendix 'E'**.

8.0 CONCLUSION

All necessary services such as roads, sanitary sewers, water; storm outlet and utilities are available and have sufficient capacity to accommodate the proposed development.
Adequate storm outlet is available for the proposed development. There is a safe overland flow route to Caledonia Street. The proposed development will have no adverse affect on the adjacent properties. The proposed stormwater drainage scheme will prevent flooding & erosion, provide stormwater quality controls and maintain the integrity of the existing drainage system.

Based on the availability of municipal services and other utilities and the fact that the proposed development is compatible with the existing land use and complements the existing landscape, we recommend approval to be granted to the proposed development. The proposed development will also generate impost fee for the Region and the City, which will assist in financing of other projects, in addition to the creation of healthy tax base.

Prepared by:

Muhammad F. Ismail P. Eng.

APPENDIX A

STORM SYSTEM DESIGN SHEET

Appendix A
STORM SEWER DESIGN SHEET

Q= 2.78AIR

Where
Q peak flow in litres per second (L/s)
A area in hectares
I rainfall in millimetres per hour (mm/hr)
$= 719.50/(tc+6.34)^{0.7687}$ 5 Year Storm
where : tc is in hours
R runoff coefficient

STREET			AREAS (ha)						Rainfall	Peak	SEWER DATA						
STREET	FROM	TO	R= 0.25	R= 0.5	R= 0.7	Indivi. 2.78AR	Accum 2.78AR	Time of Conc.	Intensity I	Flow Q (L/s)	Diameter (mm)	Slope %	Length (m)	Capacity (L/s) n= .013	Velocity (m/s) m/s	Time of Flow (minutes)	Remarks
Private	PROP CB1	PROP STM MHCB1			0.10	0.19	0.19	15.00	68.62	16.3	250	2.20	27.0	89.4	1.82	0.25	
Private	PROP STM MHCB1	PROP STM MH2			0.08	0.16	0.35	15.25	68.06	26.8	300	0.50	26.0	69.4	0.98	0.44	
Private	PROP STM MH2	PROP STM MH3			0.08	0.16	0.51	15.69	67.01	37.3	450	1.00	33.0	289.7	1.82	0.30	CONTROL MH3
Private	PROP STM MH3	CDS UNIT			-	0.00	0.86	15.99	66.32	60.2	300	1.00	4.0	98.1	1.39	0.05	
Private	CDS UNIT	STM MH4			-	0.00	0.86	16.04	66.21	60.1	300	1.00	4.0	98.1	1.39	0.05	
Private	ROOF LEADER	STM MH4			0.13	0.26	0.26	16.09	66.10	20.1	150	2.00	28.0	21.8	1.23	0.38	CONTROL FLOW
Private	PROP STM MH4	EX STM			-	0.00	0.26	16.09	66.10	20.1	300	1.00	10.0	98.1	1.39	0.12	

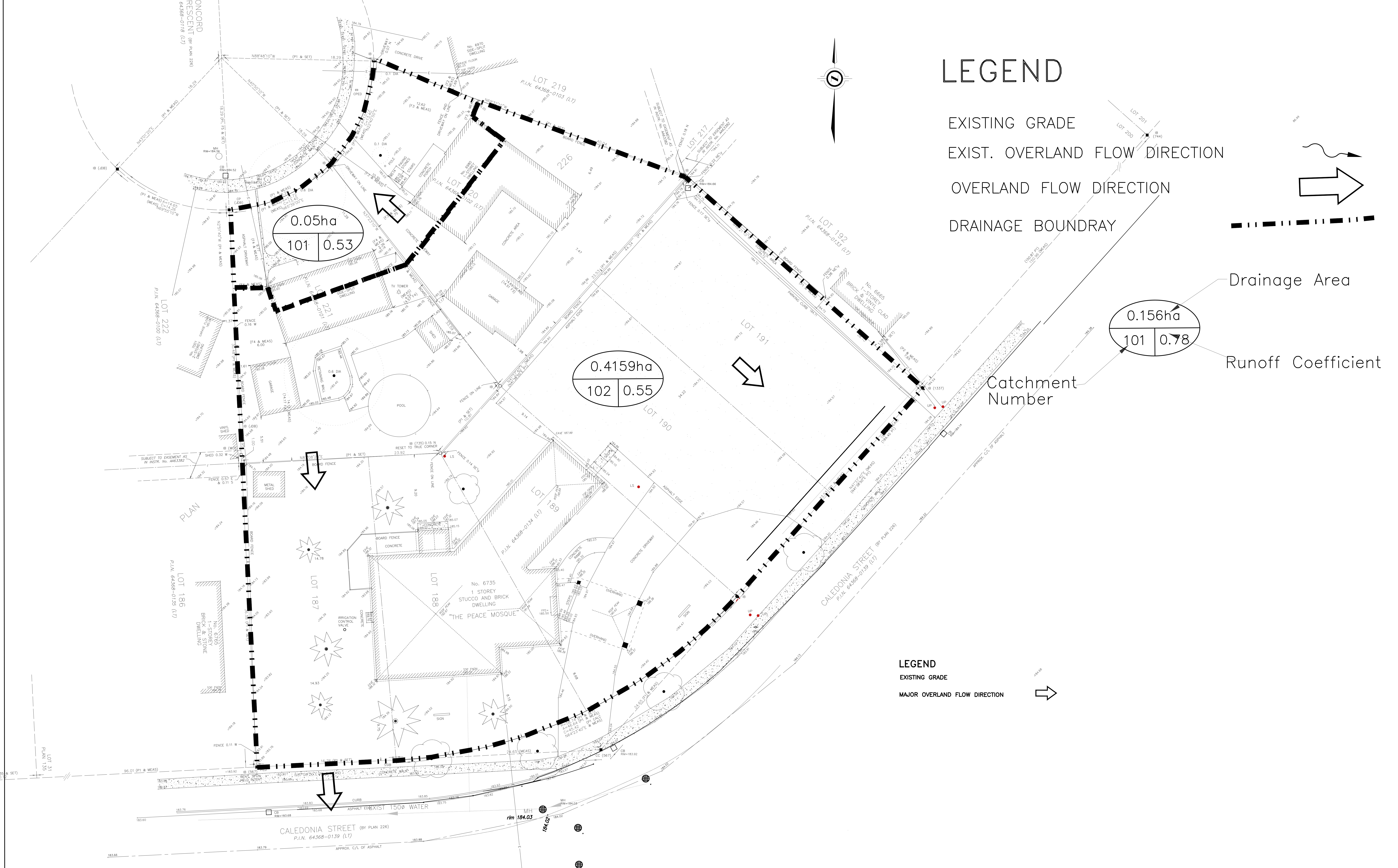
Calc by	MFI	Project:		Sheet No. 1 of 1
Checked	MFI	6735 CALEDONIA STREET		
Date	13-Sep-25	NIAGARA FALLS		

APPENDIX B

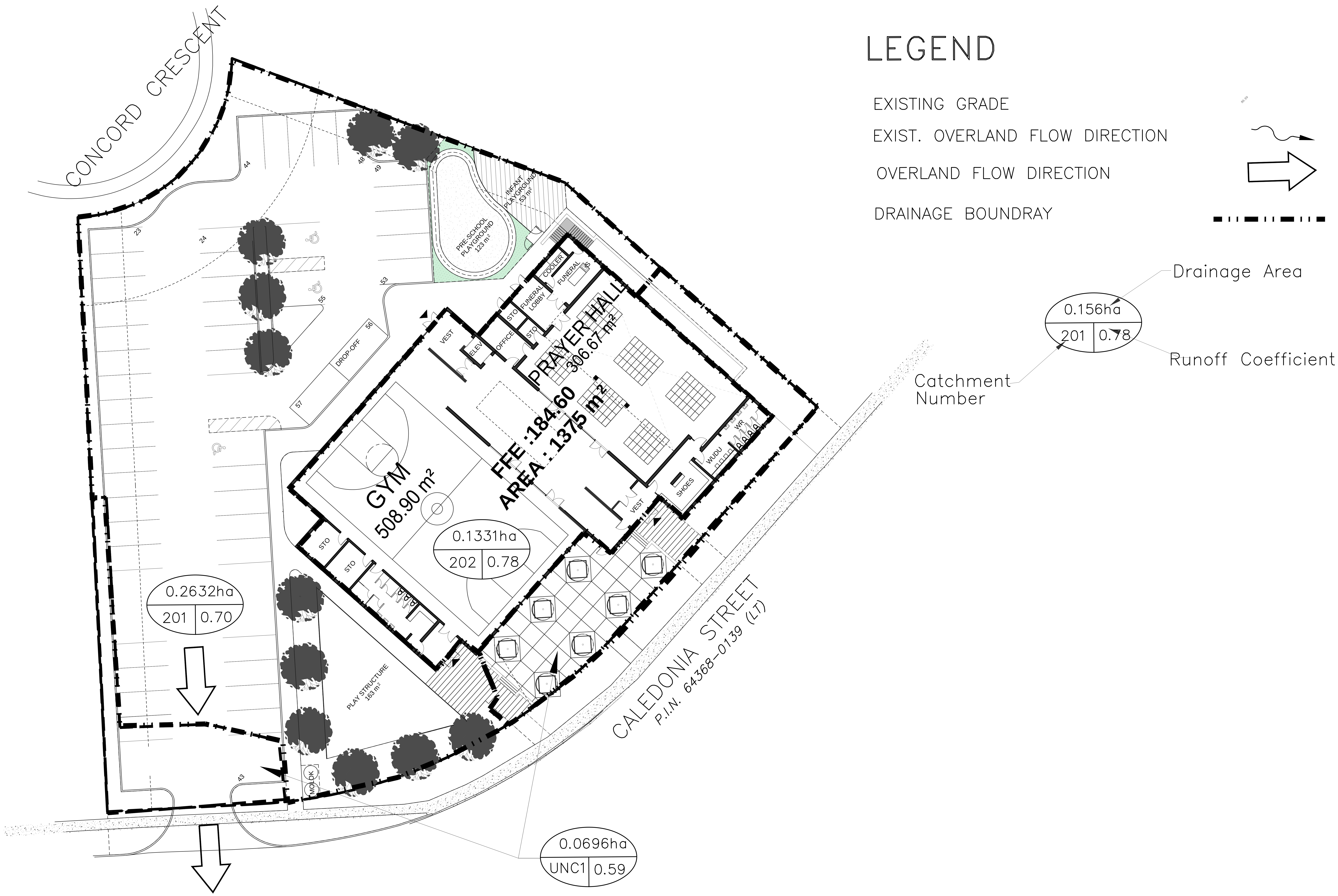
B1 PRE-DEVELOPMENT DRAINAGE PLAN

B2 POST DEVELOPMENT DRAINAGE PLAN

APPENDIX B1
PRE-DEVELOPMENT DRAINAGE PLAN



APPENDIX B2
POST-DEVELOPMENT DRAINAGE PLAN



APPENDIX C

C-1 STORAGE CALCULATIONS FOR PRE-DEVELOPMENT FLOW

C-2 STORGAE CALCULATIONS FOR THE CONTROL FLOW

Appendix C-1

Surface Storage For 5-Year Storm
6735 Calidonia
Niagara Falls

Formula Used for Runoff Calculations:		Modified Rational Formula
Runoff Flow=		2.78CIA
Return Period		5 Year
Rainfall Intensity: (5 Year Return Period)		$719.5/(T_C + 6.34)^{0.7687}$ where t_c is in hours
Total Open Area to be Controlled		0.278
Runoff Coefficient	=	0.70 (See Appendix B4)
5-Year Pre-Development from the Site		58.77 L/sec
Discharge from the Control Roof Drains		17.88
Uncontrolled Flow		9.59
Control Flow from Praking and the Open Surface	=	53.43 - 17.88 - 9.59
Control Flow from Praking and the Open Surface		25.60 l/s
Time of Concentration		10 min
Flow from the Control Orifice (Seen Sec 8.0 of the Report)		25.96 L/sec

Time (min.)	Rainfall Intensity mm/hr	Storm Runoff (l/s)	Runoff Volume (m^3)	Release Volume (m^3)	Storage Volume (m^3)
5	111.26	60.19	18.06	7.79	10.27
10	**84.02**	**45.46**	**27.27**	**15.58**	**11.70**
15	68.44	37.02	33.32	23.36	9.96
20	58.21	31.49	37.79	31.15	6.64
25	50.93	27.55	41.33	38.94	2.39

Appendix C-2

Surface Storage For 5-Year Storm
6735 Calidonia
Niagara Falls

Formula Used for Runoff Calculations:		Modified Rational Formula	
Runoff Flow=		2.78CIA	
Return Period		5 Year	
Rainfall Intensity: (5 Year Return Period)		$719.5/(T_C + 6.34)^{0.7687}$	where t_c is in hours
Total Open Area to be Controlled		0.278	
Runoff Coefficient	=	0.70	(See Appendix B4)
5-Year Pre-Development from the Site		58.77	L/sec
Discharge from the Control Roof Drains		17.88	
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5	111.26	60.19	18.06	7.58	10.48
10	**84.02**	**45.46**	**27.27**	**15.16**	**12.11**
15	68.44	37.02	33.32	22.74	10.58
20	58.21	31.49	37.79	30.32	7.47
25	50.93	27.55	41.33	37.91	3.42

APPENDIX D

ORIFICE DESIGN SHEET

Appendix D

Orifice Design Calculation

6735 Caledonia Street ,Niagara Falls

By: MFI

Date: 23-Oct-25

	HWL	Orifice Inv.	c	a	g	Orifice dia.	h	Q
	(m)	(m)	Orifice Plate	(m^2)		(m)	(m)	(m^3/sec)
Orifice for Qunatity Control	84.10	81.64	0.83	0.0044	9.81	0.0750	2.42	0.02527

APPENDIX E

QUALITY TREATMENT UNIT

- DESIGN SHEET CDS-PMSU2015-4
- OPERATION AND MAINTENANCE GUIDELINES

CDS ESTIMATED NET ANNUAL TSS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
AND A FINE PARTICLE SIZE DISTRIBUTION

ECHELON ENVIRONMENTAL

CDS

Echelon Environmental
55 Albert Street, Suite #200 | Markham, ON, L3P 2T4
www.echelonenvironmental.ca   info@echelonenvironmental.ca   905-948-0000

Project Name:	6735 Caledonia St	**Engineer:**	**Premier Engineering Solutions Inc.**
Location:	Niagara Falls	**Contact:**	Muhammad Ismail, P.Eng.
OGS ID:	OGS	**Report Date:**	9/30/2025

Area:	0.300 ha	**Rainfall Station #**	209	
C Value:	0.70	**Particle Size Distribution**	FINE	
CDS Model:	PMSU2015-4	**CDS Treatment Capacity:**	20	l/s

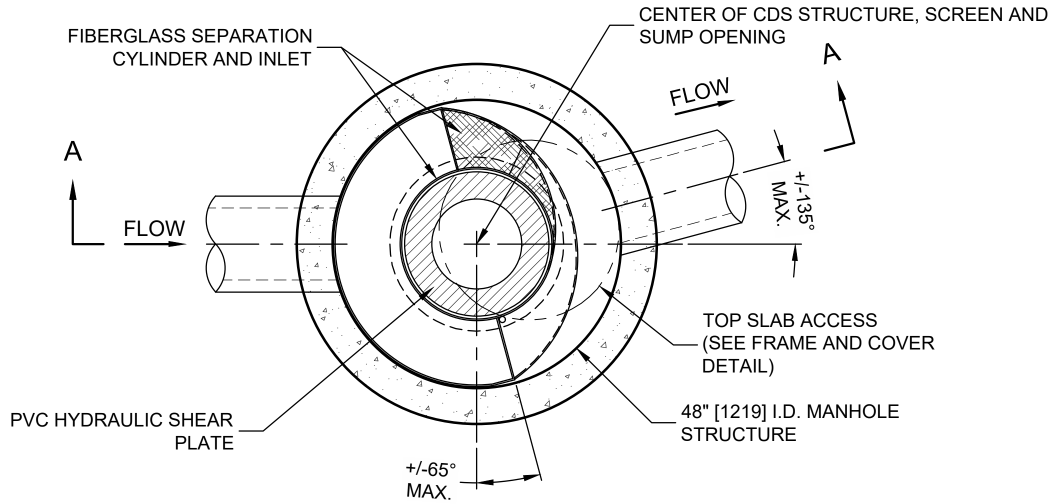
Rainfall Intensity[1] (mm/hr)	**Percent Rainfall Volume[1]**	**Cumulative Rainfall Volume**	**Total Flowrate (l/s)**	**Treated Flowrate (l/s)**	**Operating Rate (%)**	**Removal Efficiency (%)**	**Incremental Removal (%)**
0.5	9.3%	9.3%	0.3	0.3	1.5	98.4	9.1
1.0	10.3%	19.6%	0.6	0.6	2.9	98.0	10.1
1.5	9.6%	29.2%	0.9	0.9	4.4	97.6	9.4
2.0	9.1%	38.3%	1.2	1.2	5.8	97.2	8.8
2.5	7.0%	45.3%	1.5	1.5	7.3	96.8	6.8
3.0	6.6%	51.9%	1.8	1.8	8.7	96.4	6.4
3.5	3.9%	55.8%	2.0	2.0	10.2	95.9	3.7
4.0	5.4%	61.2%	2.3	2.3	11.6	95.5	5.1
4.5	3.7%	64.9%	2.6	2.6	13.1	95.1	3.5
5.0	3.6%	68.5%	2.9	2.9	14.5	94.7	3.4
6.0	5.4%	73.9%	3.5	3.5	17.4	93.9	5.1
7.0	5.0%	78.9%	4.1	4.1	20.3	93.0	4.7
8.0	3.4%	82.4%	4.7	4.7	23.2	92.2	3.2
9.0	3.1%	85.5%	5.3	5.3	26.1	91.4	2.8
10.0	2.0%	87.4%	5.8	5.8	29.0	90.5	1.8
15.0	7.4%	94.8%	8.8	8.8	43.6	86.4	6.4
20.0	2.3%	97.2%	11.7	11.7	58.1	82.2	1.9
25.0	1.1%	98.2%	14.6	14.6	72.6	78.1	0.8
30.0	0.6%	98.8%	17.5	17.5	87.1	73.9	0.4
35.0	0.7%	99.4%	20.4	20.1	100.0	69.1	0.5
40.0	0.3%	99.7%	23.4	20.1	100.0	60.4	0.2
45.0	0.3%	100.0%	26.3	20.1	100.0	53.7	0.2
50.0	0.0%	100.0%	29.2	20.1	100.0	48.4	0.0
							94.3

Removal Efficiency Adjustment[2] =	6.5%
Predicted Net Annual TSS Removal Efficiency =	**87.8%**
Predicted Annual Rainfall Treated =	**98.8%**

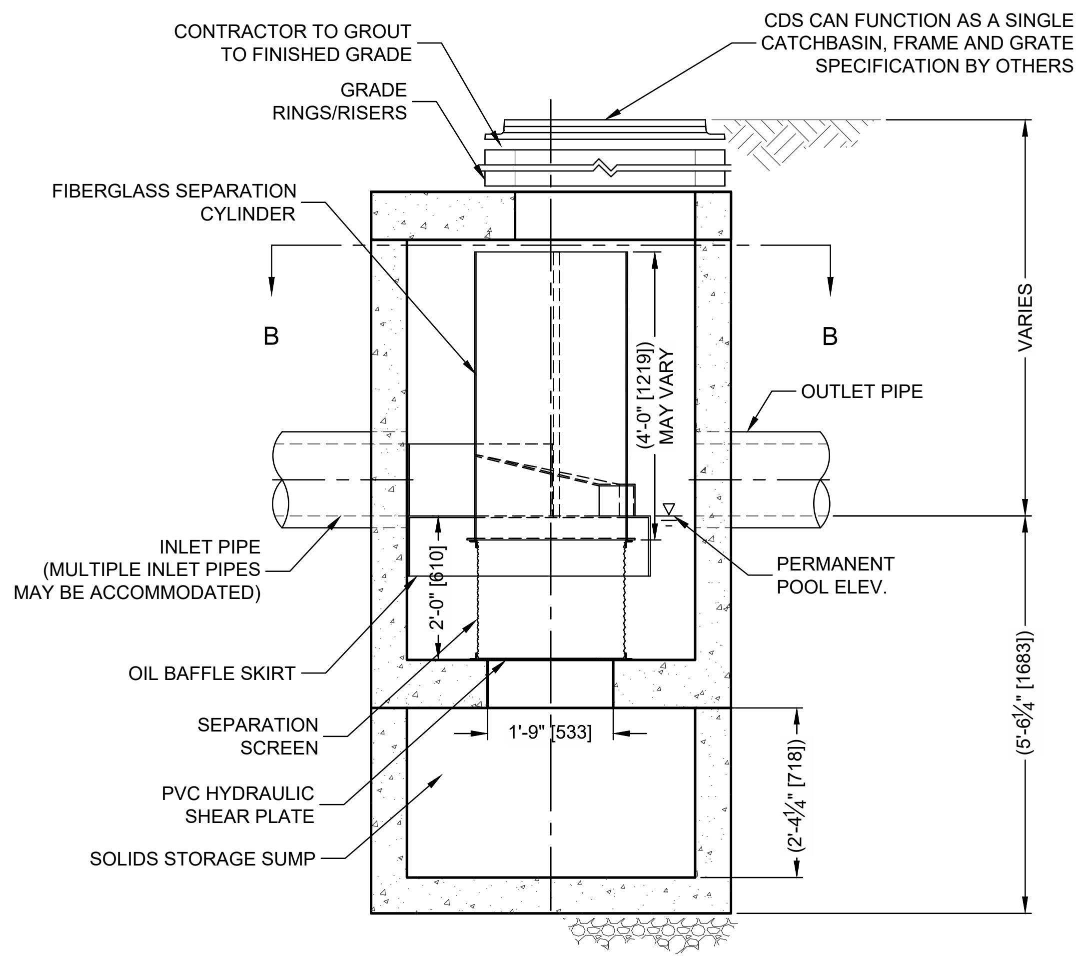
1 - Based on 36 years of hourly rainfall data from Canadian Station 6135638, Niagara Falls ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS PMSU 2015-4-C DESIGN NOTES

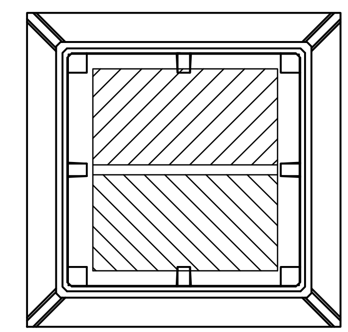
THE STANDARD CDS PMSU 2015-4-C CONFIGURATION IS SHOWN.
ANTI-BUOYANCY SLAB MAY BE INCLUDED (NOT SHOWN).
SUMP DEPTH SHOWN IS TYPICAL, CAN BE EXTENDED AS REQUIRED.
HYDRAULIC CHARACTERISTICS VARY BASED ON PIPE SIZE, MATERIAL, AND CDS UNIT SELECTION. FOR CUSTOM HYDRAULIC ANALYSIS PLEASE CONTACT ECHELON ENVIRONMENTAL.
FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT ECHELON ENVIRONMENTAL.



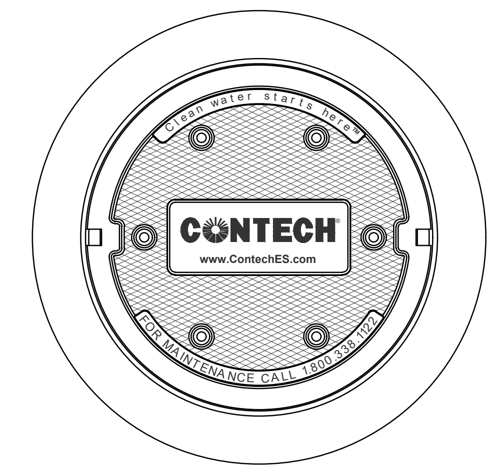
PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



FRAME AND GRATE
(DIMENSIONS VARIES)
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET HS20 (AASHTO M 306) AND BE CAST WITH THE CONTECH LOGO.
6. IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

ECHELON ENVIRONMENTAL
55 ALBERT STREET, MARKHAM ON L3P2T4
CONTACT: INFO@ECHELONENVIRONMENTAL.CA
905-948-0000

CONTECH ENGINEERED SOLUTIONS LLC

CDS PMSU 2015-4-C
ONLINE CDS
STANDARD DETAIL

DATE: 13-FEB-25
REVISION:1
DRAWN BY: PG

OPERATIONS AND MAINTENANCE GUIDELINES FOR CDS UNIT MODEL PMSU

(Continuous Deflective Separation Unit)

PROJECT NAME

1. INTRODUCTION

The CDS unit is an important and effective component of your storm water management program and proper operation and maintenance of the unit are essential to demonstrate your compliance with local, provincial and federal water pollution control requirements.

Your CDS system utilizes patented "continuous deflective separation" (CDS) technology to separate and trap debris, sediment and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material that is larger than the screen aperture.

2. OPERATION OVERVIEW

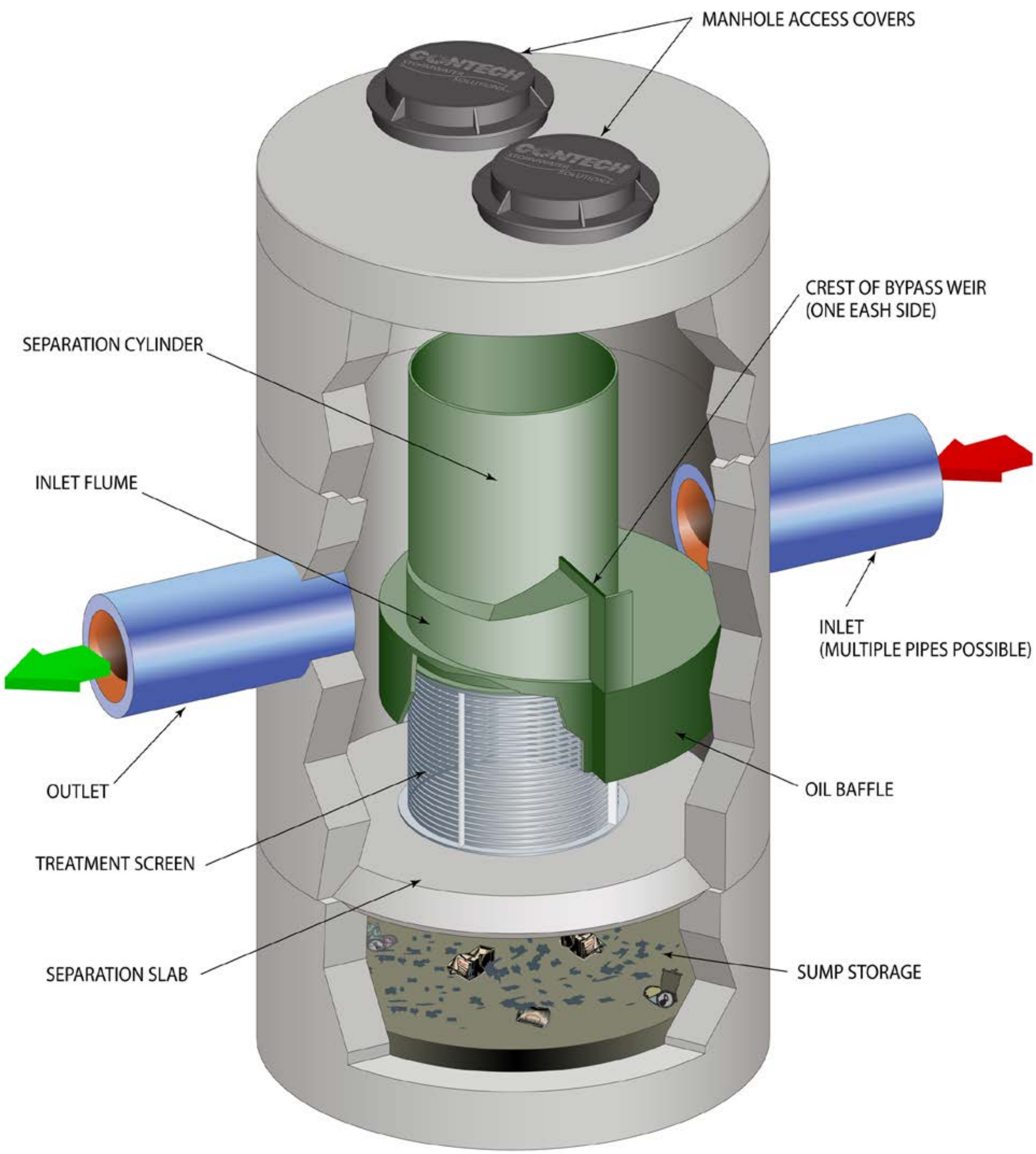
The CDS unit is a non-mechanical hydraulically driven technology that will function any time there is flow in the storm drainage system. Stormwater enters the CDS System (Figure 1) where the bypass weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated. Flows in excess of the treatment capacity spill over the bypass weir and exit the system through the outlet pipe.

Stormwater entering the CDS System circulates in a torriodial flow path. This flow pattern helps to maintain the non-blocking attributes of the treatment screen as well as creating a hydraulic condition at the screen surface that effects pollutant separation. Treated stormwater passes through the screen into the outer volute area where it moves toward the outlet pipe and out of the system.

The separation chamber is shrouded by an integral oil baffle that traps free oil and grease that floats to the water surface during treatment.

During normal operation captured grit will fall by gravity into the lower storage sump located beneath the treatment chamber. Floatables will be captured at the water surface inside the separation chamber and oil, if present, will be located at the water surface underneath the integral oil baffle.

Figure One: In-Line CDS Systems



The frequency of cleaning for the CDS unit will depend upon the generation of trash and debris and sediments in each application. Cleanout and preventive maintenance schedules will be determined based on operating experience unless precise pollutant loadings have been determined. The unit should be periodically inspected to determine the amount of accumulated pollutants and to ensure that the cleanout frequency is adequate to handle the predicted pollutant load being processed by the CDS unit. The recommended cleanout of solids within the CDS unit's sump should occur at 85% of the sump capacity. Note that the sump may be completely full with no impact on the CDS unit's performance.

Access to the CDS unit is typically achieved through two manhole access covers – one allows inspection and cleanout of the separation chamber (screen/cylinder) & sump and another allows inspection and cleanout of sediment captured and retained behind the screen. The PSW & PSWC off-line models have an additional access cover over the weir of the diversion vault. Inspections of the internal components and cleanout maintenance can, in most cases, be accomplished from the ground surface without requiring entry into the unit.

IMPORTANT - CONFINED SPACE

The CDS unit is a confined space environment and only properly trained personnel possessing the necessary safety equipment should enter the unit to perform maintenance and/or inspection. Personnel inspecting the system or performing maintenance must have proper training certification in Fall Protection and Confined Space entry as a minimum.

4. MAINTENANCE

Contech recommends the following:

NEW INSTALLATIONS – Check the condition of the unit after every runoff event for the first 30 days. The visual inspection should ascertain that the unit is functioning properly (no blockages or obstructions to inlet and/or separation screen), and should measure the amount of solid materials that have accumulated in the sump, the amount of fine sediment accumulated behind the screen, and determining the amount of floating trash and debris in the separation chamber. This can be done with a calibrated "dip stick" so that the depth of deposition can be tracked. Refer to the "Cleanout Schematic" **(Appendix B)** for allowable deposition depths and critical distances. Schedules for inspections and cleanout should be based on storm events and pollutant accumulation.

ONGOING OPERATION **–** Once the site is established, the inspection frequency should be based on historical pollutant loading. The floatables should be removed and the sump cleaned when the sump is 75-85% full. If floatables accumulate more rapidly than the settleable solids, the floatables should be removed using a vactor truck or dip net before the layer thickness exceeds one to two feet.

Cleanout of the CDS unit at the end of a rainfall season is recommended because of the nature of pollutants collected and the potential for odor generation from the decomposition of material collected and retained. This end of season cleanout will assist in preventing the discharge of pore water from the CDS® unit during summer months.

It is recommended to pump down the CDS unit and remove pollutants at least one time per year. (This may be extended for fully developed sites that generate small pollutant loadings. During cleanout, the internal components normally below the water line should be inspected. If any parts appear to be damage please contact Contech Stormwater Solutions or ENV Treatment Systems to make arrangements to have the damaged items repaired or replaced:

CONTECH Stormwater Solutions
Phone, Toll Free: 877 907-8676
200 Enterprise Drive
Scarborough, ME 04074

Or

ENV Treatment Systems
505 Hood Road, Unit #26
Markham, ON L3R 5V6
Phone 905-415-3878
Email: env@envinc.ca

CLEANOUT AND DISPOSAL

A vactor truck is recommended for cleanout of the CDS unit and can be easily accomplished in less than 30-40 minutes for most installations. Cleanout should be conducted by a licensed waste management company. Disposal of material from the CDS unit should be in accordance with the local municipality's requirements. During cleanout the vactor truck will evacuate all stormwater and pollutants from the CDS unit. (Local waste receiving stations may require the solids to have minimal water content. If decanting of stormwater from the vactor truck is required then the local permitting and regulatory authority should be contacted to determine if this is permissible.) Vactor trucks are typically equipped with a power wash system that may be used to wash the screen if required.

If oil is present in the CDS unit it should be removed separately by a licensed liquid waste hauler. The CDS unit should be cleaned immediately if a hydrocarbon spill has occurred. CDS Technologies only recommends the addition of sorbents to the separation chamber if there are specific land use activities in the catchment watershed that could produce exceptionally large concentrations of

Alternatively, the local regulator may allow the use of sorbents to capture and remove hydrocarbons from the CDS system. Disposal of sorbents may be less costly and disposing of an oily-water mixture creating by vacuum removal.

5. OPTIONAL FEATURES

USE OF SORBENTS FOR ENHANCED OIL CAPTURE

It should be emphasized that the addition of sorbents is not a requirement for CDS units to effectively capture oil and grease from storm water runoff. The CDS unit separation chamber effectively captures free oil and grease and CDS units are also equipped with a conventional oil baffle for the capture of gross quantities. However, the addition of sorbents is a unique capability of CDS units that enables enhanced oil and grease capture efficiencies beyond that obtainable by conventional oil baffle systems as well as permanent retention of captured oil and grease in solid form that prevents emulsification and conveyance.

Under normal operations, CDS units will provide effluent concentrations of oil and grease that are less than 15 parts per million (ppm) for all dry weather spills where the volume is less than or equal to the spill capture volume of the CDS unit. During wet weather flows, the oil baffle system can be expected to remove between 40 and 70% of the free oil and grease from the storm water runoff.

Contech only recommends the addition of sorbents to the separation chamber if there are specific land use activities in the catchment watershed that could produce exceptionally large concentrations of oil and grease in the runoff, or for large amounts that may be subjected to extended periods of inattention. If site evaluations merit an increased control of free oil and grease then oil sorbents can be added to the CDS unit to thoroughly address these particular pollutants of concern.

Recommended Oil Sorbents - Rubberizer® Particulate 8-4 mesh or OARS™ Particulate for Filtration, HPT4100, or equal, available from Haz-Mat Response Technologies, Inc. 4626 Santa Fe Street, San Diego, CA 92109 (800) 542-3036. OARS™ is supplied by AbTech Industries, 4110 N. Scottsdale Road, Suite 235, Scottsdale, AZ 85251 (800) 545-8999.

The amount of sorbent to be added to the CDS separation chamber can be determined if sufficient information is known about the concentration of oil and grease in the runoff. Frequently the actual concentrations of oil and grease are too variable and the amount to be added and frequency of cleaning will be determined by periodic observation of the sorbent. As an initial application, CDS recommends that approximately 4 to 8 pounds of sorbent material be added to the separation chamber of the CDS units per acre of parking lot or road surface per year. Typically this amount of sorbent results in a ½ inch to one (1") inch depth of sorbent material on the liquid surface of the separation chamber. The oil and grease loading of the sorbent material should be observed after major storm events. Oil Sorbent material may also be furnished in pillow or boom configurations.

The sorbent material should be replaced when it is fully discolored by skimming the sorbent from the surface. The sorbent may require disposal as a special or hazardous waste, but will depend on local and state regulatory requirements.

VECTOR CONTROL

Most CDS units do not readily facilitate vector infestation. However, for CDS units that may experience extended periods of non-operation (stagnant flow conditions for more than approximately one week) there may be the potential for vector infestation. In the event that these conditions exist, the CDS unit may be designed to minimize potential vector habitation through the use of physical barriers (such as seals, plugs and/or netting) to seal out potential vectors. The CDS unit may also be configured to allow drain-down under favorable soil conditions where infiltration of storm water runoff is permissible. For standard CDS units that show evidence of mosquito infestation, the application of larvicide is one control strategy that is recommended. Typical larvicide applications are as follows:

SOLID B.t.i. LARVICIDE: ½ to 1 briquet (typically treats 50-100 sq. ft.) one time per month (30-days) or as directed by manufacturer.

SOLID METHOPRENE LARVICIDE (not recommended for some locations): ½ to 1 briquet (typically treats 50-100 sq. ft.) one time per month (30-days) to once every 4-½ to 5-months (150-days) or as directed by manufacturer.

6. RECORDS OF OPERATION AND MAINTENANCE

Contech recommends that the owner maintain annual records of the operation and maintenance of the CDS unit to document the effective maintenance of this important component of your storm water management program. The attached **Annual Record of Operations and Maintenance** form (see **Appendix A**) is suggested and should be retained for a minimum period of three years.

APPENDIX A

CDS UNIT RECORD OF

OPERATIONS & MAINTENANCE

CDS UNIT RECORD OF OPERATION & MAINTENANCE

OWNER ____

ADDRESS____

OWNER REPRESENTATIVE__________________**PHONE**__________________

CDS INSTALLATION:

MODEL DESIGNATION**PMSU**   DATE_______________
SITE LOCATION____
DEPTH FROM COVER TO BOTTOM OF SUMP (SUMP INVERT) ______________
VOLUME OF SUMP_______CUBIC METERS

INSPECTIONS:

DATE/INSPECTOR	SCREEN/INLET INTEGRITY	FLOATABLES DEPTH	DEPTH TO SEDIMENT (meters)	SEDIMENT VOLUME* (cubic meters)	SORBENT DISCOLORATION

***Calculate Sediment Volume = (Depth to Sump Invert – Depth to Sediment)*(Volume/meter)**

OBSERVATIONS OF FUNCTION: ____

____

____

____

CLEANOUT:

DATE	VOLUME FLOATABLES	VOLUME SEDIMENTS	METHOD OF DISPOSAL OF FLOATABLES, SEDIMENTS, DECANT AND SORBENTS

SCREEN MAINTENANCE:
Note is Power Washing Performed: ____

CERTIFICATION:____________________________**TITLE:**__________________

DATE:______________________________

APPENDIX B

CDS UNIT

INSPECTION CHECKLIST

Date:________________________

INSPECTION CHECKLIST COMPLETED

1. During the initial rainfall season, inspect and check condition of unit once every 30 days (as needed, thereafter) ☐
2. Ascertain that the unit is functioning properly (no blockages or obstructions to inlet and/or separation screen) ☐
3. Measure amount of solid materials that have accumulated in the sump (Unit should be cleaned when the sump is 75-85% full) ☐
4. Measure amount of fine sediment accumulated behind the screen ☐
5. Measure amount of floating trash and debris in the separation chamber ☐

MAINTENANCE CHECKLIST

1. Cleanout unit at the beginning and end of the rainfall season ☐
2. Pump down unit (at least once a year) and thoroughly inspect separation chamber, separation screen and oil baffle ☐
3. No visible signs of damage to internal components observed * ☐

APPENDIX C

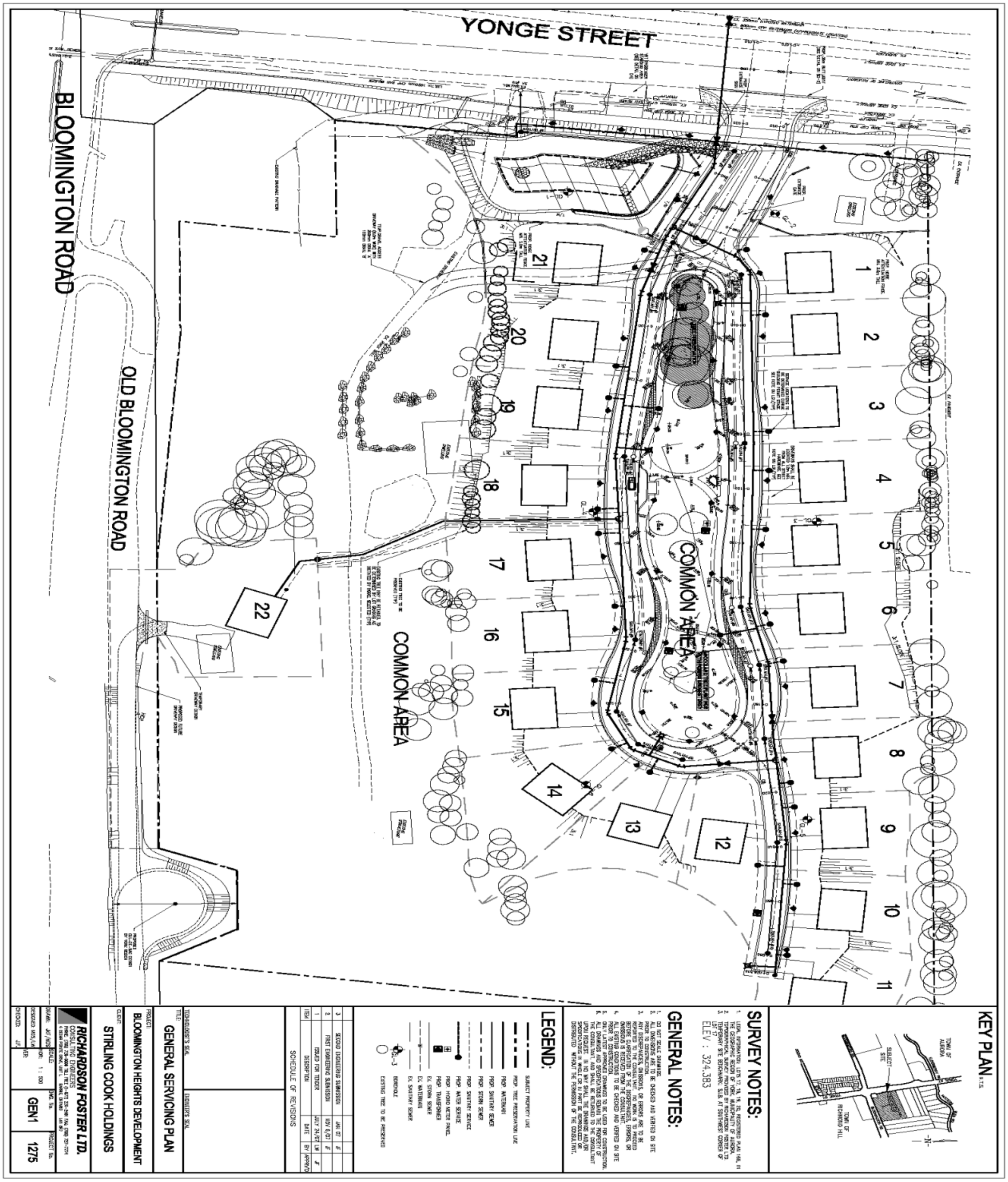
SITE LOCATION PLAN

&

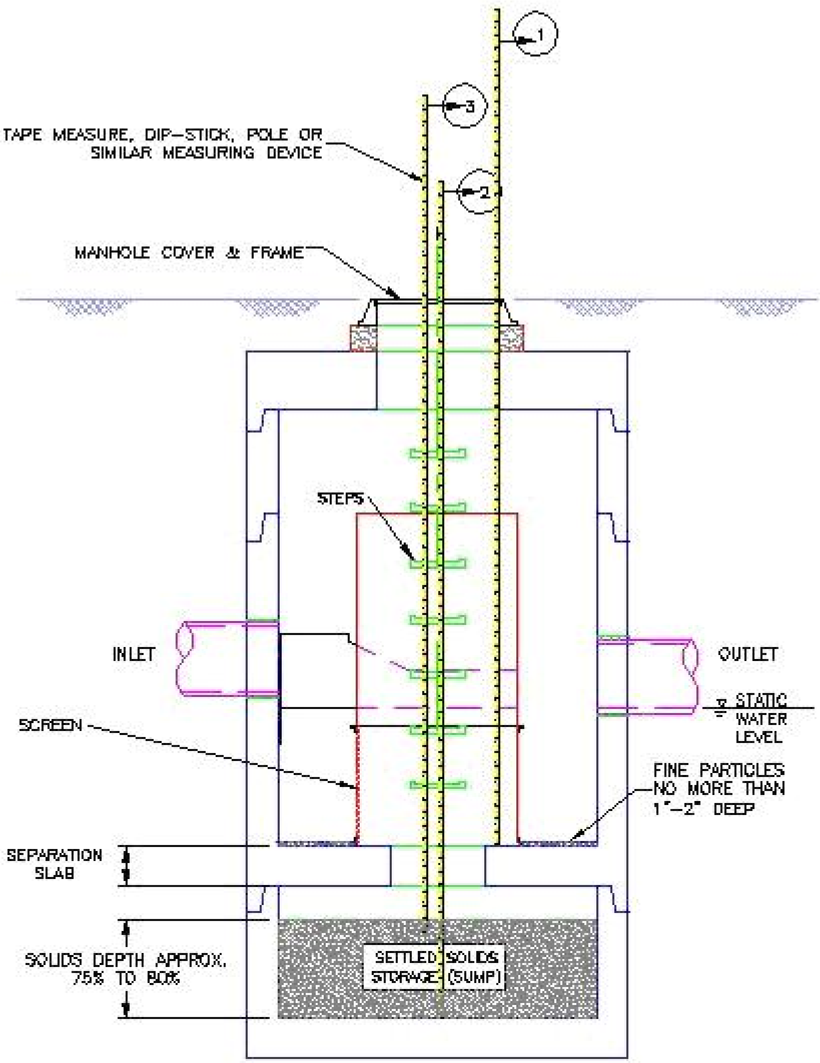
CLEANOUT SCHEMATIC

CONTECH STORMWATER SOLUTIONS Inc.

CDS



CLEANOUT
(SCHEMATIC)



505 Hood Road, Unit #26, Markham, Ontario, Canada L3R 5V6
Tel: (905) 415-3878 Fax: (905) 415-2721 E-mail: cds-service@interlog.com

APPENDIX D

AS-BUILT CDS® UNIT

PLAN & PROFILE

DRAWINGS