BRAMPTON

Corporate Support Services
Purchasing

October 25, 2024 **(32 pages)**

ADDENDUM NO. 5

BID CALL NO. T2024-276

ADDITION AND RENOVATION AT BRAMPTON MEMORIAL ARENA

This Addendum is part of the Bid Document.

Questions and Responses

Q.1 Please advise the manufacturer, model and details of exterior City Standard Bench. No information (TBC) was provided on section 32 37 00.

A.1 The City website identifies the City Standard Bench as follows:

Vintage Parisian Bench w/o optional centre armrest, as supplied by Paris Equipment Manufacturing Ltd. or approved equal. Bench colour to be RAL 5013 Cobalt Blue (Attached Drawing Total 1 sheet)

Q.2 Could you please clarify whether the transformer is copper or aluminium?.

A.2 Copper windings are mentioned n our specs, please refer drawing E600 issued in tender documents.

Q.3 We were looking for information on the OGS unit on the plans. Please advise.

A.2 Please refer to attached Functional Servicing and Strom Water Management Report (Total 29 pages).

All other terms & conditions remain unchanged**.**

If you have any questions, please do not hesitate to contact the undersigned.

Bidders are required to acknowledge all Addenda.

Santosh Mishra, CSCMP

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+VG Architects

Brampton Memorial Arena Addition
SPA-2024-0068
69 Elliott St
Brampton, Ontario

Functional Servicing and Stormwater Management Report

Prepared for:

Prepared by:

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Milton, Ontario
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File No. 2023-033

Date: August 26th, 2024

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Figures

Appendices

1. Introduction

MGM Consulting Inc. has been retained by +VG Architects to prepare a Functional Servicing and Stormwater Management Report to support the design and construction of an addition for the Memorial Arena. The existing Memorial Arena frontage covers approximately 1.26 acres in size and located southwest of 69 Elliott Street in Brampton, Ontario. A Location Plan has been included in **Figure 1**.

This report has been prepared in support of a Site Plan Approval (SPA) application for the proposed project.

The intent of this report is to demonstrate adequate site servicing, in accordance with the City of Brampton for the development. Specifically, this report will demonstrate that the development can meet all stormwater management, sanitary drainage, water supply and distribution, upstream drainage conveyance, site grading and temporary on-site works requirements.

2. Existing Conditions

The subject lands are approximately 1.26 acres in size and is designated as having cultural and heritage value. Currently, the existing arena footprint is approximately 2,585 sqm and holds an artificial turf playing surface, suitable for a variety of sports. To the west lies the Brampton Curling Club, while to the north, there is McHugh Public School and Old Fairgrounds Park. To the east, the building is aligned very close to Elliott Street with the east façade on a shallow setback from the street. To the south, the site borders some residential housing ranging from early Edwardian era to the 1960s and a nearby corner variety store.

Topographically, the subject lands exhibit a general drainage pattern from southwest to northeast, albeit with limited elevation change. All portions of the site drain towards Elliot Street. The highest elevations are found at the southwest limit of the site, with elevations on the order of 219.00 m, while the lowest elevations are observed at the northeast limit, averaging around 217.05 m.

The existing services located on Elliott Street:

- 150 mm diameter water main
- 375 mm diameter sanitary sewer

An Existing Condition Conditions Plan has been included in **Figure 2**.

3. Proposed Development

The proposed Memorial Arena addition is the main and sole development block of the subdivision with an anticipated building footprint of 280 square meters. The proposed development consists of a single-story extension on the west side of the current Memorial

Arena, covering an area of approximately 290 square meters (3,100 square feet) in gross floor area (GFA). This additional space is intended to serve two groups of players and will feature two changing rooms, two washrooms (ensuring at least one is barrier-free and gender-neutral), six shower stalls (three in each changing room), one coach office, one trainer room, one turf storage room, two smaller storage rooms, a janitor's closet, mechanical space, vestibules, and circulation areas. The proposed site plan is outlined in **Figure #3**.

4. Proposed Grading and Drainage

The proposed site grading takes into account the existing topography, perimeter elevations, as required to accommodate the proposed building finish floor elevation, provide safe vehicular and pedestrian access and to provide minimum cover on storm servicing and sewer insulation as required. Slopes within the paved areas of the site will typically be set between 1% and 5%. Grading will also be completed such that majority of the storm drainage from the development area will be contained within the site, and directed to the proposed catch basins, which will then be discharged to the existing storm sewer infrastructure.

The primary consideration was the current ground elevation encompassing the Memorial Arena's existing parking lot, situated next to the planned construction area. The grading plan for the proposed addition generally aligns with the grading concept currently present at the parking lot and will provide sufficient cover over the future storm sewers to protect against frost.

Drainage from the new building roof is proposed to drain internally through the mechanical system. A building connection has been provided and will convey the flows towards the existing storm system.

The proposed grading and servicing designs for the development are presented in **Drawing CV-2**.

5. Stormwater Management

5.1 Rate, Quantity and Quality Control

With no receiving stormwater management (SWM) pond for this site due to the development phasing, all SWM objectives associated with the proposed development must be accomplished using onsite controls. Quantity and rate controls for all events from the 2-year up to and including the 100 year storm event are to be implemented. The predevelopment runoff coefficient was estimated to be 0.79. The proposed addition increased the runoff coefficient to 0.81.

The SWM strategy for this site is centered around the relocation of existing structures to accommodate for the area covered over by the new expansion. The storm system is planned and designed to recycle/relocate two of the currently existing structures (CB#4 and ST-MH

#5) and introduce 5 new structures (PR-MH 1, PR-MH 2, PR-MH 3, PR-MH 4, PR-MH 6) to convey stormwater to the existing sewers.

A 425mm diameter orifice plate is introduced at PR – MH1 to control the post development flows to the pre-development levels for the 2-year through the 100-year event.

Storage for the 2-year event through the 100-year event are stored underground with the 100-year ponding elevation set at 217.25m below the top of catch basin elevation (217.27m).

Table 5-1 – Allowable Discharge Rates and Required Storage versus Provided

Storm Event	Allowable Discharge (m^3/s)	Required Storage (m^3)	Provided Discharge (m^3/s)	Provided Storage (m^3)
2	0.197	2.6	0.197	3.6
5	0.260	3.5	0.260	6.3
10	0.302	3.6	0.302	8.6
25	0.355	4.5	0.355	11.9
50	0.395	5.1	0.395	14.7
100	0.434	6.1	0.433	17.7

Detailed calculations supporting the selection of the proposed storm servicing and stormwater management are included in Appendix A.

The storm drainage area plan for the pre-development conditions is provided in **Figure 4,** while the post-development drainage areas under the ultimate conditions, are shown in **Figure 5**.

For quality control, an EF06 Stormceptor Oil Grit Separator (OGS) is proposed. The OGS is positioned downstream of the control orifice and is designed to achieve 85% Total Suspended Solids (TSS) removal, ensuring compliance with the City's requirements.

6. Proposed Servicing

6.1 Regional Sanitary Servicing

The sanitary servicing of the new addition is currently assumed to be connected to the existing building internally by the mechanical engineer. Confirmation has been received from the architect that the new addition will have minimal or no impact on the building occupancy. Hence, we can assume that the current sanitary system will be sufficient for the new expansion.

6.2 Regional Water Servicing

Similar to the sanitary servicing, the water servicing of the new addition is currently assumed to be connected to the existing building internally by the mechanical engineer. Confirmation has been received from the architect that the new addition will have minimal or no impact on the building occupancy. Hence, we can assume that the current water servicing system will be sufficient for the new expansion. Final confirmation of adequate flow and pressure for fire protection is to be provided by the mechanical engineering team during the detailed design phase.

7. Erosion and Sediment Control During Construction

All erosion and sediment control practices for all phases of site alteration work and ultimate construction are to be implemented in accordance with the Greater Golden Horseshoe Area Conservation Authorities ESC Guideline titled Erosion and Sediment Control Guidelines for Urban Construction.

Based on the proposed development phasing it is anticipated that the erosion and sediment control measures will be required to be phased to meet the overall protection objectives. Detailed erosion and sediment control engineering drawings and reports will be required for each phase during the detailed engineering design and submitted in support of the site plan or subdivision process or in support of a site alteration permit depending on timing. The erosion and sediment control guidelines are general in nature and will be used as a guiding principle for the completion of the individual detailed erosion and sediment control designs.

The following principles should be adhered to for all development within the subject lands *(Ref. Erosion and Sediment Control Guidelines for Urban Construction)*

- Adopt a multi-barrier approach to provide erosion and sediment control through erosion controls first,
- Retain existing ground cover and stabilize exposed soils with vegetation where possible,
- Limit the duration of soil exposure and phase construction where possible,
- Limit the size of disturbed areas by minimizing nonessential clearing and grading,
- Minimize slope length and gradient of disturbed areas,
- Maintain overland sheet flow and avoid concentrated flows,
- Store/stockpile soil away (e.g., greater than 15 meters) from storm inlets, watercourses corridors, etc,
- Ensure contractors and all involved in the ESC practices are trained in ESC Plan, implementation, inspections, maintenance, and repairs,
- Adjust ESC Plan at construction site to adapt to site features,
- Assess all ESC practices before and after all rainfall and significant snowmelt events, and

- Maintain record of inspection on site and copy the City and the NPCA (if requested).

Control Measures and Construction Sequencing

- Install all silt fences prior to any other activities on site.
- Construct temporary construction access including mud mat at construction access points.
- Construct cut-off swales along as shown on the Sediment and Erosion Control Plan, to be provided at detailed design.
- Install sediment socks as indicated on the Erosion and Sediment Control Plan.
- Construct the SWM facilities to ultimate grades to enable the immediate stabilization.
- It is a priority to promptly stabilize the pond to maximize the establishment of ground cover.
- Disturbed areas adjacent to the pond are to be seeded with a compost/seed mixture. (i.e., Terraseed type treatment or suitable equivalent).
- Strip and pre-grade to provide conveyance of overland flows to the SWM facility.
- Contractors use haulage roads to minimize disturbances to existing vegetated areas.
- During the servicing construction, limit open trench lengths to minimize erosion potential.
- During work stoppages or inclement weather, plug ends of open sewers to prevent downstream sedimentation.
- Provide catchbasin sediment protection on all catchbasin and catchbasin manholes for the duration of construction.
- Ensure silt laden water from truck wash areas are directed to areas protected by a Filter Ring and at least 15 meters from a watercourse corridor.
- All silt laden water during dewatering of trenches is to be directed to an area protected by a filter ring or to a geotextile filter bag prior to being directed to the sedimentation pond. Filtration to be a minimum of 15 meters from a watercourse corridor.
- Provide dust control during dry periods as directed by the site engineer.
- Sweep external streets as directed by the engineer to the satisfaction of the City.
- Following base course asphalt, catchbasins to be rewrapped with geotextile.
- Periodic street cleaning and catchbasin cleanout to be performed as required.

Inspection and Maintenance

The following is a minimum inspection schedule that should be adhered to for the full length of the construction period. *(Ref. Erosion and Sediment Control Guidelines for Urban Construction).*

- All erosion and siltation measures are to be inspected on a weekly basis by the Consultant's resident inspector.
- All erosion and siltation measures are to be inspected after every rainfall event by the Consultant's resident inspector.
- All erosion and siltation measures are to be inspected after significant snowfall events by the Consultant's resident inspector.
- All erosion and siltation measures are to be inspected daily during extended rain or snowmelt periods by the Consultant's resident inspector.
- Maintain record of inspection on site and copy the City and NPCA (if requested).

During inactive construction periods, where the site is left alone for 30 days or longer, monthly inspections should be conducted.

8. Summary

The following summarizes the proposed site works as required to accommodate the proposed development:

- Based on our analysis, the proposed addition to the Memorial Arena can be adequately serviced with water and sanitary servicing and can meet the required SWM objectives required by the City of Brampton and Region of Peel.
- Site grading has been proposed to accommodate perimeter elevations, proposed building finish floor elevation, safe vehicular and pedestrian access, and to convey storm flows to the proposed storm infrastructure.
- The sanitary and water servicing of the new addition is assumed to be connected to the existing building internally under the scope of the mechanical engineer.
- Erosion and sediment controls as indicated on the Removals/Erosion and Sediment Control Plan are to be implemented prior to construction and maintained until the site is stabilized.

Yours truly,
MGM Consulting Inc.

Shahzeb Shaikh

Figures

LOCATION PLAN

BRAMPTON MEMORIAL ARENA
69 ELLIOTT STREET, BRAMPTON, ONTARIO

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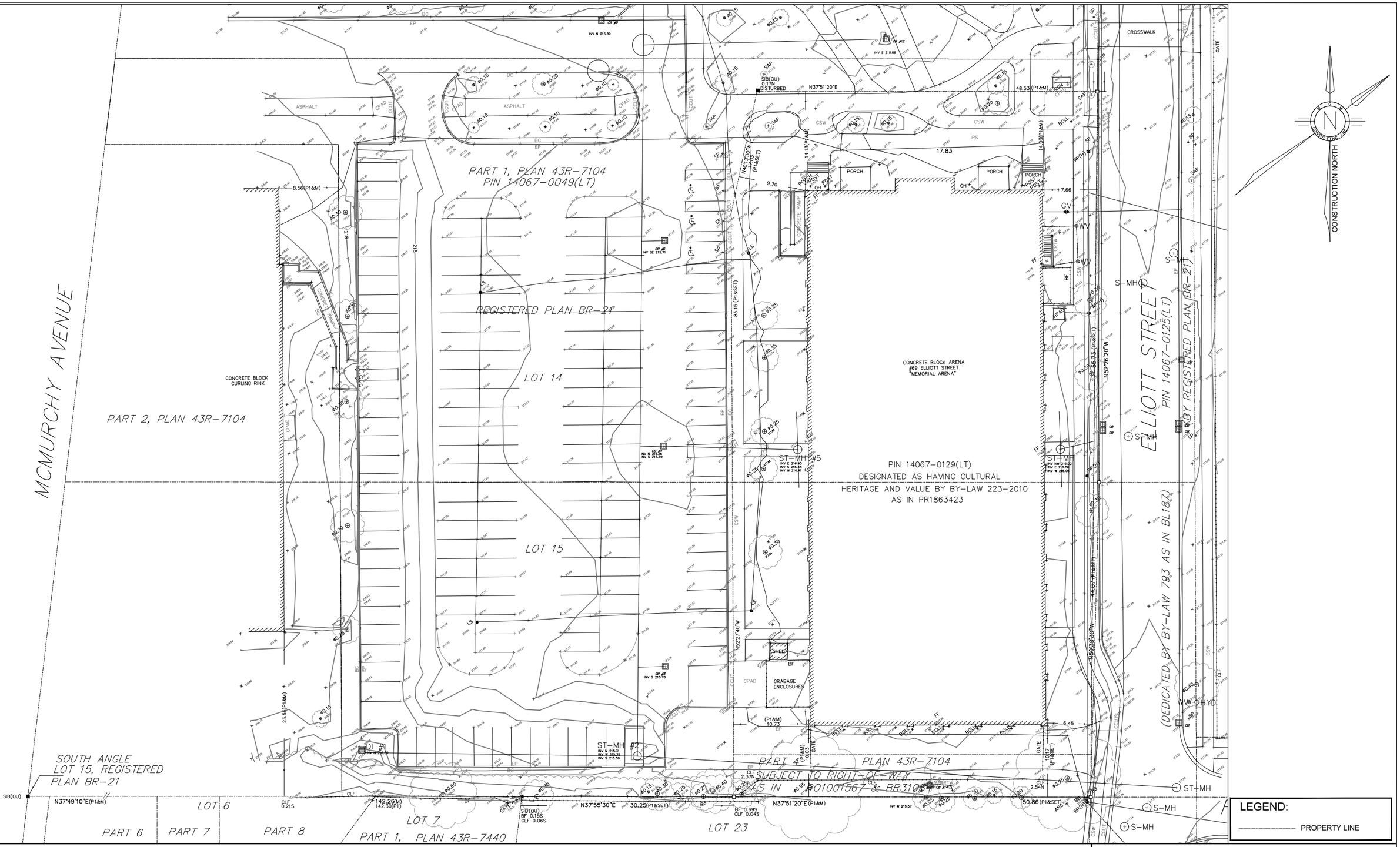
Email: mgm@mgm.on.ca
www.mgm.on.ca

FIGURE 1.0

DATE: JULY 2024
N.T.S
DWG#: 2023-033 C2



EXISTING CONDITION

BRAMPTON MEMORIAL ARENA
69 ELLIOTT STREET, BRAMPTON, ONTARIO

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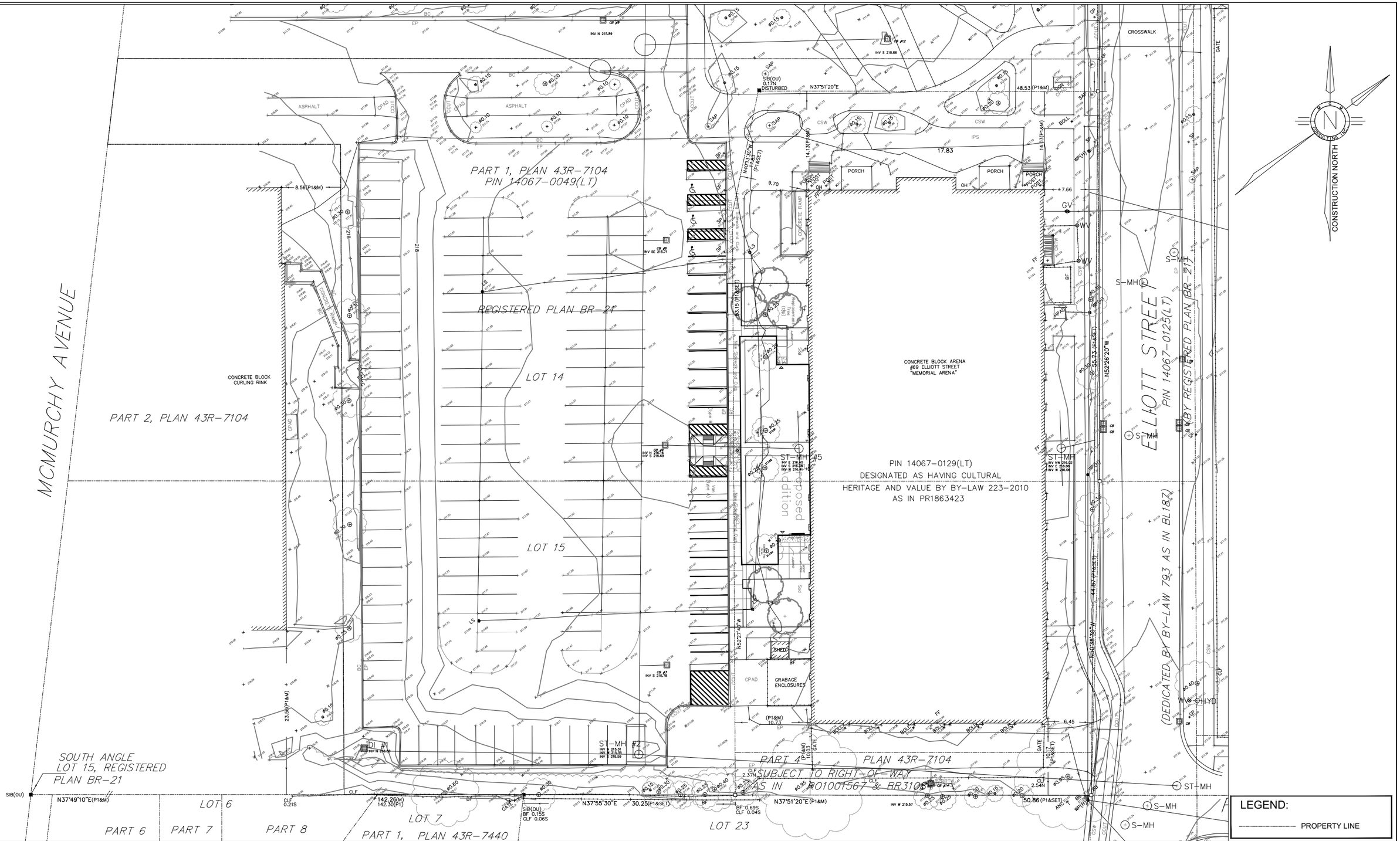
FIGURE 2.0

DATE: JULY 2024
NTS
DWG#: 2023-033 C2



CONCEPTUAL SITE PLAN

BRAMPTON MEMORIAL ARENA
69 ELLIOTT STREET, BRAMPTON, ONTARIO

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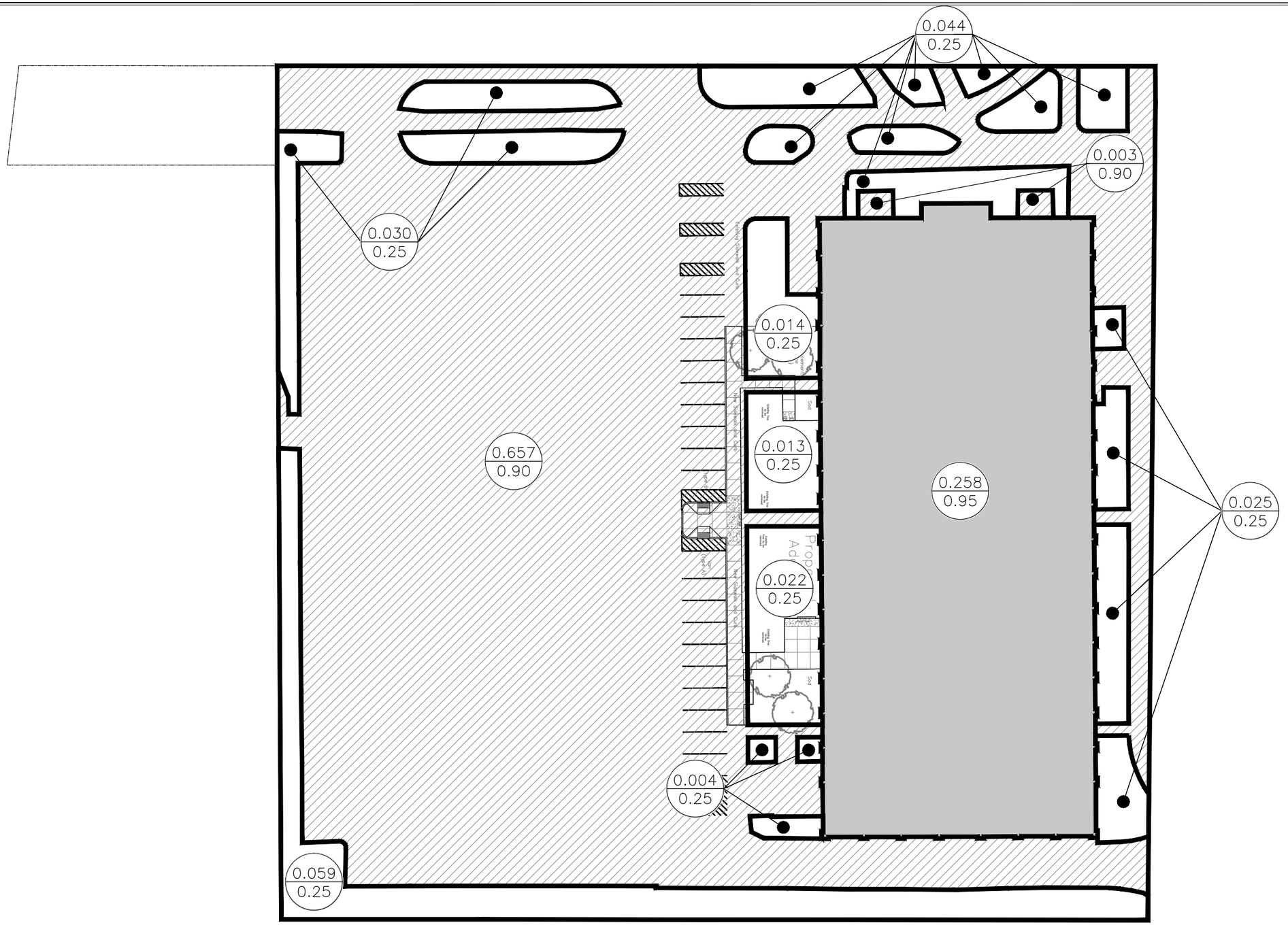
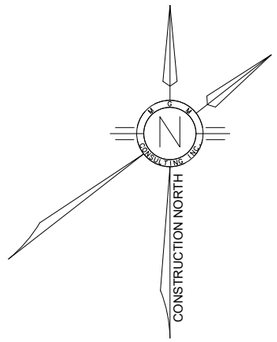
FIGURE 3.0

DATE: JULY 2024
NTS
DWG#: 2023-033 C2





LEGEND:

- PROPERTY LINE
- DRAINAGE BOUNDARY
- LANDSCAPE
- ASPHALT AND CONCRETE
- BUILDING ROOF
- 0.258 / 0.95 — DRAINAGE AREA / RUNOFF COEFFICIENT

PRE-DEVELOPMENT DRAINAGE

BRAMPTON MEMORIAL ARENA
69 ELLIOTT STREET, BRAMPTON, ONTARIO

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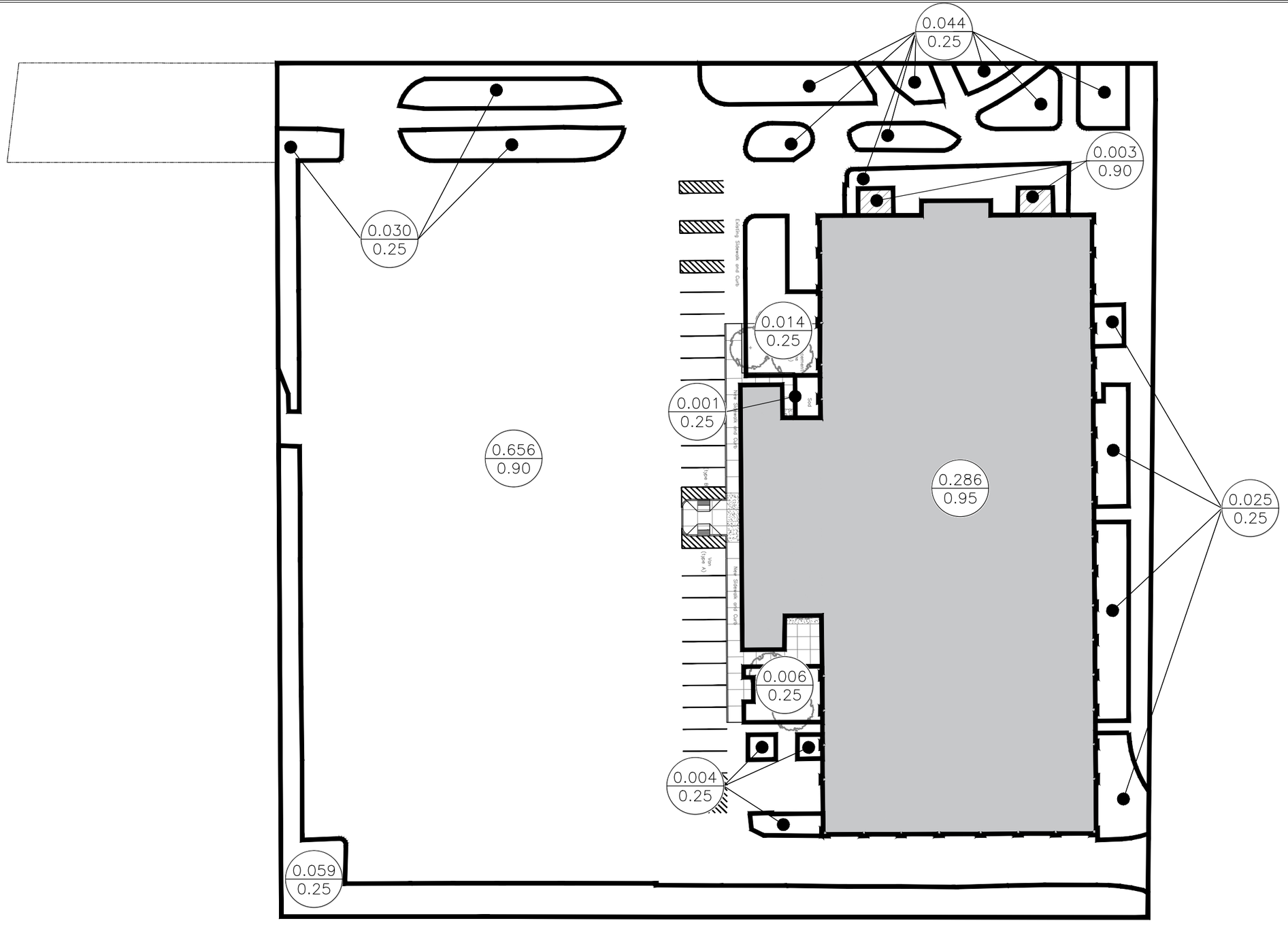
FIGURE 4.0

DATE: JULY 2024
NTS
DWG#: 2023-033 C2



LEGEND:

- PROPERTY LINE
- DRAINAGE BOUNDARY
- LANDSCAPE
- ASPHALT AND CONCRETE
- BUILDING ROOF
- 0.286 / 0.95 — DRAINAGE AREA (ha) / RUNOFF COEFFICIENT

POST-DEVELOPMENT DRAINAGE

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FIGURE 5.0

DATE: JULY 2024
NTS
DWG#: 2023-033 C2

Appendix A

Stormwater Management Calculations

2023-033 - Brampton Memorial Arena Expansion
STORMWATER MANAGEMENT CALCULATIONS

1.0 Drainage Characteristics

1.1 Existing Drainage Areas (Figure No 4):

		"c"	Area (ha)
Attenuated Areas			
	Grass	0.25	0.211
	Pavement	0.90	0.660
	Roof	0.95	0.258
	Subtotal	**0.79**	**1.129**

1.2 Proposed Drainage Areas (Figure No 5):

		"c"	Area (ha)
Attenuated Areas			
	Grass	0.25	0.183
	Pavement	0.90	0.659
	Roof	0.95	0.286
	Subtotal	**0.81**	**1.128**
Unattenuated Areas			
	Grass	0.25	0.000
	Pavement	0.90	0.000
	Subtotals	**0.00**	**0.000**
	TOTAL SITE	**0.81**	**1.128**

2.0 Allowable Post Development Flows

2.1 Existing Flow Rates (Based on IDF Curves for the City of Brampton):

Estimated Tc (min) = 0.1667
Existing Site Runoff Coeff (c) = 0.79

	A	B	I = A*(T^B) (mm/hr)	$Q_{existing}$= cIA (m3/s)
2-Year	22.1	-0.714	79.4	**0.197**
5-Year	29.9	-0.701	105.0	**0.260**
10-Year	35.1	-0.695	121.9	**0.302**
25-Year	41.6	-0.691	143.5	**0.355**
50-Year	46.5	-0.688	159.5	**0.395**
100-Year	51.3	-0.686	175.4	**0.434**

The post-development 100-year peak runoff flows to be controlled to the existing 100-year peak flow rate.
the allowable peak discharge rate for the site is 0.434 m3/s

3.0 Proposed Peak Rate Controls

An orifice plate is proposed at the outlet from the internal storm system as required to control the post development flows to the existing peak 100 year flow rate.

Orifice equation = Q = CA*(2gh)^1/2, where

Q = flow (cms)
C = discharge coefficient = 0.62
A = cross sectional area of orifice
g = gravitational constant = 9.81 m/sec^2
h = head (m)

Proposed orifice dia. = 425 mm.
Orifice invert elevation = 215.8 m.
Centreline of orifice = 216.0 m.

Return Period	Ponding Elev. [m]	Head [m]	$Q_{Orifice}$ [m^3/s]
2-Year	216.27	0.2545	**0.197**
5-Year	216.46	0.4445	**0.260**
10-Year	216.62	0.6025	**0.302**
25-Year	216.85	0.8325	**0.355**
50-Year	217.04	1.0275	**0.395**
100-Year	217.25	1.2375	**0.433**

4.0 Site Storage Calculations

Post Development 2 Year Storage Based on Existing Site Runoff Coefficient with 1.0 Factor of Safety Applied

Rainfall Duration min.	s	2 Year Rainfall Intensity (I) mm/h	Unattenuated Flow m^3/s	Attenuated Flow m^3/s	Controlled Flow From Site m^3/s	Detention Volumes m^3
10	**600**	**79.4**	**0.000**	**0.201**	**0.197**	**3**
15	900	59.5	0.000	0.150	0.197	-42
20	1200	48.4	0.000	0.122	0.197	-89
25	1500	41.3	0.000	0.104	0.197	-138
30	1800	36.3	0.000	0.092	0.197	-189

Total flow from the site during the 2 year storm event (attenuated + unattenuated flow) = 0.197 cms.

Post Development 5 Year Storage Based on Existing Site Runoff Coefficient with 1.0 Factor of Safety Applied

Rainfall Duration min.	s	5 Year Rainfall Intensity (I) mm/h	Unattenuated Flow m^3/s	Attenuated Flow m^3/s	Controlled Flow From Site m^3/s	Detention Volumes m^3
10	**600**	**105.0**	**0.000**	**0.266**	**0.260**	**3.5**
15	900	79.0	0.000	0.200	0.260	-54
20	1200	64.6	0.000	0.163	0.260	-116
25	1500	55.2	0.000	0.140	0.260	-180
30	1800	48.6	0.000	0.123	0.260	-246

Total flow from the site during the 5 year storm event (attenuated + unattenuated flow) = 0.260 cms.

Post Development 10 Year Storage Based on Existing Site Runoff Coefficient with 1.0 Factor of Safety Applied

Rainfall Duration min.	s	10 Year Rainfall Intensity (I) mm/h	Unattenuated Flow m^3/s	Attenuated Flow m^3/s	Controlled Flow From Site m^3/s	Detention Volumes m^3
10	**600**	**121.9**	**0.000**	**0.308**	**0.302**	**3.6**
15	900	92.0	0.000	0.233	0.302	-63
20	1200	75.3	0.000	0.191	0.302	-134
25	1500	64.5	0.000	0.163	0.302	-209
30	1800	56.8	0.000	0.144	0.302	-286

Total flow from the site during the 10 year storm event (attenuated + unattenuated flow) = 0.302 cms.

Post Development 25 Year Storage Based on Existing Site Runoff Coefficient with 1.0 Factor of Safety Applied

Rainfall Duration min.	s	10 Year Rainfall Intensity (I) mm/h	Unattenuated Flow m^3/s	Attenuated Flow m^3/s	Controlled Flow From Site m^3/s	Detention Volumes m^3
10	**600**	**143.5**	**0.000**	**0.363**	**0.355**	**4.5**
15	900	108.4	0.000	0.274	0.355	-73
20	1200	88.9	0.000	0.225	0.355	-157
25	1500	76.2	0.000	0.193	0.355	-244
30	1800	67.2	0.000	0.170	0.355	-334

Total flow from the site during the 25 year storm event (attenuated + unattenuated flow) = 0.355 cms.

Post Development 50 Year Storage Based on Existing Site Runoff Coefficient with 1.0 Factor of Safety Applied

Rainfall Duration min.	s	10 Year Rainfall Intensity (I) mm/h	Unattenuated Flow m^3/s	Attenuated Flow m^3/s	Controlled Flow From Site m^3/s	Detention Volumes m^3
10	**600**	**159.5**	**0.000**	**0.403**	**0.395**	**5.1**
15	900	120.7	0.000	0.305	0.395	-81
20	1200	99.0	0.000	0.250	0.395	-173
25	1500	84.9	0.000	0.215	0.395	-270
30	1800	74.9	0.000	0.189	0.395	-370

Total flow from the site during the 50 year storm event (attenuated + unattenuated flow) = 0.395 cms.

Post Development 100 Year Storage Based on Existing Site Runoff Coefficient

Rainfall Duration min.	s	100 Year Rainfall Intensity (I) mm/h	Unattenuated Flow m^3/s	Attenuated Flow m^3/s	Controlled Flow From Site m^3/s	Detention Volumes m^3
10	**600**	**175.4**	**0.000**	**0.444**	**0.433**	**6.1**
15	900	132.8	0.000	0.336	0.433	-88
20	1200	109.0	0.000	0.276	0.433	-189
25	1500	93.5	0.000	0.237	0.433	-295
30	1800	82.5	0.000	0.209	0.433	-404

Total flow from the site during the 100 year storm event (attenuated + unattenuated flow) = 0.433 cms.

5.0 Site Storage Provided

5.2 Underground Storage

Underground storage has been provided within the proposed internal storm system as follows:

From	To	Sewer Dia. (mm)	Length (m)	Volume (cu.m.)
CB4	PR - MH1	300	5.0	0.4
PR - MH3	PR - MH2	375	11.5	1.3
PR - MH2	ST-MH #5	300	16.1	1.1
ST-MH #5	PR - MH1	300	11.0	0.8
PR - MH4	PR - MH6	300	11.5	0.8
PR - MH6	ST-MH #5	300	27.5	1.9
	Total underground sewer storage =			6.3

Structure	Top of Lid	Invert	Storage Volume (cu.m)
CB4	217.27	215.93	1.52
PR - MH1	217.20	215.8	1.58
PR - MH2	217.44	216.1	1.52
PR - MH3	217.85	216.24	1.82
PR - MH4	217.88	216.3	1.79
ST - MH #5	217.43	215.94	1.69
PR - MH6	217.45	216.16	1.46
	Total underground structure storage =		11.37
	Total Underground Storage =		**17.66**

TOTAL SITE STORAGE PROVIDED (Underground, Aboveground) = 17.7 cm3

8.0 Summary

Item	Storage Required (cu.m)	Allowable Discharge Rate (cms)	Storage Provided (cu.m)	Actual Discharge (cms)
5 Year Flood	2.6	0.197	3.6	0.197
100 Year Flood	6.1	0.434	17.7	0.433

Appendix B

OGS Sizing Calculations

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

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

07/25/2024

Province:	Ontario
City:	Brampton
Nearest Rainfall Station:	TORONTO CITY
Climate Station Id:	6158355
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	1.129
% Imperviousness:	84.00

Runoff Coefficient 'c': 0.80

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	29.33
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	433.00
Peak Conveyance (maximum) Flow Rate (L/s):	444.00
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	1036
Estimated Average Annual Sediment Volume (L/yr):	842

Project Name:	Memorial Arena Expansion
Project Number:	2023-033
Designer Name:	Adeola Adesoga
Designer Company:	MGM Consulting
Designer Email:	aadesoga@mgm.on.ca
Designer Phone:	647-657-0997
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	74
EFO6	85
EFO8	92
EFO10	95
EFO12	98

Recommended Stormceptor EFO Model: EFO6

Estimated Net Annual Sediment (TSS) Load Reduction (%): 85

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 waterwavs.

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.

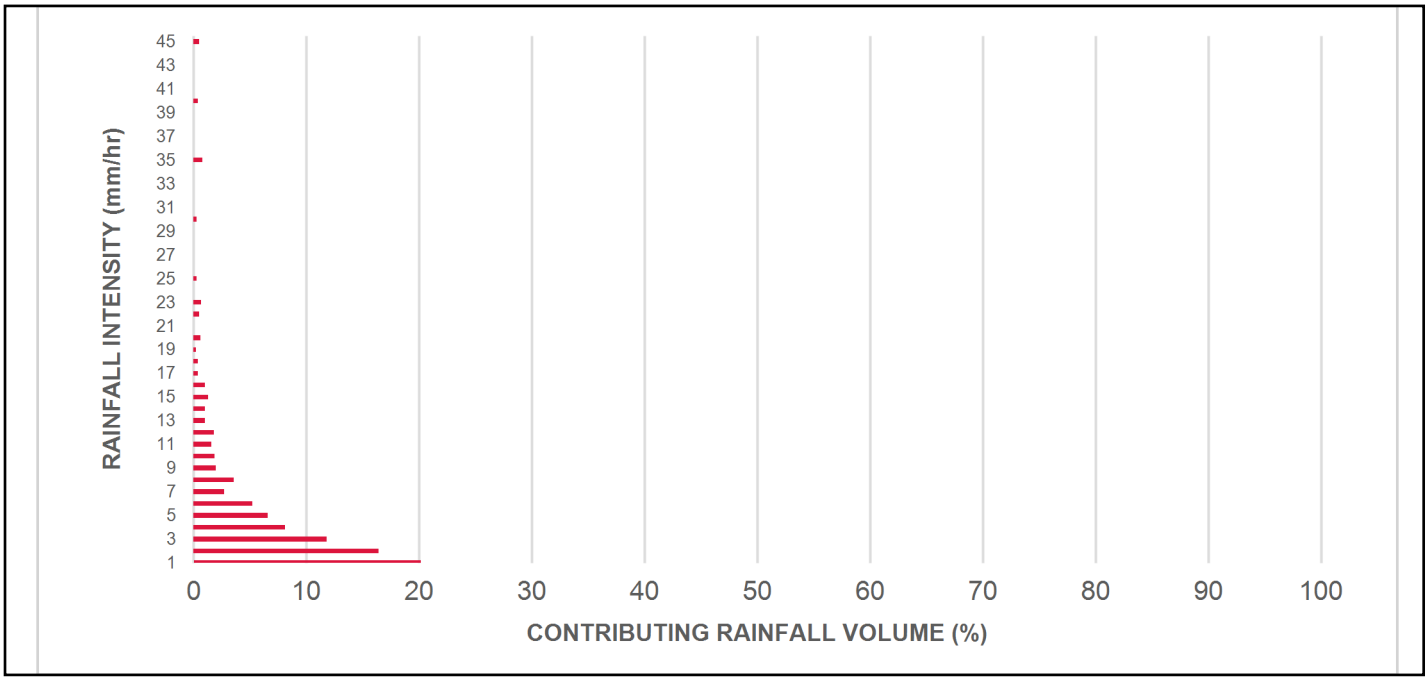
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

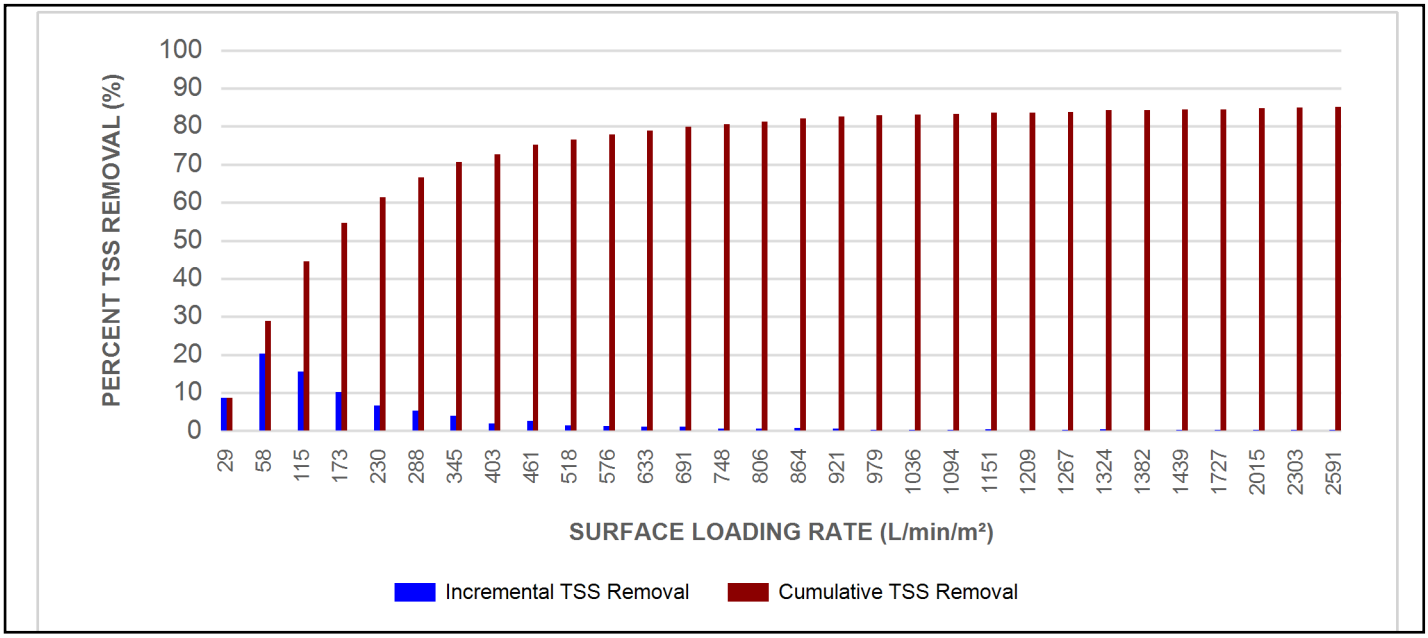
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.7	8.7	1.26	76.0	29.0	100	8.7	8.7
1.00	20.2	28.9	2.52	151.0	58.0	100	20.2	28.9
2.00	16.4	45.3	5.05	303.0	115.0	95	15.6	44.5
3.00	11.8	57.1	7.57	454.0	173.0	87	10.2	54.7
4.00	8.1	65.2	10.09	606.0	230.0	82	6.6	61.3
5.00	6.6	71.9	12.62	757.0	288.0	79	5.3	66.6
6.00	5.2	77.1	15.14	908.0	345.0	77	4.0	70.6
7.00	2.7	79.8	17.66	1060.0	403.0	74	2.0	72.6
8.00	3.6	83.4	20.19	1211.0	461.0	71	2.6	75.1
9.00	2.0	85.4	22.71	1363.0	518.0	69	1.4	76.5
10.00	1.9	87.3	25.23	1514.0	576.0	66	1.3	77.8
11.00	1.6	88.9	27.76	1665.0	633.0	64	1.0	78.8
12.00	1.8	90.7	30.28	1817.0	691.0	64	1.1	79.9
13.00	1.0	91.6	32.80	1968.0	748.0	64	0.6	80.6
14.00	1.0	92.7	35.33	2120.0	806.0	63	0.6	81.2
15.00	1.3	93.9	37.85	2271.0	864.0	63	0.8	82.0
16.00	1.0	95.0	40.38	2423.0	921.0	62	0.6	82.6
17.00	0.4	95.3	42.90	2574.0	979.0	62	0.2	82.9
18.00	0.4	95.7	45.42	2725.0	1036.0	61	0.2	83.1
19.00	0.2	95.9	47.95	2877.0	1094.0	59	0.1	83.2
20.00	0.6	96.5	50.47	3028.0	1151.0	58	0.4	83.6
21.00	0.0	96.5	52.99	3180.0	1209.0	57	0.0	83.6
22.00	0.5	97.0	55.52	3331.0	1267.0	56	0.3	83.8
23.00	0.7	97.7	58.04	3482.0	1324.0	54	0.4	84.2
24.00	0.0	97.7	60.56	3634.0	1382.0	53	0.0	84.2
25.00	0.3	98.0	63.09	3785.0	1439.0	51	0.1	84.4
30.00	0.3	98.3	75.70	4542.0	1727.0	43	0.1	84.5
35.00	0.8	99.1	88.32	5299.0	2015.0	36	0.3	84.8
40.00	0.4	99.5	100.94	6056.0	2303.0	32	0.1	84.9
45.00	0.5	100.0	113.56	6813.0	2591.0	28	0.1	85.1
Estimated Net Annual Sediment (TSS) Load Reduction =								**85 %**

Climate Station ID: 6158355 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO CITY 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

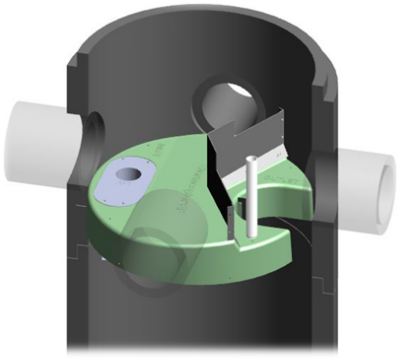
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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.

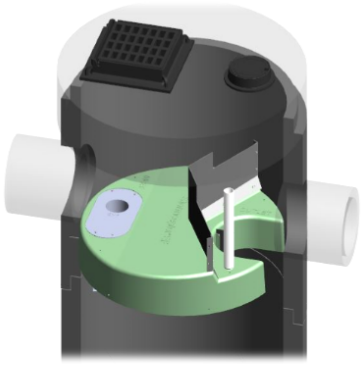
DESIGN FLEXIBILITY

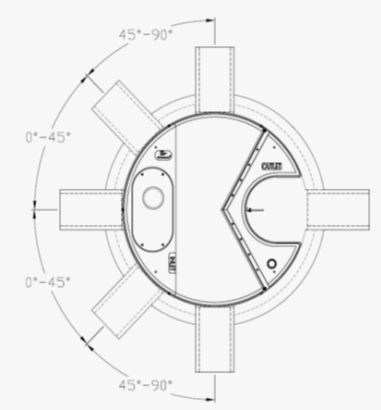
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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)	(ft^3)	(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

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** S**eparators**

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.**

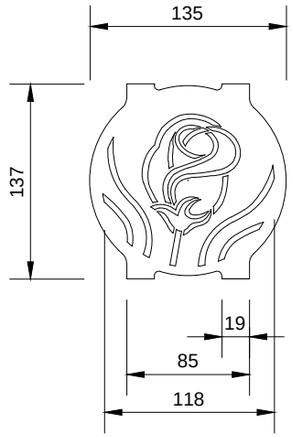
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

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.



PARK BENCH: ARMREST LOGO

SPECIFICATIONS:

CAST ALUMINUM LEG FRAMES (WITH ROSE LOGO PANEL):
CAST ALUMINUM, STRONG "H"-BEAM CROSS SECTION, 8 MM AVERAGE WALL THICKNESS. OPTIONAL ANTI-VAGRANT CENTRE ARM, 33 MM O.D. ILG STEEL TUBE.

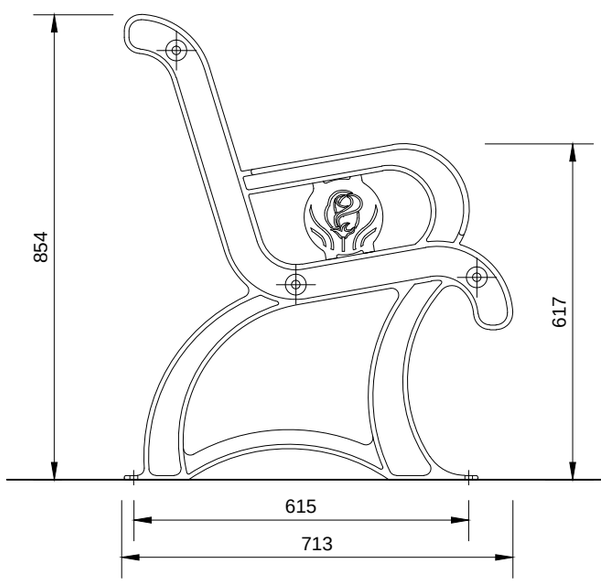
HARDWARE:
ALL STAINLESS STEEL. ANCHORING HARDWARE NOT INCLUDED.

SEATING SURFACES:
PERFORATED STEEL -- 11 GAL. (VERTICAL SLOT PATTERN ONLY)
COMMON ELEMENTS -- 11 GAL. STEEL SUPPORT WEBS AND BRACKETS, 5X38 MM BAR.

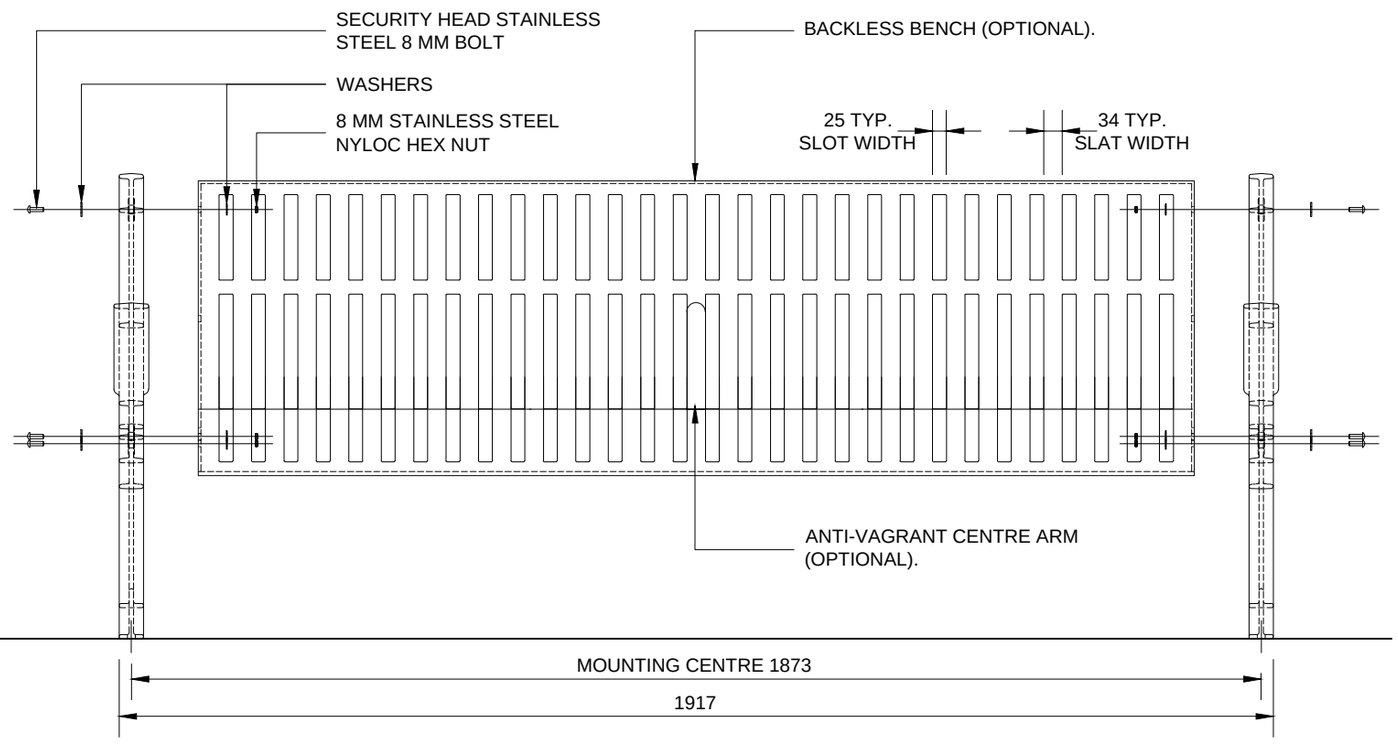
FINISH:
SEAT SECTIONS -- E-COAT ANTICORROSION PRIMER WITH POLYESTER POWDER TOP COAT (BOTH ELECTROSTATICALLY APPLIED).
ALUMINUM LEG FRAMES -- POLYESTER POWDER TOP COAT (ELECTROSTATICALLY APPLIED).

NOTES:

1. VINTAGE PARISIAN BENCH WITH OPTIONAL CENTRE ARMREST AND BACKLESS VERSIONS SUPPLIED BY PARIS EQUIPMENT MANUFACTURING LTD. OR APPROVED EQUIVALENT. ALL NEW DEVELOPMENT PARK BENCHES SHALL BE WITHOUT A CENTRE ARMREST.
2. BENCH COLOUR TO BE RAL 5013 COBALT BLUE UNLESS OTHERWISE INDICATED.
3. BENCH IS DELIVERED PRE-ASSEMBLED. HOLES (13 MM) ARE PROVIDED IN EACH FOOT FOR SECURING TO BASE.
4. CONTRACTOR TO PROVIDE HARDWARE (10 MM SHIELD & LAG BOLT OR EQUIVALENT) FOR INSTALLATION.
5. REFER TO PARK BENCH CONCRETE PAD DETAIL L871 FOR MOUNTING DETAILS.
6. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.



PARK BENCH: ARMREST ELEVATION



PARK BENCH: FRONT ELEVATION

L876

N.T.S

PARK BENCH

SITE AMENITIES - SERIES 800

SEPTEMBER 2015

BRAMPTON Flower City
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