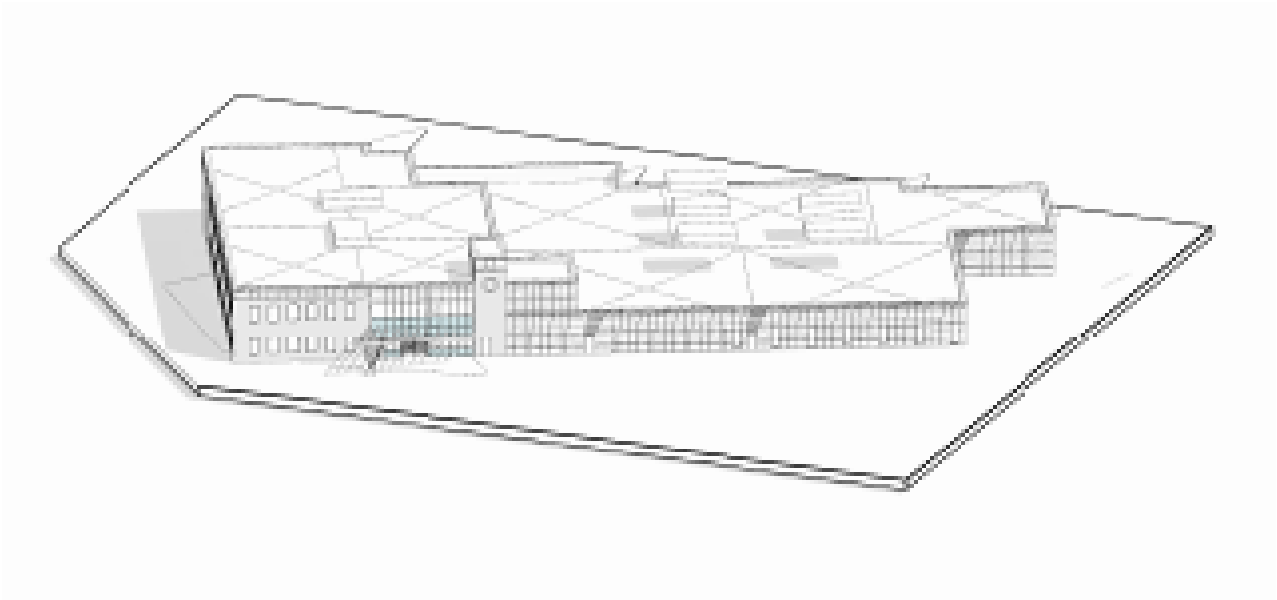
SITE SERVICING & STORMWATER MANAGEMENT REPORT
GASTOPS LTD. HEADQUARTERS

Project No.: CCO-24-2748



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Revision 4: 5/21/2025

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1.0 PROJECT DESCRIPTION

1.1 Purpose

Egis Canada Ltd. (Egis) has been retained by CSV Architects to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control process for the proposed Gastops Headquarters located in the proposed Riverside South Business Park, Ottawa ON.

The main purpose of this report is to present a servicing design for the development in accordance with the recommendations and guidelines provided by the City of Ottawa (Municipality), the Rideau Valley Conservation Authority (RVCA). This report will address the water, sanitary, and storm sewer servicing for the development, ensuring that existing and available services will adequately service the proposed development.

This report should be read in conjunction with the following drawings:

C101 – Lot Grading, Drainage and Erosion Sediment Control Plan; and
C102 – Site Servicing Plan

1.2 Site Description

The subject property, herein referred to as the site, is located at 3700 Twin Falls Pl within the Riverside South - Findlay Creek Ward, City of Ottawa. The site covers approximately ***2.37 ha*** and is located at the northeast corner of the future Mosquito Drive and Gastops St intersection. The site is zoned for Industrial use (IL).

See Site Location Plan in Appendix A for more details.

Figure 1: Site Location (sketch provided by Urbandale Corp.)

1.3 Existing Conditions and Infrastructure

The existing property is currently undeveloped and consists primarily of vegetated lands, with no existing observable stormwater design.

Sewer systems and watermain mapping collected from the City of Ottawa's GIS information, and the Riverside Business Park Plans indicate that the following services exist or will exist across the property frontages within adjacent municipal rights-of-ways (ROW):

- **Limebank Road:**
    - 305mm diameter watermain;
    - 600mm diameter concrete storm sewer – tributary to the Rideau Valley Watershed, and;
    - 375mm diameter concrete sanitary sewer – tributary to the West Rideau Trunk Collector.
- **Mosquito Drive (Riverside South Business Park):**
    - 300mm diameter watermain, and;
    - 375mm diameter sanitary sewer.
- **Gastops Street (Riverside South Business Park):**
    - 200mm diameter watermain, and;
    - 200mm diameter sanitary sewer.

1.4 Proposed Development and Statistics

The proposed development for phase 1 consists of a +/- 2116 m^2 1-storey building, a 1239 m^2 2-storey building, 205 proposed parking stalls, and 7 barrier-free parking stalls. For phase 2 of the development, a further 2263 m^2 1-storey building is accounted for and addressed within this report. Entrances are located along Gastops Street to the west. Further details are available in the site plan provided by CSV Architects included in Appendix B.

1.5 Approvals

The proposed development is subject to the City of Ottawa site plan control approval process. Site plan control requires the City to review, provide concurrence and approve the engineering design package. Permits to construct can be requested once the City has issued a site plan agreement.

An Environmental Compliance Approval (ECA) through the Ministry of Environment, Conservation and Parks (MECP) is not anticipated to be required since the proposed storm system services one parcel of land, will be predominantly an office building and does not propose industrial use, and does not outlet to a combined sewer. The MECP and City have been contacted to further discuss this requirement

1.0 BACKGROUND STUDIES, STANDARDS, AND REFERENCES

1.1 Background Reports / Reference Information

Background studies have been completed for the proposed development, which include the City of Ottawa's as-built drawings, a topographical survey, and a geotechnical report.

As-built drawings of existing services, provided by the City of Ottawa Information Centre, within the vicinity of the proposed site were reviewed in order to identify infrastructure available to service the proposed development.

The following reports have previously been completed and are available under separate cover:

- *Assessment Of Adequacy Of Public Services* (Prepared by IBI Group, dated July 2022);
- *Geotechnical Investigation* (Prepared by Paterson Group, dated July 5, 2022); and
- Gastops Ltd. Headquarters – Site Plan (Prepared by CSV Architects)
- *Design Brief Phase 1 – 3700 Twin Falls Place, Riverside South* (Prepared by Arcadis, dated April 25, 2024)

The reports indicated above were used in developing the civil design within this report and will be referenced throughout.

1.2 Applicable Guidelines and Standards

City of Ottawa:

- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (***Ottawa Sewer Guidelines***)
    - Technical Bulletin ISTB-2014-01 City of Ottawa, February 2014***. (ISTB-2014-01)***
    - Technical Bulletin PIEDTB-2016-01 City of Ottawa, September 2016. ***(PIEDTB-2016-01)***
    - Technical Bulletin ISTB-2018-01 City of Ottawa, January 2018***. (ISTB-2018-01)***
    - Technical Bulletin ISTB-2018-04 City of Ottawa, March 2018. ***(ISTB-2018-04)***
    - Technical Bulletin ISTB-2019-02 City of Ottawa, February 2019. ***(ISTB-2019-02)***
- Ottawa Design Guidelines – Water Distribution City of Ottawa, July 2010. (***Ottawa Water Guidelines***)
    - Technical Bulletin ISD-2010-2 City of Ottawa, December 15, 2010. ***(ISD-2010-2)***
    - Technical Bulletin ISDTB-2014-02 City of Ottawa, May 2014. **(ISDTB-2014-02)**
    - Technical Bulletin ISTB-2018-02 City of Ottawa, March 2018. ***(ISTB-2018-02)***
    - Technical Bulletin ISTB-2021-03 City of Ottawa, August 2021. ***(ISTB-2021-03)***

Ministry of Environment, Conservation and Parks:

- Stormwater Planning and Design Manual, Ministry of the Environment, March 2003. ***(MECP Stormwater Design Manual)***
- Design Guidelines for Sewage Works, Ministry of the Environment, 2008. (***MECP Sewer Design Guidelines***)

Other:

- Water Supply for Public Fire Protection, Fire Underwriters Survey, 2020. (***FUS Guidelines***)

2.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on May 28, 2024, regarding the proposed site. Specific design parameters to be incorporated within this design include the following:

- Stormwater Management Criteria (quantity and quality control) is to follow the design laid out in the subdivision's adequacy of public services report (APSR).
- On-site quality control at an enhanced level is required (80% TSS removal).
- The use of LIDs is to be considered for this site.
- Existing water and sanitary stubs from Limebank Road may be used, watermain is inactive and would need to be recommissioned.
- An onsite manhole shall be incorporated into the design for sanitary as per City of Ottawa guidelines.
- Stormwater management design shall be completed as per the City of Ottawa guidelines.

3.0 WATERMAIN

3.1 Existing Watermain

The site is located within the 1W pressure zone, as per the Water Distribution System mapping. A 305mm watermain is located on Limebank Road. A 200mm watermain on Gastops Street and a 300mm watermain on Mosquito Drive as a part of the proposed Riverside South Business Park development are under construction as designed by IBI.

3.2 Proposed Watermain

New 152 mm diameter water services connected to the 300 mm diameter watermain stub coming from Limebank Road is proposed. The water services will contain water valves located at the property line. The water services are designed to have a minimum of 2.4 m cover. The watermain calculations below assumes the overall Phase 2 build-out in the calculations.

The Fire Underwriters Survey 2020 (FUS) method was utilized to determine the required fire flow for the site. The 'C' factor (type of construction) for the FUS calculation was determined to be 0.8 (non-combustible construction). The building will also to have a supervised sprinkler system. The total floor area ('A' value) for the FUS calculation was determined to be 6,859 m^2. The results of the calculations yielded a required fire flow of 8,000 L/min. A fire flow of 9,000 L/min was calculated using the Ontario Building Code (OBC) criteria. The detailed calculations for the FUS and OBC can be found in Appendix C.

The water demands for the proposed building have been calculated to adhere to the Ottawa Design Guidelines – Water Distribution manual and can be found in Appendix C. The results have been summarized in ***Table 1***, below.

These calculations account for the phase 1 and phase 2 buildings.

Table 1: Water Demands

Design Parameter	**Value**
Site Area	2.37 ha
Floor Area	6,859 m^2
Commercial	28,000 L/ha/day
Average Day Demand (L/s)	0.22

Maximum Day Demand (L/s)	0.33
Peak Hour Demand (L/s)	0.60
OBC Fire Flow Requirement (L/s)	150
FUS Fire Flow Requirement (L/s)	133

Boundary conditions for the site were requested and received from the city, dated July 8, 2024. The model assumed demands for the property as - Average Day = 0.26 L/s, Maximum Day = 0.39 L/s and Maximum Hourly = 0.70, and the fire flow to be 133.33 L/s, results are summarized in ***Table 2*** below.

Table 2: Boundary Conditions

Scenario	**Total HGL (m)**	**Head Pressure* (m)**	**Head Pressure (psi)**
300mm Diameter Watermain Connection on Mosquito Drive			
Average Day (Maximum HGL)	147.00	91.00	79.68
Maximum Day + Fire Flow	144.90	91.00	76.69
Peak Hourly (Minimum HGL)	145.60	91.00	77.68

The boundary conditions were used to ensure the normal operating pressure range is not less than 275kPa (40psi) or more than 552kPa (80psi). The resultant hydraulic grade line (HGL) shows that the minimum pressure limit is satisfied during the average day and peak hour scenario.

In addition to normal operations, the maximum day plus fire flow conditions were reviewed to ensure that there is sufficient fire flow available to meet the required 133 L/sec flow rate, while maintaining a minimum of 20psi (140kPa) within the City's distribution system as per the City of Ottawa Design Guidelines for Water Distribution, 2010. The resulting HGL shows that the minimum pressure is satisfied during a fire scenario.

In addition to the review of the boundary conditions, the available fire flow based on hydrant spacing was analysed as per the City of Ottawa's technical bulletin ISTB 2018-02 Appendix I, Table 1. All existing and proposed municipal hydrants within 150m clear distance to the nearest face of the building were used to find a combined available fire flow to support the site. Existing and proposed hydrants were assumed to be class AA (painted blue) by visual inspection through the latest imagery provided on Google Street View. A total contribution of 5,700 L/min and 3,800 L/min was used for each hydrant within 75m, and between 75m and 150m of the building,

respectively. The results are summarized below in ***Table 3***. Please refer to ***Appendix C*** for a hydrant location map.

Table 3: Fire Hydrant Protection

Location	Assumed Class	Status	Distance	Flow Contribution (L/min)
4101 Limebank Rd	AA	Existing	82m	3,800
Gastops Street	AA	Proposed (Business Park)	43m	5,700
Gastops Street	AA	Proposed (Business Park)	60m	5,700
Mosquito Drive	AA	Proposed (Business Park)	33m	5,700
Mosquito Drive	AA	Proposed (Business Park)	52m	5,700
Total				**26,600**

Based on City guidelines (ISTB-2018-02), the existing hydrants can provide adequate fire protection to the proposed development.

4.0 SANITARY DESIGN

4.1 Existing Sanitary Sewer

A 375mm sanitary sewer is located on Limebank Road, and a 200mm sanitary sewer and a 375mm sanitary sewer are proposed on Gastops Street and Mosquito Drive, respectively, as a part of the proposed Riverside South Business Park development.

4.2 Proposed Sanitary Sewer

A new 150 mm diameter PVC gravity sanitary lateral is proposed to be connected to a proposed manhole which outlets to the existing 375 mm diameter sanitary sewer lateral connected to Limebank Road. Refer to civil drawing C102 for a detailed servicing layout. The sanitary design below assumes the overall Phase 2 building footprint in the calculations.

The peak design flows for the proposed buildings were calculated using criteria from the Ottawa Sewer Design Guidelines (2012) and are summarized in Table . The proposed site development will generate a flow of 1.13 L/s under peak wet weather conditions. See Appendix D for more details.

Table 4: Sanitary Design Criteria

Design Parameter	Value
Site Area	2.37 ha
Commercial	2,800 L/1,000m^2/day
Institutional/Commercial Peaking Factor	1.5
Extraneous Flow Allowance	0.33 L/s/ha
Total Infiltration Flow	0.80 L/s
Average Dry Weather Flow	0.34 L/s
Peak Sewage Flow	0.45 L/s
Total Peak Wet Weather Flow	1.13 L/s

4.3 Allowable Release Rate

To confirm the adequacy of the existing sanitary sewer the Assessment of Adequacy of Public Services prepared by IBI Group dated July, 2022, was reviewed. The report indicates a design flow 36.2 L/s for the employment lands, the peak wet weather flow for this development is expected to be less than 3% of its available design capacity.

Due to the complexity of the downstream network, it is requested that the City advise of any additional downstream constraints not considered in this report that may be impacted by these flows. Please refer to ***Appendix D*** for detailed calculations.

5.0 STORM SEWER DESIGN

5.1 Existing Storm Sewers

A 600mm storm sewer is located on Limebank Road. The site currently drains to Mosquito Creek. Storm ditches that are part of the industrial subdivision are to be available for outlet.

5.2 Proposed Storm Sewers

Storm sewers are proposed to convey storm flow from the catch basins in the parking areas west of the building to retention area on the southwest corner and then outlet to the Roadside Ditch along Gastops Street. Perforated pipes are also proposed beneath the proposed swales along the north, south and east property lines to convey stormwater to the retention area along the north property line as outline in plan C102. Inlet Control Devices and roof drains are specified for quantity control and catch basin shields and surface treatment are utilised for quality control.

6.0 PROPOSED STORMWATER MANAGEMENT

6.1 Design Criteria and Methodology

Stormwater management for the proposed development will be maintained through positive drainage away from the proposed building and be conveyed toward a retention area. The overland flow route for the site will be directed to the roadside ditching along the south and west sides of the property. The quantitative properties of the storm runoff for both the pre- and post-development flows are further detailed below.

In summary, the following design criteria has been employed in development the stormwater management design for the site:

Quantity Control

- The maximum allowable release rate from the site is 54 L/s. Per *Design Brief Phase 1 – 3700 Twin Falls Place, Riverside South* & the pre-consultation.
- Additional impermeable areas proposed for the Phase 2 expansion were included in the calculations.

Quality Control

- Enhanced level is required (80% TSS removal).

6.2 Runoff Calculations

Runoff calculations presented in this report are derived using the Rational Method, given as:

$$Q = 2.78CIA \text{ (L/s)}$$

Where: C = Runoff coefficient

I = Rainfall intensity in mm/hr (City of Ottawa IDF curves)

A = Drainage area in ha

It is recognized that the Rational Method tends to overestimate runoff rates. As a result, the conservative calculation of runoff ensures that any SWM facility sized using this method is expected to function as intended.

The following coefficients were used to develop an average C for each area, summarized in ***Table 5***.

Table 5: Runoff Coefficients

Land Cover	C
Roofs/Concrete/Asphalt	0.90
Gravel	0.60
Undeveloped/Grass	0.20

As per the *City of Ottawa – Sewer Design Guidelines (2012)*, the 5-Year balanced C-value must be increased by 25% for a 100-Year storm event to a maximum of 1.0.

6.3 Pre-Development Drainage

The existing site drainage limits are demonstrated on the Pre-Development Drainage Area Plan. A summary of the Pre-Development Runoff Calculations can be found in ***Table 6***.

Table 6: Pre-Development Runoff Summary

Drainage Area	Area (ha)	Runoff Coefficient (5-Year)	Runoff Coefficient (100-Year)	5-Year Peak Flow (L/s)	100-Year Peak Flow (L/s)
A1	2.37	0.21	0.26	97.90	208.95

See the Pre-Development Drainage Area Plan in Appendix F and SWM Calculations in Appendix E.

The previously accepted pre-development release rates from Table 4.5 in the Subdivision Design Brief prepared by Arcadis are summarized in ***Table 7***.

Table 7: Required Restricted Flow - Previously Accepted

Drainage Area	Area (ha)	Required Release Rate (100-Year)
A1	**2.37**	**54.0 L/s**

6.4 Post-Development Drainage Areas

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan found in Appendix G of this report. A summary of the Post-Development Runoff Calculations for the site are shown in ***Table 8***.

Table 8: Post-Development Runoff Summary

Drainage Area	Unrestricted Flow (L/S)			Restricted Flow (L/S)			Storage Required (m^3)			Storage Provided (m^3)		
	2-year	5-year	100-Year	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
B1	65.69	89.46	174.14	8.76	9.29	11.58	45.61	68.8	155.3	48.0	71.3	156.9
B2	64.23	87.46	166.54	3.24	4.32	7.56	63.38	86.9	166.8	75.5	100.7	176.1
B3	164.04	223.37	433.55	8.25	9.92	12.80	161.46	227.2	487.8	175.1	238.8	495.9
B4	3.99	5.43	11.64	3.99	5.43	11.64						
B5	2.70	3.67	7.87	2.70	3.67	7.87						
Total	**300.65**	**409.40**	**793.73**	**26.94**	**32.64**	**51.45**	**270.45**	**382.84**	**809.95**	**298.52**	**410.73**	**828.96**

6.5 Quantity Control

The total post-development runoff for this site has been restricted to match the required release rates outlined in table 7. Reducing site flows will be achieved using flow restrictions and the existing onsite storage.

Area B1 conveys water via catch basins, pipes and swales to a stormwater retention area in the grass area on the southwest property corner, where the release rate to the ditch along Gastops St. is controlled to 11.58 L/s in a 100-year event. **Area B2** is the roof area where stormwater is collected by 9 flow-controlled roof drains controlling the to 7.56 L/s in a 100-year event to outlet to the ditch along Gastops St. **Area B3** conveys water via catch basins, pipes, swales and landscape catch basin to a stormwater retention area in the grass area along the north property line, where the release rate to Gastops St. is controlled to 12.80 L/s in a 100-year event. **Area B4** flows unrestricted along the North and west property lines. **Area B5** flows unrestricted to the east of the site.

In an event that exceeds the 100-year storm event (calculated using the 20% stress test), or in the event of a sewer blockage, emergency overland flow routes have been identified to convey water overland to the subdivision stormwater infrastructure. Area B1 will spill to the Gastops Street roadside ditch with the highest spill elevation of 91.99, therefore 1.16m of freeboard is provided from the finished floor (93.15). Area B2 will also spill to the Gastops Street roadside ditch with the highest spill elevation being 92.60 from the CB1 catchment area, providing 0.55m of freeboard. The CB2 catchment area is spilling at a lower elevation of 92.57 toward the Gastops right-of-way, and the CB3 catchment spills to the stormwater storage area at an elevation of 92.40. Refer to Drawing C101 for locations of overland flow route.

See Appendix E for SWM calculations.

6.6 Quality Control

The development of this lot will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's is to ensure that water quality and quantity concerns are addressed at all stages of development. Lot level BMP's typically include temporary retention of the lot runoff, minimizing ground slopes and maximizing landscaped areas. Some of these BMP's cannot be provided for this site due to site constraints and development requirements.

Two quality treatment units have been proposed to provide a TSS removal rate of 80% as per the requirements. The OGS (Oil & Grit Separator) units will provide a water quality of at least 80% TSS. The OGS Units shall be placed downstream of the parking area's storm structures and sewers to provide the required water quality treatment for the site runoff before discharging to the ditch in the adjacent easement. The units have been sized as a Stormceptor EFO4 which have been ETV verified. An an approved equivalent will acceptable for this site as well. Upon correspondence with City staff, 60% TSS removal is the maximum accepted value, which is why we have adopted a treatment train approach.

Area B2 collects water predominantly from the rooftop and is therefore assumed to be clean. Areas B4 and B5 are entirely landscaped areas, and passes through a low flow landscaped storage area prior to outlet. Therefore, quality control is to be provided to Areas B1 & B3 which contain the parking lots on site and take a treatment train approach.

The treatment train for the stormwater in the parking areas has a three-phase approach. The first step is when the water first enters the catch basin it passes through a CB shield which is predicted to achieve ~50% TSS removal, detail sheets included in Appendix E. The stormwater will then pass through the OGS units as discussed above before reaching a low flow landscaped storage area.

All relevant OGS details, authorizations, and sizing information have included in Appendix E.

7.0 EROSION AND SEDIMENT CONTROL

7.1 Temporary Measures

Before construction begins, temporary silt fence and straw bale/rock flow check dams will be installed at all natural runoff outlets from the property. It is crucial that these controls be maintained throughout construction and inspection of erosion and sediment control will be facilitated by the Contractor or Contract Administration staff throughout the construction period.

Silt fences will be installed where shown in the final engineering plans, specifically along the downstream property limits. The Contractor, at their discretion, or at the instruction of the Municipality, Conservation Authority, or Contract Administrator, shall increase the quantity of erosion and sediment controls on-site to ensure that the site is operating as intended and no additional sediment finds its way off site. The check dams and silt fences shall be inspected weekly and after rain events. Care shall be taken to properly remove sediment from the fences

and check dams as required. Inlet sediment control devices (ISCD) are to be placed under the grates of all existing catchbasins and manholes surrounding the site that will come in contact with flows during construction. Any new structures will have an ISCD installed immediately upon installation. The measures for the existing/proposed structures are to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any sediment that has accumulated is properly handled and disposed of. Removal of all silt fences and ISCDs prior to removal of the sediments shall not be permitted.

Although not anticipated, work through the winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the problematic area(s). Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the Municipality and/or Conservation Authority to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as the ground conditions warrant. Please see the Site Grading and Sediment & Erosion Control Plan for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

7.2 Permanent Measures

Rip-rap will be placed at all locations that have the potential for concentrated flow. It is crucial that the Contractor ensure that the geotextile is keyed in properly to ensure runoff does not undermine the rip rapped area. Additional rip-rap is to be placed at erosion prone locations as identified by the Contractor / Contract Administrator / Municipality or Conservation Authority.

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

8.0 SUMMARY

- Office building is proposed at block 2 of the proposed Riverside South Business Park at 3700 Twin Falls Pl. in Ottawa, Ontario.
- A 150mm watermain service is proposed to service the site, connecting to the 300mm watermain extension from Limebank Road.
- A 150mm sanitary service lateral will be connected to the existing 375mm sanitary sewer stub located from Limebank Road.
- Storage for the 2-, 5- and 100-year storm events will be provided within the rooftop and in two above-ground storage areas.
- Water quality control will be provided on-site via a treatment train approach including CB shields, two OGS units, and low flow channels/storage areas.

9.0 RECOMMENDATION

Based on the information presented in this report, we recommend that the Municipality approve this Servicing Report in support of the proposed building addition.

The report is respectfully being submitted for approval.

Regards,

Egis Canada Ltd.

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613-266-5779

Robbie Pickard, E.I.T.
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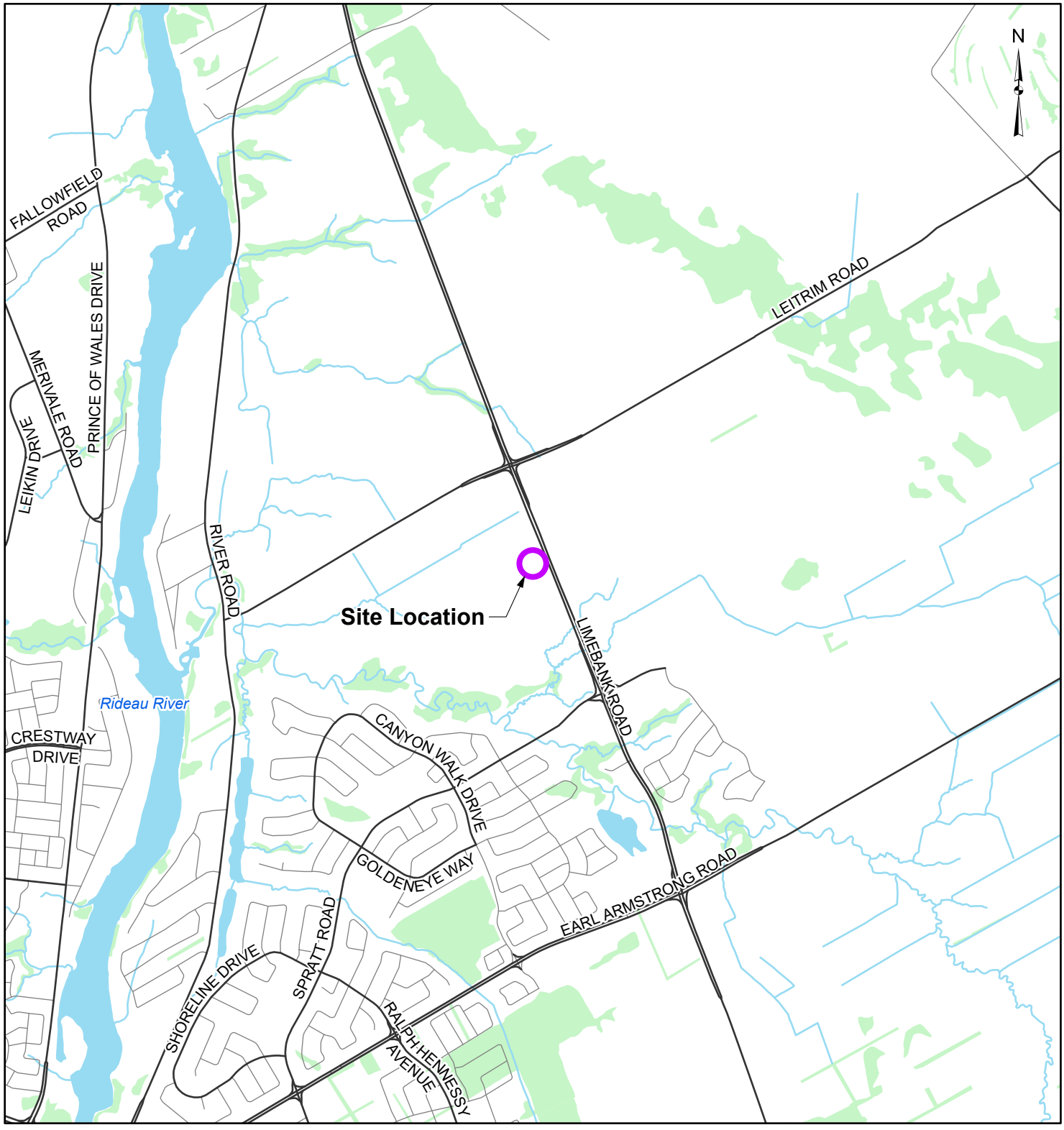
APPENDIX A
KEY PLAN



LEGEND

- Site Location
- Local Road
- Major Road
- Watercourse
- Waterbody
- Wooded Area

800 400 0 800

Scale 1:25,000 Metres

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2024.

CLIENT: CSV ARCHITECTS
190 O'CONNOR STREET, SUITE 100
OTTAWA, ON

PROJECT: LOT GRADING & SERVICING PLAN

TITLE: LOCATION PLAN

egis
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742

PROJECT NO:	CCO-24-2748
Date	May., 28, 2024
GIS	AH
Checked By	RP

FIGURE: 00

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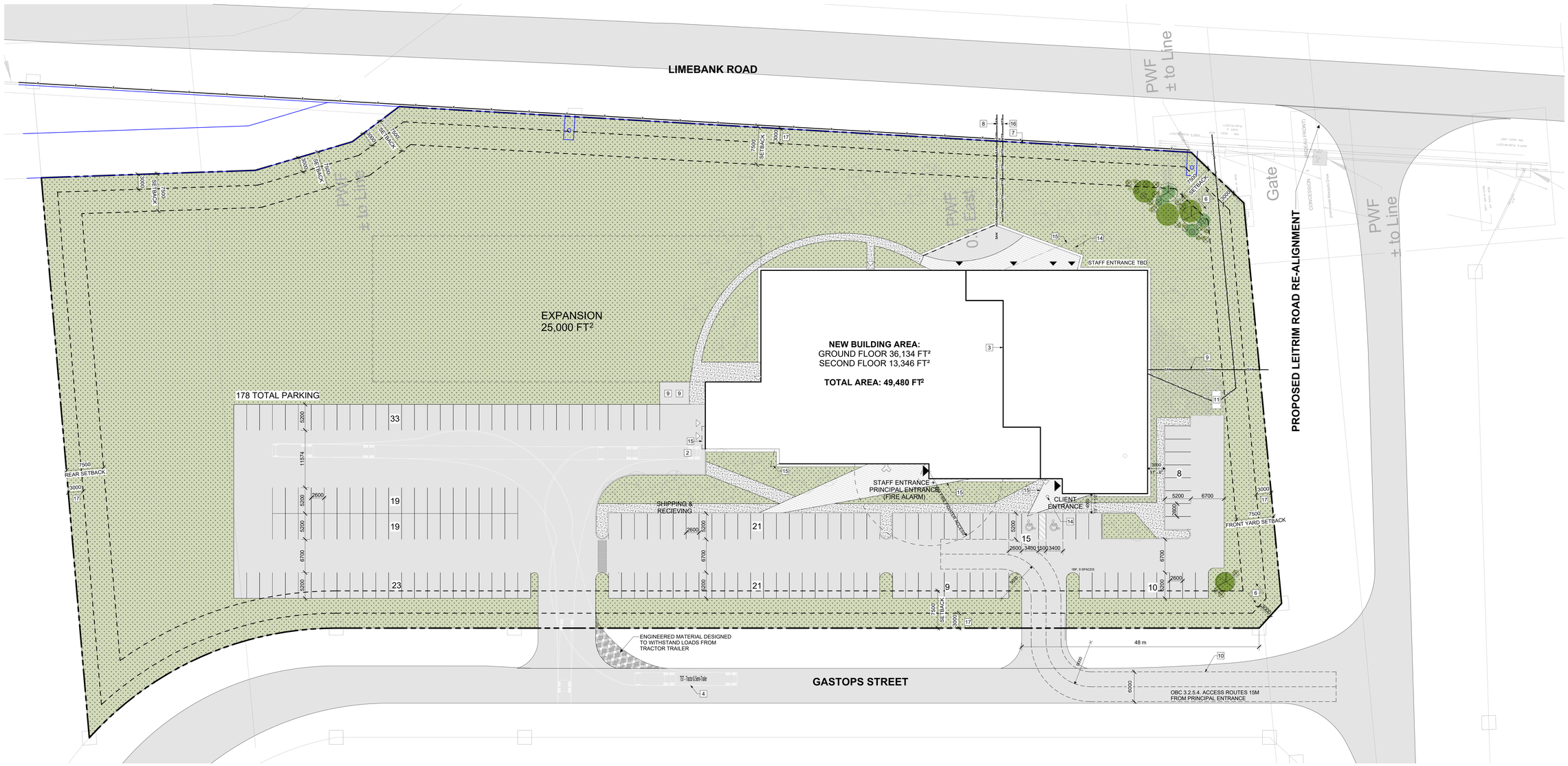
APPENDIX B
BACKGROUND DOCUMENTS



1 PHASE 1 - SITE PLAN 20241001 SM
A100 | 1 : 300

SITE PLAN LEGEND:

- EXISTING BUILDING & SITE ELEMENTS
- DEMOLISHED BUILDING & SITE ELEMENTS
- ASPHALT PAVING
- GRASS
- CONCRETE SIDEWALK
- CONCRETE PAD
- MULCH/PLANTING
- GRAVEL/ RIVERSTONE/ MAINTENANCE STRIP
- STONE DUST/ SAND
- PAVER TYPE 1
- PAVER TYPE 2
- PAVER TYPE 3
- ENTRANCE/ BARRIER-FREE ENTRANCE
- MAIN ENTRANCE
- VEHICLE ACCESS
- PROPERTY LINE
- FENCE PER SURVEY
- DOMESTIC WATER PER CIVIL
- SANITARY PER CIVIL
- NEW STORM PER CIVIL
- NEW ELECTRICAL SERVICE (BELOW GRADE) PER CIVIL
- GAS PER CIVIL
- OVERHEAD WIRE
- SUBJECT TO EASEMENT
- CATCH BASIN
- LIGHT STANDARD
- FIRE HYDRANT
- MAINTENANCE HOLE
- UTILITY POLE
- SIAMESE CONNECTION
- DROPPED CURB
- TREE
- SHRUB

SITE PLAN GENERAL NOTES:

1. ALL GENERAL SITE INFORMATION AND CONDITIONS COMPILED FROM EXISTING PLANS AND SURVEYS
2. DO NOT SCALE THIS DRAWING
3. REPORT ANY DISCREPANCIES PRIOR TO COMMENCING WORK. NO RESPONSIBILITY IS BORN BY THE CONSULTANT FOR UNKNOWN SUBSURFACE CONDITIONS
4. CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND REPORT ANY ERRORS AND/OR OMISSIONS TO THE CONSULTANT
5. REINSTATE ALL AREAS AND ITEMS DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES TO THE SATISFACTION OF THE CONSULTANT
6. CONTRACTOR TO LAYOUT PLANTING BEDS, PATHWAYS ETC. TO APPROVAL OF CONSULTANT PRIOR TO ANY JOB EXCAVATION
7. THE ACCURACY OF THE POSITION OF UTILITIES IS NOT GUARANTEED - CONTRACTOR TO VERIFY PRIOR TO EXCAVATION
8. INDIVIDUAL UTILITY COMPANY MUST BE CONTACTED FOR CONFIRMATION OF UTILITY EXISTENCE AND LOCATION PRIOR TO DIGGING
9. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE NOTED

SITE PLAN KEYNOTES:

1 FIRE ROUTE
2 DROP OFF / LOADING BAY
3 OUTLINE OF SECOND STOREY
4 TRUCK TURNING RADIUS
5 OUTLINE OF SECOND STOREY
6 CULVERT
7 STORM DITCH
8 EXISTING SANITARY CONNECTION
9 NEW SANITARY CONNECTION
10 FIRE TRUCK ROUTE
11 TRANSFORMER
12 GARBAGE
13 SOCCER
14 CANOPY COLUMN
15 CANOPY ABOVE
16 DOMESTIC WATER
17 3M LANDSCAPE BUFFER

LEGAL DESCRIPTION:

BLOCK 2 4R-8033

REFERENCE SURVEY:

BASED ON INFORMATION FROM A SURVEY RECEIVED

MUNICIPAL ADDRESS:

NOT ESTABLISHED

DEVELOPMENT INFORMATION:

SITE AREA:	24076 m²
BUILDING AREA:	3358 m²
GROSS FLOOR AREA:	4597 m²
BUILDING HEIGHT:	9754 m / (2) STORIES
ZONE:	IL
SCHEDULE 1:	AREA [C]
SCHEDULE 1A:	AREA [C]
SCHEDULE 2:	

ZONING PROVISION:	REQUIRED:	PROVIDED:
MIN. LOT WIDTH:	NO MINIMUM	
MIN. LOT AREA:	2000 m²	
MIN. LOT COVERAGE:	65%	
MIN. FRONT YARD SETBACK:	7.5 m	
MIN. CORNER YARD SETBACK:	7.5 m	
MIN. REAR YARD SETBACK:	7.5 m	
MIN. INTERIOR YARD SETBACK:	7.5 m	
MAXIMUM FLOOR SPACE INDEX:	2	
MAXIMUM BUILDING HEIGHT:	18 m	
MINIMUM LANDSCAPE AREA:	NO MINIMUM	
MINIMUM LANDSCAPE BUFFER:	3M	

PARKING QUEUING + LOADING	REQUIRED:	PROVIDED:
TOTAL SPACES:		178
TYPICAL SPACES:		176
ACCESSIBLE PARKING:	2	2
BICYCLE PARKING:	1 PER 1000 m2 OF GROSS FLOOR AREA (5)	0
REFUSE COLLECTION:		
GARBAGE COLLECTION:		

CSV ARCHITECTS
sustainable design - conception écologique
613.564.8118 www.csv.ca
190 O'Connor Street, Suite 100 Ottawa, Ontario,K2P 2R3

STRUCTURAL ENGINEER
CLELAND JARDINE
580 Terry Fox Drive
Kanata, Ontario K2L 4B9

MECHANICAL ENGINEER
QUASAR CONSULTING GROUP
150 Isabella Street, Suite 400
Ottawa, Ontario K1S 5H3

ELECTRICAL ENGINEER
QUASAR CONSULTING GROUP
150 Isabella Street, Suite 400
Ottawa, Ontario K1S 5H3

CIVIL ENGINEER
EGIS GROUP
115 Walgreen Road
R.R. 3 Carp, Ontario K0A 1L0

LANDSCAPE ARCHITECT
URBAN TYPOLOGY INC.
163 Sterling Road Unit 10
Toronto, Ontario M6R 2B2

STAMP

REV	DATE	ISSUE
2	2024/07/30	ISSUED FOR CLIENT COORDINATION

NOTES

CLIENT

GASTOPS

OTTAWA
ONTARIO, CANADA

PROJECT

GASTOPS NEW FACILITY

3700 Twin Falls Place

TITLE

SITE PLAN

PROJECT NO:	2023-2260
DRAWN:	KM
APPROVED:	DH
SCALE:	As indicated
DATE PRINTED:	10/29/2024 9:02:51 AM

REV 2 DRAWING NO. A100

File No.: PC2024-0189

May 28, 2024

Paolo Marinelli
CSV Architects
Via email: marinelli@csv.ca

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Site Plan Control Application – 3700 Twin Falls

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on May 24, 2024.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☒

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

Please proceed to complete a Phase 3 Pre-Consultation by submitting the required studies and plans and completing the Pre-consultation Application Form. Send the submission to planningcirculations@ottawa.ca.

In your subsequent pre-consultation submission, include a detailed cover letter stating how each comment detailed herein was addressed. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

Note: If your development proposal changes significantly in scope, design, or density before the Phase 3 pre-consultation, staff may require a Phase 2 pre-consultation.

Supporting Information and Material Requirements

The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

Staff encourage applicants to consult with technical agencies early in the development process and throughout the development of your project concept. Refer to the attached list of technical agencies.

Planning Comments

1. The Official Plan designates the property Industrial and Logistics within the Suburban Transect. The Official Plan permits traditional heavy and industrial uses and accessory offices in this designation.

   The property is also within the Riverside South Secondary Plan. City Council approved the Secondary Plan on May 1st, 2024, and it is within the statutory 20-day appeal period. The approved Secondary Plan policy text, staff report and schedules are available at the following link: https://pub-ottawa.escribemeetings.com/Meeting.aspx?Id=3a8d2f7c-bb06-453d-9163-2ae3a9ebdef5&Agenda=Agenda&lang=English&Item=59&Tab=attachments

   Key policies to be aware of include:

   - Schedule B – Maximum Building Heights
   - Section 2.5 Policy 4)

     To minimize the urban heat island effect, where possible, development should: a) Have a front yard that supports soft landscaping and mature trees; b) Have a soft landscaped buffer around parking areas; c) Provide soft landscaping within parking areas; and d) Design buildings with light coloured and/or reflective materials. Cool and green roofs are encouraged.

   - Section 2.5 Policy 6)

     Development within the Industrial and Logistics designation that is also within the Airport Operating Influence Zone, per Schedule C14 – Land Use Constraints Due to Aircraft Noise in Volume 1 of the Official Plan, is subject to the Airport Operating Influence Zone policies in section 10.2.2 in Volume 1 of the Official Plan.

   - Section 2.5 Policy 7)

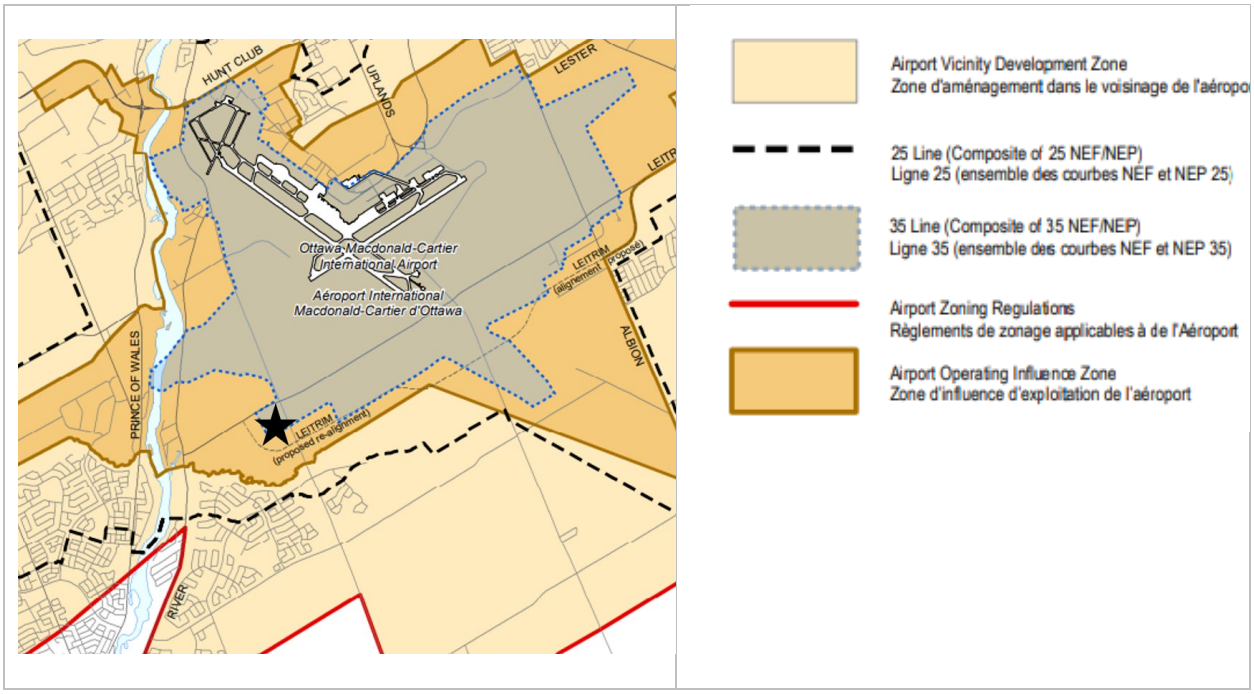
     Per the recommendations of the Master Drainage Plan for Mosquito Creek, the City may require that development incorporate Low Impact Development measures to the treatment train approach for Stormwater Management Facilities.

2. The property is also within the City's Ottawa International Airport Economic District. The objective of this Special District is to guide development and support the preparation of a secondary plan to recognize its role as an economic generator and to balance employment and mixed uses around the airport. See Section 6.6.3.1 of the Official Plan.

3. The property falls within the Airport Operating Zone and the 25 Line (i.e., Composite of the Noise Exposure Forecast and Noise Exposure Projection) as shown on Schedule C14 (see screenshot below). The northern portion of the site also falls within the 35 Line, where no noise sensitive land uses are permitted.

   The Official Plan requires a noise control study as part of a complete application for any development proposal within the 25 Line (Section 10.2.2 Policy 3). For more information on

the contents of the study, refer to Section 4.0 of the City's Environmental Noise Control Guidelines.



4. There is an existing utility corridor impacting the subject property as shown on Schedule A of the Riverside South Secondary Plan. Review the registered easement agreement to confirm allowable building footprints and setbacks.

5. The property is zoned Light Industrial (IL), and the preliminary site plan concept appears to comply to the applicable provisions. Please take note the following provisions:

   - Section 203 limits accessory display and sale areas to 25% of the gross floor area
   - Based on the size of the building, 1 oversized loading space is required. Refer to the dimension and aisle provisions in Section 113.
   - Minimum parking rate requirements are based on the gross floor area of the proposed building(s). The applicable rate is:
     - 0.8 spaces per 100 m^2 for the first 5000 m^2 and 0.4 spaces per 100 100 m^2 for the remainder.

     Note: If the office only services the warehouse on-site, you can rely on the above parking rate. However, if the office serves other locations, staff will request that the parking calculation is separated for the warehouse use and office use by applying the applicable minimum parking rates.

6. Accessible parking spaces will be required. The number of required Type A and Type B spaces will depend on the total number of provided parking spaces. Refer to Section 3.0 of the City's Accessibility Design Standards for more information.

7. Consider the following City Guidelines through the design development process:

- Bird-Safe Design Guidelines
- Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines.

8. Preliminary Site Plan Comments:

    a) As shown in the meeting, explore opportunities to incorporate additional soft landscaping in the surface parking lot (i.e., perimeter and interior landscaped areas).

    b) Staff recommend planting trees around the amenity area to create a comfortable environment for users.

    c) Denote the snow storage areas on the site plan and landscape plan.

    Locate snow storage areas in strategic locations given the amount of surface parking. If the applicant identifies parking spaces for snow storage, please note that the spaces cannot contribute to the minimum required parking count.

    d) Denote the waste management area on the site plan and landscape plan.

    Section 110(3) of the Zoning By-law includes specific provisions for waste management areas contained within a parking lot.

    e) Include the aisle width dimensions within the parking lot, including the loading space. Please note that the aisle width of the loading space will depend on the angle to turn into the loading space.

    f) Ensure that the site plan includes the relevant content as per the City's Terms of Reference

If you have any questions regarding the above comments, please contact Siobhan Kelly, Planner I, at siobhan.kelly@ottawa.ca

Urban Design Comments

9. This looks to be an existing project, especially if the architecture and landscape design work together. Staff appreciate the inclusion of future phases outlined on the plans.

10. Consider shifting some of the parking spaces to establish a great landscape area along Leitrim and Gastops Street. This will help signify the building entrance and sense of arrival to the site. Understandably some stalls are needed for visitors but a few of the stalls in the front yard setback adjacent to Leitrim and a few along Gastops should be shifted giving a greater presence to the building entrance.

11. Please include architectural treatments and features at the northeast corner of the building (viewable from Limebank and Leitrim). Even though it is not the main entrance corner, the building should have a strong street presence.

12. For the façade facing Limebank, please include windows when possible. Where blank facades cannot be avoided, utilize landscape elements to break up the building wall.

13. Larger landscape islands are supported and where possible, include pedestrian links from the surface parking stalls to main entrances in a logical desire line.

14. Please provide bicycle parking stalls near entrances and preferably covered stalls.

15. Will there be a sidewalk along Gastops? If so, please provide clear pedestrian connections to the main entrances.

16. Please provide as many trees as possible, great opportunity along the Limebank Road frontage.

17. Refer to the attached list of prohibited plant material for projects within the airport influence zones.

18. In the next submission, please provide more information on the adjacent site conditions.

19. Submission Requirements:

    a) An Urban Design Brief is required. Refer to the attached customized Terms of Reference to guide the preparation.

       Note: the Urban Design Brief should follow the structure of the headings highlighted under Section 3 – Contents of these Terms of Reference.

    b) Attendance at the Urban Design Review Panel is not required.

    c) Additional drawings are required as identified on the attached Study and Plan Identification List (SPIL). Please follow the associated Terms of References when preparing the drawings. (Planning application submission information and materials | City of Ottawa

If you have any questions regarding the above comments, please contact Molly Smith, Planner II Urban Design, at molly.smith@ottawa.ca

Engineering Comments

20. The site is a part of a larger subdivision at 3700 Twin Falls carried out by Riverside South Development Corporation (RSDC).

    a. Stormwater Management Criteria (quantity and quality control) is to follow the design laid out in the subdivision's adequacy of public services report (APSR), design brief and the in the Mosquito Creek Infrastructure Servicing Study Update (ISSU).

i. On-site quality control at an enhanced level is required (80% TSS removal). Details can be found in the APSR.

ii. The maximum allowable release rate from the site is 54 L/s (per the subdivision design brief). Runoff outlet is roadside ditches along Gastops Street.

iii. Interim and ultimate conditions need to be considered (the ultimate condition is the urbanized future Leitrim Road). Refer to APSR for details.

iv. The use of LIDs is to be considered for this site. The City will be releasing a technical bulletin that will go into detail about the applications of LIDs within the next few weeks (today being May 24th).

b. For water and sanitary connections, there are existing stubs coming into the southeast side of the site from Limebank. These can be used, however, the watermain that the stub connects to along Limebank is inactive and would need to be recommissioned.

c. A sanitary monitoring manhole is required at an accessible location on private property.

d. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

i. Location of service

ii. Type of development

iii. The amount of fire flow required (per OBC or FUS).

iv. Average daily demand: ___ l/s.

v. Maximum daily demand: ___l/s.

vi. Maximum hourly daily demand: ___ l/s.

21. An MECP ECA is not anticipated to be required for this site.

Feel free to contact Reed Adams, Project Manager, for follow-up questions.

Transportation Comments

22. A noise study is required due to the office use.

23. Please ensure that the following right-of-way protections are shown on the site plan:

a) See Schedule C16 of the Official Plan.

b) Any requests for exceptions to ROW protection requirements must be discussed with Transportation Planning and concurrence provided by Transportation Planning management.

The new required corner triangle dimensions will be embedded within Schedule C16 of the OP. Until then here are the requirements at all intersection types:

- Arterial/Arterial: overlapping 5m x 15m triangles
- Arterial/Collector: overlapping 5m x 15m triangles
- Collector/Collector: overlapping 5m x 15m triangles
- Arterial/Local: 3m x 9m with the longer dimension along the arterial road
- Collector/Local: 3m x 9m with the longer dimension along the collector road
- Local/Local: 3m x 3m
- Lane/Local: 3m x 3m

Note: Any exceptions to the above requirements requires approval from Transportation Planning – Max Walker from Transportation Policy & Networks.

24. A Transportation Impact Assessment (TIA) is required as per included screening form. Please submit step 2 (i.e., scoping report) 14 days prior to the Phase 3 pre-consultation submission.

25. Transportation staff have no concerns with the two accesses proposed on Gastops Street.

If you have any questions regarding the above comments, please contact **Mike Giampa**, Transportation Project Manager, at mike.giampa@ottawa.ca

Environment Planning Comments

26. There are no natural heritage features, surface water features, or species at risk habitat on or near the site that would trigger the need for an Environmental Impact Statement (EIS). Though no EIS is required for this submission, there are some minor considerations from the EIS for the subdivision application that are applicable here.

    a. Pollinator gardens, stocked with milkweed to provide food for monarch butterflies (among other plants), should be constructed. The EIS suggests that these should be “planted adjacent to parking lots to provide native vegetation as well as an opportunity for infiltration of stormwater run off to minimize erosion within the adjacent valleylands.” This should be considered, but locations not adjacent to parking lots would also be welcome.

    b. Consideration should be given to the landscaping and maintenance procedures with regard to the impacts on monarch butterflies. Per the EIS: “Pesticide use should be limited or avoided, when possible, in landscape maintenance to reduce risk of exposure to Monarch.” The main pesticide group to avoid using is neonicitinoids.

27. Additional tree plantings wherever possible should be considered. The City prefers that all plantings be of native and non-invasive species.

28. The Bird Safe Design Guidelines will apply here, which has some implications for the design of the structure itself.

29. This area is in the Airport Bird Hazard Zone, which affects what types of vegetation can be planted. A list of tree species to avoid will be provided.

If you have questions regarding the above comments, please contact Mark Elliott, Environmental Planner at mark.elliott@ottawa.ca

Forestry Planning Comments

30. The City of Ottawa is working towards a 40% canopy cover target. Staff expect the applicant to prioritize the planting of large canopy native species with this development application.

31. Section 4.1.4 of the Official Plan lists surface parking lot design requirements. This includes landscaping requirements for the right of way around the perimeter of parking lots and includes regular spacing of tree islands that support the growth of mature shade trees.

32. Staff do not recommend that the applicant plant trees in areas planned for future expansion. Instead, focus on planting areas that can foster long term tree growth and health, including the large expanses of greenspace and the property perimeter.

33. Staff recommend planting trees around the amenity area to provide shade and encourage use in the warmer months.

34. A Tree Conservation Report (TCR) is required. Staff adapted the following TCR requirements from Schedule E of the Urban Tree Protection Guidelines.

    a) Any tree 10 cm in diameter or greater and City-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.

    b) The TCR must contain 2 separate plans/maps:

        - Plan/Map 1 - showing existing conditions with tree cover information.

        - Plan/Map 2 - showing proposed development with tree cover information

    c) The TCR must list all trees on site and off-site trees if the Critical Root Zone (CRZ) extends into the developed area. The TCR must identify the trees by species, diameter, and health condition. Please note that averages can be used if there are forested areas.

    d) Identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)

    e) If trees are to be removed, the TCR must clearly show where they are and document the reason retention is not possible.

f) The removal of trees on a property line will require the permission of both property owners.

g) All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca

h) Staff encourage the retention of healthy trees. Where possible, seek opportunities for tree retention that contributes to the design/function of the site.

i) Removal of a City tree is not permitted unless justified. If justified, monetary compensation for the value of the tree must be paid before a tree removal permit is issued.

35. Landscape Plan Requirements:

a) The landscape plan must adhere to the City's Landscape Plan Terms of Reference

36. Additional elements for tree planting in the right-of-way:

a) Please ensure any retained trees are shown on the landscape plan.

b) The site is impacted by sensitive marine clay. Please follow the City's Tree Planting in Sensitive Marine Clay Soils Guidelines.

c) Where possible, prioritize planting native species as it increases the probability of survival to maturity.

d) Staff encourage all applicants to contribute to the city's future tree canopy cover at the site level by planting and retaining existing trees. The landscape plan must show/document that the proposed planting will contribute to the overall canopy cover over time. Please also provide a 40-year projection of the site's canopy

37. Minimum Planting Setbacks:

- Maintain a 1.5 m distance from a sidewalk, multi-use path (MUP)/cycle track, or water service laterals.
- Maintain 2.5 m from curbs
- Coniferous species require a minimum 4.5m setback from curb, sidewalk, or MUP/cycle track/pathway.
- Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas.
- Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

38. Tree specifications:

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage.
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and if possible, include watering and warranty as described in the specification.
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

39. Hard surface planting

- If there are hard surface plantings, a planting detail must be provided.
- Curb style planters are highly recommended.
- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade.
- Soil Volume - Please demonstrate as per the Landscape Plan Terms of Reference that the available soil volumes for new plantings will meet or exceed the minimum soil volumes requested.

If you have questions regarding the above comments, please contact Hayley Murray, Planning Forester, at hayley.murray@ottawa.ca

Parks and Facilities Planning Comments

40. All parkland dedication requirements for the site are being addressed through the Phase 1 subdivision agreement for the current draft plan of subdivision application for 3700 Twin Falls Place and 4020 Spratt Road, File No. D07-16-22-0014.

If you have any questions, please contact Burl Walker, Parks Planner, at burl.walker@ottawa.ca

RVCA Comments

41. The RVCA did not provide comments on the Phase 1 pre-consultation submission.

Other Comments

42. The High-Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design. The HPDS was passed by Council on April 13, 2022.

    Currently, the HPDS is not in effect and Council has referred the 2023 HPDS Update Report back to staff with direction to bring forward an updated report to Committee with recommendations for revised phasing timelines, resource requirements and associated amendments to the Site Plan Control By-law by no later than Q1 2024. Refer to the HPDS information at ottawa.ca/HPDS.

Submission Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified as either required (R) or advised (A) as part of a future complete application submission.

   The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

2. Address all the comments to ensure the effectiveness of the application submission review.

3. The 2024 Planning Application Fees are outlined on the City's website: https://ottawa.ca/en/planning-development-and-construction/residential-property-regulations/development-application-review-process/development-application-submission/development-applications/site-plan-control

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above disciplines.

Regards,

Siobhan Kelly
Planner I
Development Review, South
Planning, Development and Building Code Services Department

Attached: Study and Plan Identification List
List of Technical Agencies to Consult
List of Prohibited Species in the Airport Zones
Urban Design Brief Terms of Reference
Pre-Consultation Supplementary Development Information

cc. Reed Adams, Infrastructure Project Manager
Molly Smith, Planner II Urban Design
Mark Elliott, Planner II Environnemental Planning
Mike Giampa, Transportation Project Manager
Hayley Murray, Forester
Burl Walker, Parks Planner

APPENDIX C
WATERMAIN CALCULATIONS

CO-24-2748 - Gastops LTD. Headquarters - Water Demands

Project:	Gastops LTD. Headquarters
Project No.:	CO-24-2748
Designed By:	RP
Checked By:	AG
Date:	November 20, 2024
Site Area:	2.41 gross ha

Commercial 6859 m2

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	280	L/c/d
Industrial - Light	35,000	L/gross ha/d
Industrial - Heavy	55,000	L/gross ha/d
Shopping Centres	2,500	L/(1000m² /d
Hospital	900	L/(bed/day)
Schools	70	L/(Student/d)
Trailer Park with no Hook-Ups	340	L/(space/d)
Trailer Park with Hook-Ups	800	L/(space/d)
Campgrounds	225	L/(campsite/d)
Mobile Home Parks	1,000	L/(Space/d)
Motels	150	L/(bed-space/d)
Hotels	225	L/(bed-space/d)
Tourist Commercial	28,000	L/gross ha/d
Other Commercial	28,000	L/gross ha/d

AVERAGE DAILY DEMAND	Residential	0.00	L/s
	Commercial/Industrial /Institutional	0.22	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	9.5	x avg. day	L/c/d
Industrial	1.5	x avg. day	L/gross ha/d
Commercial	1.5	x avg. day	L/gross ha/d
Institutional	1.5	x avg. day	L/gross ha/d

MAXIMUM DAILY DEMAND	Residential	0.00	L/s
	Commercial/Industrial /Institutional	0.33	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	14.3	x avg. day	L/c/d
Industrial	1.8	x max. day	L/gross ha/d
Commercial	1.8	x max. day	L/gross ha/d
Institutional	1.8	x max. day	L/gross ha/d

MAXIMUM HOUR DEMAND	Residential	0.00	L/s
	Commercial/Industrial /Institutional	0.60	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

AVERAGE DAILY DEMAND	0.22	L/s
MAXIMUM DAILY DEMAND	0.33	L/s
MAXIMUM HOUR DEMAND	0.60	L/s

CO-24-2748 - Gastops LTD. Headquarters - OBC Fire Calculations

Project:	Gastops LTD. Headquarters
Project No.:	CO-24-2748
Designed By:	RP
Checked By:	AG
Date:	November 20, 2024

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Store/Office & Warhouse Building

Building is classified as Group : D, E and F2 up to 2 Storeys (from table 3.2.2.55)
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with subsections 3.2.2., including loadbearing walls, columns and arches

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	17	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	27,436	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	466,412.00 L	

From Figure 1 (A-32)

Snorth	70	m	0.0
Seast	740	m	0.0
Ssouth	480	m	0.0
Swest	42	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

9000 L/min
2378 gpm

if Q > 270,000 L

Use FUS per 4.2.11

CO-24-2748 - Gastops LTD. Headquarters - Fire Underwriters Survey

Project:	Gastops LTD. Headquarters
Project No.:	CO-24-2748
Designed By:	RP
Checked By:	CM
Date:	November 20, 2024

From the Fire Underwriters Survey (2020)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
City of Ottawa Technical Bulletin ISTB-2018-02 Applied Where Applicable

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x √A Where: F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type: Non-Combustible Construction

C	0.8	A	6,859.0 m^2
	Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area)		6,859.0 m^2

Calculated Fire Flow	14,576.2 L/min
	15,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Combustible	0%
Fire Flow	15,000.0 L/min

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Fully Supervised Sprinklered	-50%
Reduction	-7,500.0 L/min

D. INCREASE FOR EXPOSURE (No Rounding)

	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor	
Exposure 1	Over 30 m	Fire Resistive - Non Combustible (Unprotected Openings)	20	1	20.0	0%
Exposure 2	Over 30 m	Wood frame	20	1	20.0	0%
Exposure 3	Over 30 m	Ordinary - Mass Timber (Unprotected)	20	1	20.0	0%
Exposure 4	Over 30 m	Wood frame	20	2	40.0	0%
					% Increase*	0%

Increase*	0.0 L/min

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	7,500.0 L/min
Fire Flow Required**	8,000.0 L/min

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min

CO-24-2748 - Gastops LTD. Headquarters - Boundary Condition Unit Conversion

Project:	Gastops LTD. Headquarters
Project No.:	CO-24-2748
Designed By:	RP
Checked By:	CM
Date:	November 20, 2024

Boundary Conditions Unit Conversion

*Limebank & Spratt

Scenario	Height (m)	Elevation (m)	m H_2O	PSI	kPa
Avg. DD	147.00	91.00	56.00	79.68	549.36
Fire Flow (133 L/s or 8,000 L/min)	144.90	91.00	53.90	76.69	528.76
Peak Hour	145.60	91.00	54.60	77.68	535.63

JOB BENCHMARK
TOP OF SPINDLE
Elev.=93.87

1-STOREY OFFICE BUILDING
MAIN FLOOR FFE = 93.15

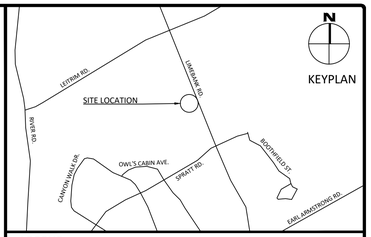
2-STOREY OFFICE BUILDING
MAIN FLOOR FFE = 93.15

TEMPORARY SWALE

LIMIT OF ROADWAY CONSTRUCTION PHASE 1A

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

KEYPLAN



LEGEND

LEGAL BOUNDARY	
EXISTING FENCE	
EXISTING STORM STRUCTURE	
EXISTING CATCHBASIN	
EXISTING SANITARY STRUCTURE	
EXISTING FIRE HYDRANT	
EXISTING VALVE & VALVE BOX	
EXISTING HYDRO POLE	H.P.
EXISTING HYDRO	
EXISTING UTILITIES	HBCS HBCS
EXISTING ELEVATION	×99.00
PROPOSED STORM MANHOLE	
PROPOSED STORM CATCHBASIN MH	
PROPOSED SANITARY STRUCTURE	
PROPOSED WATER VALVE/HYDRANT	
PROPOSED CURB OUTLET PER OPSD 604.010	
PROPOSED FINISHED GROUND ELEVATION	×99.00
PROPOSED TOP OF WALL ELEVATION	×99.00TW
PROPOSED BOTTOM OF WALL ELEVATION	×99.00BW
PROPOSED DITCH ELEVATION	×99.00(D)
PROPOSED SWALE ELEVATION	×99.00(S)
PROPOSED SLOPE	1.0%
PROPOSED TERRACING (3:1 MAX)	
PROPOSED BARRIER CURB	
PROPOSED RETAINING WALL	
PROPOSED DRAINAGE SWALE	
PROPOSED CONCRETE SIDEWALK	
ENTRY/EXIT LOCATION, ELEVATION & LEVEL BF = BARRIER FREE 1R = ONE RISER, OH = OVERHEAD DOOR	BF,1R, OH MAIN,L1 FFE=74.40

No.	Revisions	Date

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 500

0 10 20 30 40 50 Metres

egis

Stamp:

Client:

CSV ARCHITECTS
190 O'CONNOR ST, SUITE 100
OTTAWA, ON

Project:

GASTOPS LTD. HEADQUARTERS
RIVERSIDE SOUTH BUSINESS PARK,
OTTAWA, ON

Drawing Title:

HYDRANT SKETCH

Scale: 1:500	Project Number: CO-24-2748
Drawn By: RP	
Checked By: CM	Drawing Number: HYD
Designed By:	

D07-00-000

#18662

FILENAME: I:\Ottawa\03 Project - Proposal\2024 Jobs\CCO\CO-24-2748 CSV_Gastops Ltd. World HQ_Riverside South Business Park\12 - Drawings\CO-24-2748 -Design_2.dwg
LAST SAVED: Tuesday, November 19, 2024 LAST SAVED BY: r.pickard
LAST PLOTTED: Wednesday, November 20, 2024 CTB FILE USED:

Boundary Conditions
3700 Twin Falls Place

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	16	0.26
Maximum Daily Demand	23	0.39
Peak Hour	42	0.70
Fire Flow Demand #1	8,000	133.33

Location

Results

Existing Conditions

Connection 1 – Limebank & Spratt

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	132.2	57.5
Peak Hour	125.0	47.4
Max Day plus Fire Flow #1	125.0	47.4

[1] Ground Elevation = 91.7 m

Future SUC

Connection 1 – Limebank & Spratt

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	147.0	78.6
Peak Hour	144.9	75.6
Max Day plus Fire Flow #1	145.6	76.6

[1] Ground Elevation = 91.7 m

Notes

1. Typically, water boundary result is provided off the public looped watermains, not the dead-end main. Thus, demands for proposed Connection 1 at existing water main along Limebank Rd. were assigned to upstream junction at Spratt & Limebank intersection. The engineer must calculate head loss off the dead-end main.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

APPENDIX D
SANITARY CALCULATIONS

CCO-24-2748 - Gastops LTD. Headquarters - Sanitary Demands

Project:	Gastops LTD. Headquarters
Project No.:	CCO-24-2748
Designed By:	RP
Checked By:	AG
Date:	November 20, 2024

Site Area	2.41	Gross ha
Office Space	6859	m^2

DESIGN PARAMETERS

Institutional/Commercial Peaking Factor	1.5	
Residential Peaking Factor	3.80	** Using Harmon Formula* = 1+(14/(4+P^0.5))*0.8 *where P = population in thousands, Harmon's Correction Factor = 0.8*
Mannings coefficient (n)	0.013	
Demand (per capita)	280	L/day
Infiltration allowance	0.33	L/s/Ha

EXTRANEOUS FLOW ALLOWANCES

Infiltration / Inflow	Flow (L/s)
Dry	0.12
Wet	0.67
Total	0.80

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	POPULATION / AREA	Flow (L/s)
Residential	280	L/c/d		0
Industrial - Light**	35,000	L/gross ha/d		0
Industrial - Heavy**	55,000	L/gross ha/d		0
Commercial / Amenity	2,800	L/(1000m²/d)	6859	0.22
Restaurant	125	L/(9.2m²/d)		0
Schools	70	L/(Student/d)		0
Trailer Parks no Hook-Ups	340	L/(space/d)		0
Trailer Park with Hook-Ups	800	L/(space/d)		0
Campgrounds	225	L/(campsite/d)		0
Mobile Home Parks	1,000	L/(Space/d)		0
Motels	150	L/(bed-space/d)		0
Hotels	225	L/(bed-space/d)		0
Office	75	L/7.0m^2/d		0
Tourist Commercial	28,000	L/gross ha/d		0
Other Commercial	28,000	L/gross ha/d		0

AVERAGE RESIDENTIAL FLOW	0.00	L/s
PEAK RESIDENTIAL FLOW	0.00	L/s
AVERAGE ICI FLOW	0.22	L/s
PEAK INSTITUTIONAL/COMMERCIAL FLOW	0.33	L/s
PEAK INDUSTRIAL FLOW	0.00	L/s
TOTAL PEAK ICI FLOW	0.33	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	0.34	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	0.45	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	1.13	L/s

SANITARY SEWER DESIGN SHEET

PROJECT: CCO-24-2748
LOCATION: GASTOPS ST.
CLIENT: CSV

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			FLOW	SEWER DATA						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	**22**	23	24	25	26	27	28	29	30	**31**
STREET	AREA ID	FROM	TO	UNIT TYPES				AREA	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha)						PEAK FLOW (L/s)	AREA (ha)		FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
				SF	SD	TH	APT	(ha)	IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM								L/s	(%)
													IND	CUM	IND	CUM	IND	CUM											
Street No. 1	A-1	Building	MH1A									0.00		0.00	0.69	0.69		0.00	0.33	2.41	2.41	0.80	1.13	27.52	22.10	150	3.00	1.509	26.39	95.90

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day	1.5
APT	2.3	p/p/u	COM	28,000	L/Ha/day	1.5
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
Harmon Formula = 1+(14/(4+P^0.5)*0.8)
where P = population in thousands

Designed: RP

Checked: AG

Project No.: CCO-24-2748

No.	Revision	Date
1.	Submission No. 1	9/12/2024

Sheet No:
1 of 1

APPENDIX E
STORMWATER CALCULATIONS

CO-24-2748 - Gastops Ltd - SWM Calculations

Tc (min)	Intensity (mm/hr)			
	2-Year	5-Year	100-Year	
20	51.6	70.3	120.0	PRE-DEVELOPMENT
10	76.5	104.2	178.6	POST-DEVELOPMENT

C-Values	
Impervious	0.90
Gravel	0.60
Pervious	0.20

Pre-Development Runoff Coefficient

Drainage Area	Impervious Area (m^2)	Gravel (m^2)	Pervious Area (m^2)	Average C (2-year)	Average C (5-year)	Average C (100-year)
A1	0	682	23,018	0.21	0.21	0.26

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 2-Year	C 5-Year	C 100-Year	Tc (min)	Q (L/s)		
						2-Year	5-Year	100-Year
A1	2.37	0.21	0.21	0.26	10	71.89	97.90	208.95

Post-Development Runoff Coefficient

Drainage Area	Impervious Area (m^2)	Gravel (m^2)	Pervious Area (m^2)	Average C (2-year)	Average C (5-year)	Average C (100-year)
B1	2,820	0	2,752	0.55	0.55	0.63
B2	3,355	0	0	0.90	0.90	1.00
B3	7,245	0	5,956	0.58	0.58	0.66
B4	0	0	938	0.20	0.20	0.25
B5	0	0	634	0.20	0.20	0.25

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 2-Year	C 5-Year	C 100-Year	Tc (min)	Q (L/s)			
						2-Year	5-Year	100-Year	
B1	0.557	0.55	0.55	0.63	10	65.69	89.46	174.14	*Restricted South East*
B2	0.336	0.90	0.90	1.00	10	64.23	87.46	166.54	*Restricted roof*
B3	1.320	0.58	0.58	0.66	10	164.04	223.37	433.55	*Restricted South West*
B4	0.094	0.20	0.20	0.25	10	3.99	5.43	11.64	*Unrestricted Limebank*
B5	0.063	0.20	0.20	0.25	10	2.70	3.67	7.87	*Unrestricted Gastops*
Total	2.37					300.65	409.40	793.73	

Required Restricted Flow

Drainage Area	Area (ha)	Q (L/s)
A1	2.37	54.00

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow			Restricted Flow			Storage Required (m^3)			Storage Provided (m^3)		
	2-year	5-year	100-Year	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year
B1	65.69	89.46	174.14	8.76	9.29	11.58	45.61	68.8	155.3	48.0	71.3	156.9
B2	64.23	87.46	166.54	3.24	4.32	7.56	63.38	86.9	166.8	75.5	100.7	176.1
B3	164.04	223.37	433.55	8.25	9.92	12.80	161.46	227.2	487.8	175.1	238.8	495.9
B4	3.99	5.43	11.64	3.99	5.43	11.64						
B5	2.70	3.67	7.87	2.70	3.67	7.87						
Total	300.65	409.40	793.73	26.94	32.64	51.45	270.45	382.84	809.95	298.52	410.73	828.96

Storage Requirements for Area B1

2-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
5	102.6	88.09	8.76	79.33	23.80
15	61.0	52.37	8.76	43.61	39.25
25	44.5	38.21	8.76	29.45	44.17
35	35.5	30.48	8.76	21.72	45.61
45	29.8	25.59	8.76	16.83	45.43

Maximum Storage Required 2-year =	46	m^3

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	89.46	9.29	80.17	48.10
25	60.9	52.29	9.29	43.00	64.50
40	44.2	37.95	9.29	28.66	68.78
55	35.1	30.14	9.29	20.85	68.79
70	29.4	25.24	9.29	15.95	67.00

Maximum Storage Required 5-year =	69	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	174.18	11.58	162.60	97.56
20	120.0	117.03	11.58	105.45	126.54
30	91.9	89.62	11.58	78.04	140.48
40	75.1	73.24	11.58	61.66	147.98
50	64.0	62.41	11.58	50.83	152.50
60	55.9	54.52	11.58	42.94	154.57
70	49.8	48.57	11.58	36.99	155.34
80	45.0	43.89	11.58	32.31	155.06
90	41.1	40.08	11.58	28.50	153.91
100	37.9	36.96	11.58	25.38	152.29

Maximum Storage Required 100-year =	155	m^3

2-Year Storm Event Storage Summary

		Water Elev. (m) =		91.8		
Location	INV. (in)	INV. (out)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
MH5	X	90.85	130.8	X	0.80	48.0

Storage Available (m^3) =	48.0	*
Storage Required (m^3) =	45.6	

5-Year Storm Event Storage Summary

		Water Elev. (m) =		91.96		
Location	T/G	INV. (out)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
MH5	X	90.85	160.9	X	0.96	71.3

Storage Available (m^3) =	71.3	*
Storage Required (m^3) =	68.8	

100-Year Storm Event Storage Summary

		Water Elev. (m) =		92.38		
Location	T/G	INV. (out)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
MH5	X	90.85	253.3	X	1.38	156.9

Storage Available (m^3) =	156.9	*
Storage Required (m^3) =	155.3	

*Available Storage calculated from AutoCAD IPEX LMF-105

Storage Requirements for Area B2

2-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B2	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	76.0	63.80	3.24	60.56	36.33
60	24.1	20.23	3.24	16.99	61.16
110	15.3	12.84	3.24	9.60	63.38
160	11.4	9.57	3.24	6.33	60.76
210	9.2	7.72	3.24	4.48	56.48

Maximum Storage Required 2-year =	63	m^3

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B2	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	87.47	4.32	83.15	49.89
40	44.2	37.10	4.32	32.78	78.68
70	29.4	24.68	4.32	20.36	85.51
100	22.4	18.80	4.32	14.48	86.90
130	18.3	15.36	4.32	11.04	86.12

Maximum Storage Required 5-year =	87	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B2	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	166.58	7.56	159.02	95.41
30	91.9	85.71	7.56	78.15	140.68
50	64.0	59.69	7.56	52.13	156.40
70	49.8	46.45	7.56	38.89	163.33
90	41.1	38.33	7.56	30.77	166.18
110	35.2	32.83	7.56	25.27	166.79
130	30.9	28.82	7.56	21.26	165.83
150	27.6	25.74	7.56	18.18	163.64
170	25.0	23.32	7.56	15.76	160.72
190	22.9	21.36	7.56	13.80	157.30

Maximum Storage Required 100-year =	167	m^3

2-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	2516.25	0.030	75.49

Storage Available (m^3) =	75.49
Storage Required (m^3) =	63.38

5-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	2516.25	0.040	100.65

Storage Available (m^3) =	100.65
Storage Required (m^3) =	86.90

100-Year Storm Event Storage Summary

Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	2516.25	0.070	176.14

Storage Available (m^3) =	176.14
Storage Required (m^3) =	166.79

*Area is 75% of the total roof area

Roof Drain Flow (B2)

Roof Drains Summary			
Type of Control Device	Watts Drainage - Accutrol Weir		
Number of Roof Drains	9		
	2-Year	5-Year	100-Year
Rooftop Storage (m^3)	75.49	100.65	176.14
Storage Depth (m)	0.030	0.040	0.070
Flow (Per Roof Drain) (L/s)	0.36	0.48	0.84
Total Flow (L/s)	3.24	4.32	7.56

Flow Rate Vs. Build-Up (One Weir)	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
35	0.42
40	0.48
45	0.54
50	0.60
55	0.66

*Roof Drain model to be Accutrol Weirs, See attached sheets

*Roof Drain Flow information taken from Watts Drainage website

CALCULATING ROOF FLOW EXAMPLES

1 roof drain during a 5 year storm
elevation of water = 25mm
Flow leaving 1 roof drain = (1 x 0.30 L/s) = 0.30 L/s

1 roof drain during a 100 year storm
elevation of water = 50mm
Flow leaving 1 roof drain = (1 x 0.60 L/s) = 0.60 L/s

4 roof drains during a 5 year storm
elevation of water = 25mm
Flow leaving 4 roof drains = (4 x 0.30 L/s) = 1.20 L/s

4 roof drains during a 100 year storm
elevation of water = 50mm
Flow leaving 4 roof drains = (4 x 0.60 L/s) = 2.40 L/s

Roof Drain Flow		
Flow (l/s)	Storage Depth (mm)	Drains Flow (l/s)
0.18	15	1.62
0.24	20	2.16
0.30	25	2.70
0.36	30	3.24
0.42	35	3.78
0.48	40	4.32
0.54	45	4.86
0.60	50	5.40
0.66	55	5.94
0.72	60	6.48
0.78	65	7.02
0.84	70	7.56
0.90	75	8.10
0.96	80	8.64
1.02	85	9.18
1.08	90	9.72
1.14	95	10.26
1.20	100	10.80
1.26	105	11.34
1.32	110	11.88
1.38	115	12.42
1.44	120	12.96
1.50	125	13.50
1.56	130	14.04
1.62	135	14.58
1.68	140	15.12
1.74	145	15.66
1.80	150	16.20

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

Storage Requirements for Area B3

2-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	166.0	355.88	8.25	347.63	0.00
50	27.6	59.17	8.25	50.92	152.76
100	16.4	35.16	8.25	26.91	161.46
150	12.0	25.73	8.25	17.48	157.29
200	9.6	20.58	8.25	12.33	147.97

Maximum Storage Required 2-year =	161	m^3

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	230.5	494.16	9.92	484.24	0.00
75	27.9	59.81	9.92	49.89	224.52
150	16.4	35.16	9.92	25.24	227.15
225	11.9	25.51	9.92	15.59	210.49
300	9.5	20.37	9.92	10.45	188.04

Maximum Storage Required 5-year =	227	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	433.65	12.80	420.85	252.51
85	43.0	104.41	12.80	91.61	467.19
160	26.2	63.61	12.80	50.81	487.82
235	19.3	46.86	12.80	34.06	480.27
310	15.5	37.63	12.80	24.83	461.93
385	13.0	31.56	12.80	18.76	433.46
460	11.3	27.44	12.80	14.64	403.98
535	10.0	24.28	12.80	11.48	368.52
610	9.0	21.85	12.80	9.05	331.32
685	8.1	19.67	12.80	6.87	282.24

Maximum Storage Required 100-year =	488	m^3

2-Year Storm Event Storage Summary

		Water Elev. (m) =		91.26		
Location	T/G	INV. (out)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
MH6	X	90.91	1043.1	X	0.23	175.1

Storage Available (m^3) = 175.1 *
Storage Required (m^3) = 161.5

5-Year Storm Event Storage Summary

		Water Elev. (m) =		91.32		
Location	T/G	INV. (out)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
MH6	X	90.91	1081.9	X	0.28	238.8

Storage Available (m^3) = 238.8 *
Storage Required (m^3) = 227.2

100-Year Storm Event Storage Summary

		Water Elev. (m) =		91.55		
Location	T/G	INV. (out)	Area (m^2)	Depth (m)	Head (m)	Volume (m^3)
MH6	X	90.93	1212.9	X	0.49	495.9

Storage Available (m^3) = 495.9 *
Storage Required (m^3) = 487.8

*Available Storage calculated from AutoCAD IPEX Type A

Time of Concentration Pre-Development

Drainage Area ID	Sheet Flow Distance (m)	Slope of Land (%)	Tc (min) (5-Year)	Tc (min) (100-Year)
A1	75	1.00	25	24

Therefore, a Tc of 20 can be used

Tc= (3.26(1.1-c)L^0.5/S^0.33)

c = Balanced Runoff Coefficient

L = Length of drainage area

S = Average slope of watershed

STORM SEWER DESIGN SHEET

PROJECT: CCO-24-2748
LOCATION: Gastops St
CLIENT: CSV

LOCATION				CONTRIBUTING AREA (ha)				RATIONAL DESIGN FLOW										SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
STREET	AREA ID	FROM MH	TO MH	C-VALUE	AREA	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																					DIA	W	H			(L/s)	(%)
	B1	CB1	CBMH1	0.84	0.15	0.13	0.13	10.00	0.15	10.15	104.19	122.14	178.56	36.86	43.21	63.17		36.86	41.15	7.30	250			0.44	0.812	4.29	10.43%
	B1	CB2	MAIN	0.86	0.11	0.09	0.09	10.00	0.16	10.16	104.19	122.14	178.56	27.40	32.12	46.96		27.40	36.70	7.00	250			0.35	0.724	9.30	25.34%
	B1	CB3	MAIN	0.90	0.08	0.07	0.07	10.16	0.19	10.35	103.35	121.15	177.10	20.69	24.25	35.45		20.69	36.70	8.40	250			0.35	0.724	16.02	43.64%
	B1	CBMH1	OGS1				0.29	10.15	1.91	12.06	103.41	121.22	177.20	84.48	99.03	144.76		84.48	91.46	92.14	375			0.25	0.802	6.98	7.63%
	B1	OGS1	MH2				0.29	12.06	0.02	12.08	94.42	110.64	161.66	77.14	90.38	132.07		77.14	304.42	3.30	375			2.77	2.670	227.29	74.66%
	B1	LCB6	LCB7	0.35	0.02	0.01	0.01	10.00	0.64	10.64	104.19	122.14	178.56	1.52	1.78	2.61		1.52	45.16	34.00	250			0.53	0.891	43.64	96.63%
	B1	LCB7	LCB8	0.35	0.07	0.03	0.03	10.64	0.53	11.17	100.95	118.32	172.95	8.58	10.05	14.69		8.58	48.06	30.20	250			0.60	0.948	39.48	82.16%
	B1	LCB8	LCB9	0.22	0.05	0.01	0.04	11.17	0.56	11.73	98.41	115.33	168.56	11.39	13.34	19.50		11.39	34.54	23.00	250			0.31	0.682	23.16	67.03%
	B1	LCB9	E POND	0.20	0.06	0.01	0.05	11.73	0.45	12.17	95.87	112.34	164.16	14.29	16.75	24.47		14.29	44.30	23.40	250			0.51	0.874	30.01	67.74%
	B1	E POND	MH2	0.20	0.03	0.01	0.35	10.00	0.04	10.04	104.19	122.14	178.56	102.59	120.26	175.80		102.59	105.81	3.70	300			1.10	1.450	3.22	3.04%
	B1	MH2	GASTOPS ST				0.65	10.04	0.08	10.13	103.97	121.88	178.17	187.30	219.56	320.98	11.58	11.58	145.18	6.40	375			0.63	1.273	133.60	92.02%
	B2	BUILDING	GASTOPS ST	1.00	0.34	0.34	0.34	10.00	0.37	10.37	104.19	122.14	178.56	97.18	113.92	166.54	7.56	97.18	123.55	38.00	300			1.50	1.693	26.37	21.35%
	B3	DICB1	OGS2	0.91	0.38	0.34	0.34	10.00	0.07	10.07	104.19	122.14	178.56	99.21	116.31	170.03		99.21	121.33	4.50	375			0.44	1.064	22.12	18.23%
	B3	OGS2	W POND				0.34	10.07	0.26	10.33	103.82	121.70	177.92	98.86	115.89	169.42		98.86	114.23	15.40	375			0.39	1.002	15.37	13.45%
	B3	LCB6	LCB5	0.25	0.07	0.02	0.02	10.00	0.75	10.75	104.19	122.14	178.56	5.34	6.26	9.15		5.34	33.98	30.00	250			0.30	0.671	28.64	84.29%
	B3	LCB5	LCB4	0.23	0.12	0.03	0.05	10.75	0.64	11.39	100.41	117.69	172.02	13.09	15.34	22.42		13.09	33.98	25.80	250			0.30	0.671	20.89	61.49%
	B3	LCB4	LCB3	0.20	0.16	0.03	0.08	11.39	0.64	12.03	97.40	114.14	166.80	21.19	24.84	36.30		21.19	33.98	25.80	250			0.30	0.671	12.79	37.63%
	B3	LCB3	LCB2	0.20	0.16	0.03	0.11	12.03	0.64	12.66	94.58	110.82	161.93	28.94	33.91	49.55		28.94	33.98	25.60	250			0.30	0.671	5.04	14.83%
	B3	LCB2	LCB1	0.20	0.12	0.02	0.13	12.66	0.55	13.21	91.95	107.73	157.39	34.27	40.15	58.66		34.27	55.26	24.90	300			0.30	0.757	20.98	37.97%
	B3	LCB1	LCB0	0.20	0.06	0.01	0.15	13.21	0.55	13.77	89.82	105.21	153.70	36.47	42.73	62.42		36.47	55.26	25.20	300			0.30	0.757	18.78	33.99%
	B3	LCB0	W POND	0.20	0.08	0.02	0.16	13.77	0.56	14.32	87.76	102.80	150.16	39.40	46.15	67.41		39.40	55.26	25.30	300			0.30	0.757	15.86	28.70%
	B3	W POND	MH1	0.20	0.27	0.05	0.56	10.00	0.04	10.04	104.19	122.14	178.56	161.37	189.17	276.55		161.37	212.41	2.80	450			0.51	1.294	51.04	24.03%
	B3	MH1	GASTOPS				0.56	10.04	0.15	10.18	104.00	121.92	178.23	161.08	188.83	276.04	12.80	12.80	55.26	6.70	300			0.30	0.757	42.46	76.83%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed:
RP

Checked:
AG

Project No.:
CCO-24-2748

No.	Revision	Date
1.	Submission 1	2/10/2025

Date: 2/10/2025

Sheet No: 1 of 1

Volume III: TEMPEST INLET CONTROL DEVICES

Municipal Technical Manual Series

SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

MHF (Medium to High Flow) ICD

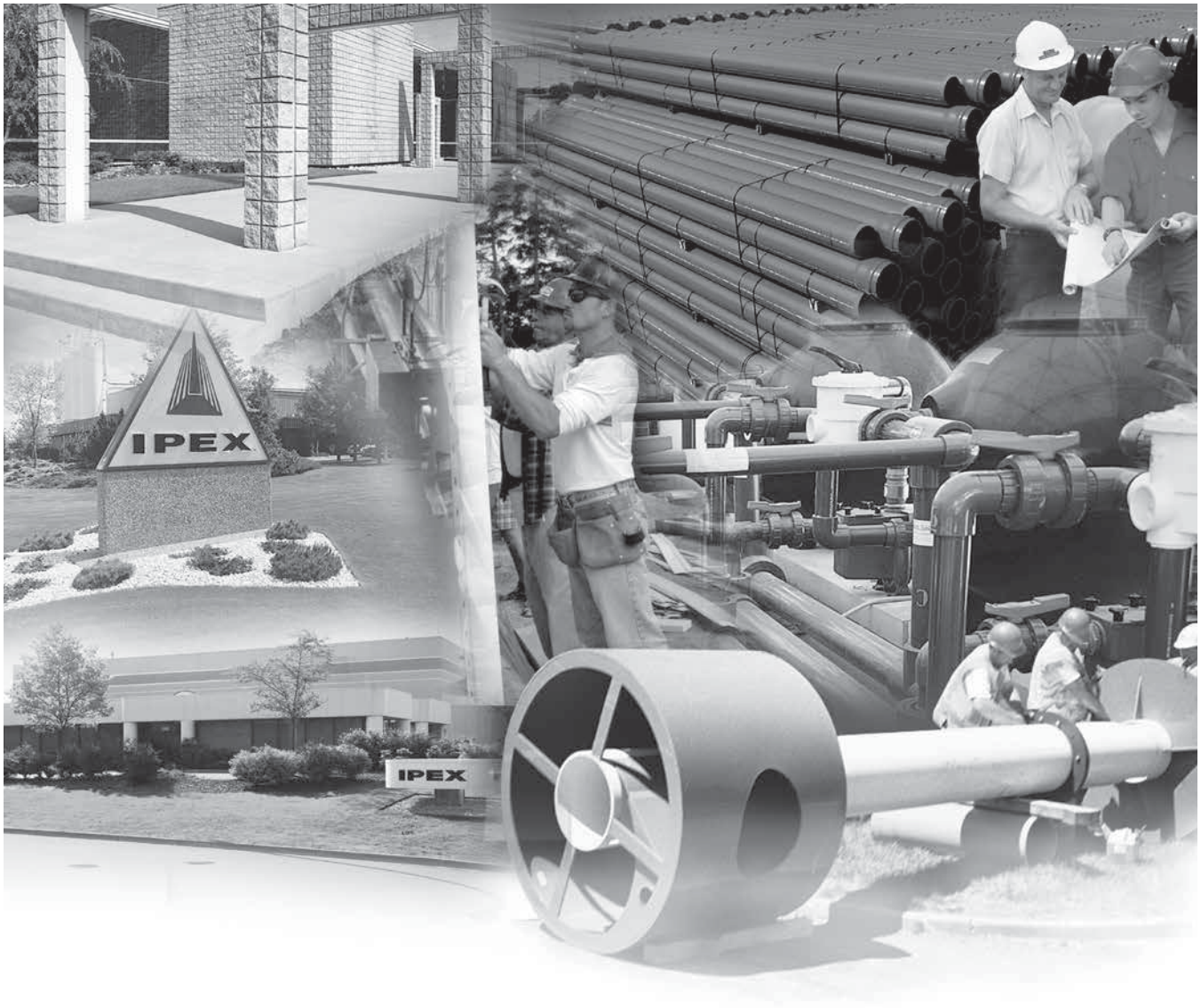
IPEX
by aliaxis

IPEX Tempest™ Inlet Control Devices

Municipal Technical Manual Series

Vol. I, 2nd Edition

For information contact: IPEX, Marketing,
1425 North Service Road East, Oakville, Ontario, Canada, L6H 1A7



ABOUT IPEX

At IPEX, we have been manufacturing non-metallic pipe and fittings since 1951. We formulate our own compounds and maintain strict quality control during production. Our products are made available for customers thanks to a network of regional stocking locations throughout North America. We offer a wide variety of systems including complete lines of piping, fittings, valves and custom-fabricated items.

More importantly, we are committed to meeting our customers' needs. As a leader in the plastic piping industry, IPEX continually develops new products, modernizes manufacturing facilities and acquires innovative process technology. In addition, our staff take pride in their work, making available to customers their extensive thermoplastic knowledge and field experience. IPEX personnel are committed to improving the safety, reliability and performance of thermoplastic materials. We are involved in several standards committees and are members of and/or comply with the organizations listed on this page.

For specific details about any IPEX product, contact our customer service department.

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PRODUCT INFORMATION: TEMPEST LOW, MEDIUM FLOW (LMF) ICD

Purpose

To control the amount of storm water runoff entering a sewer system by allowing a specified flow volume out of a catch basin or manhole at a specified head. This approach conserves pipe capacity so that catch basins downstream do not become uncontrollably surcharged, which can lead to basement floods, flash floods and combined sewer overflows.

Product Description

Our LMF ICD is designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter and larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 14 preset flow curves, the LMF ICD has the ability to provide flow rates: 2lps – 17lps (31gpm – 270gpm)

Product Function

The LMF ICD vortex flow action allows the LMF ICD to provide a narrower flow curve using a larger orifice than a conventional orifice plate ICD, making it less likely to clog. When comparing flows at the same head level, the LMF ICD has the ability to restrict more flow than a conventional ICD during a rain event, preserving greater sewer capacity.

Product Construction

Constructed from durable PVC, the LMF ICD is light weight 8.9 Kg (19.7 lbs).

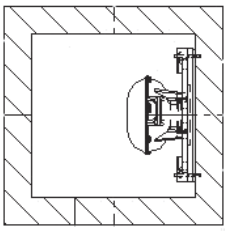
Product Applications

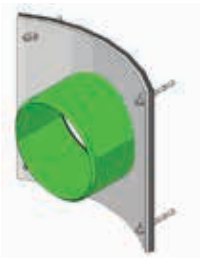
Will accommodate both square and round applications:

Square Application

Round Application

Universal Mounting Plate





+

Spigot CB Wall Plate

=

Universal Mounting Plate Hub Adapter

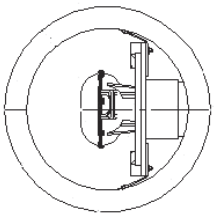


Chart 1: LMF 14 Preset Flow Curves

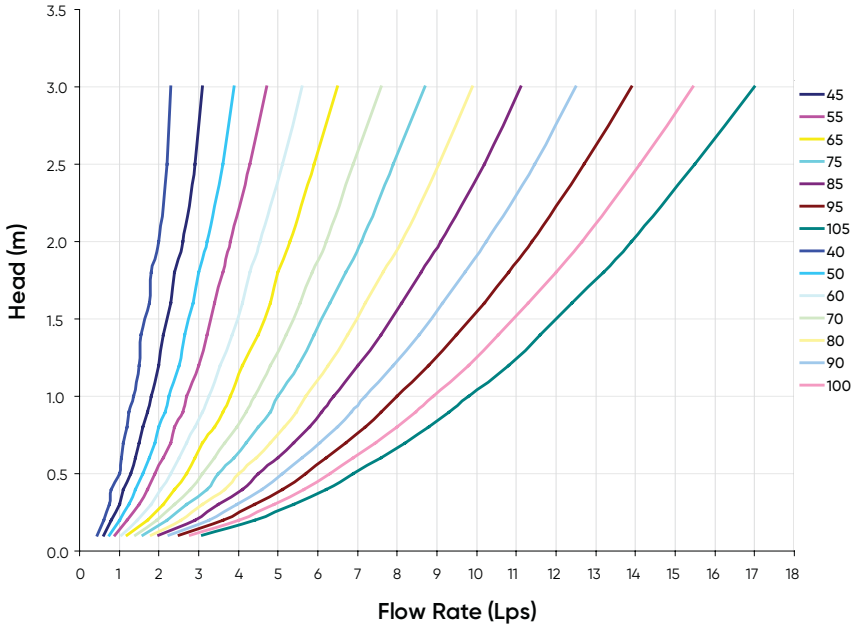
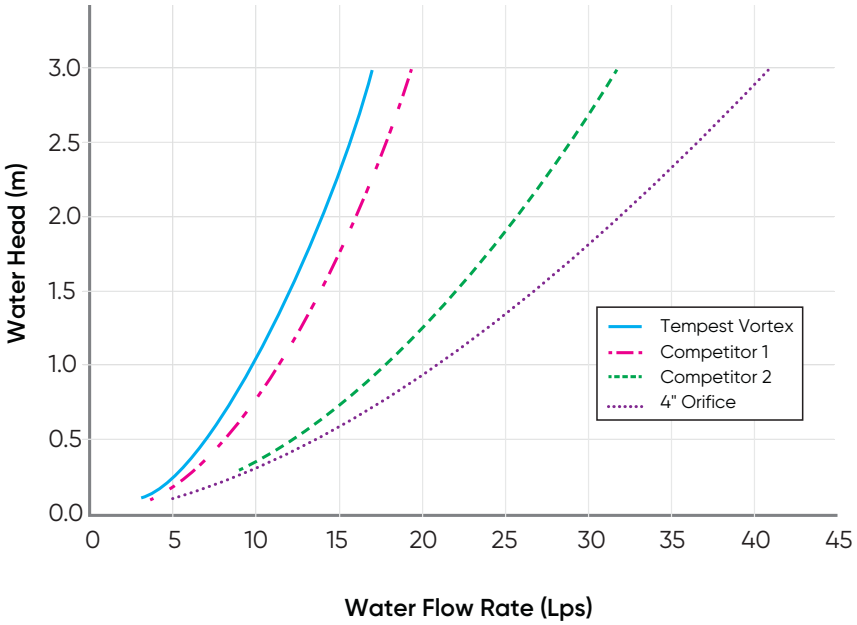


Chart 2: LMF Flow vs. ICD Alternatives



PRODUCT INSTALLATION

Instructions to assemble a TEMPEST LMF ICD into a Square Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device.
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST LMF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut back the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at ipexna.com.
- Call your IPEX representative for more information or if you have any questions about our products.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

Product Description

Our HF, HF Sump and MHF ICD's are designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter or larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 5 preset flow curves, these ICDs have the ability to provide constant flow rates: 9lps (143 gpm) and greater

Product Function

TEMPEST HF (High Flow): designed to manage moderate to higher flows 15 L/s (240 gpm) or greater and prevent the propagation of odour and floatables. With this device, the cross-sectional area of the device is larger than the orifice diameter and has been designed to limit head losses. The HF ICD can also be ordered without flow control when only odour and floatable control is required.

TEMPEST HF (High Flow) Sump: The height of a sewer outlet pipe in a catch basin is not always conveniently located. At times it may be located very close to the catch basin floor, not providing enough sump for one of the other TEMPEST ICDs with universal back plate to be installed. In these applications, the HF Sump is offered. The HF Sump offers the same features and benefits as the HF ICD; however, is designed to raise the outlet in a square or round catch basin structure. When installed, the HF sump is fixed in place and not easily removed. Any required service to the device is performed through a clean-out located in the top of the device which can be often accessed from ground level.

TEMPEST MHF (Medium to High Flow): The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

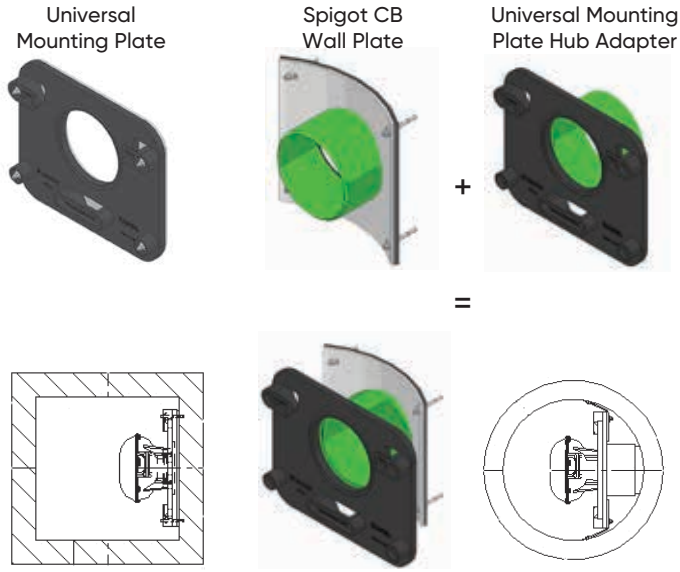
Product Construction

The HF, HF Sump and MHF ICDs are built to be light weight at a maximum weight of 6.8 Kg (14.6 lbs).

Product Applications

The HF and MHF ICD's are available to accommodate both square and round applications:

Square Application **Round Application**



The HF Sump is available to accommodate low to no sump applications in both square and round catch basins:

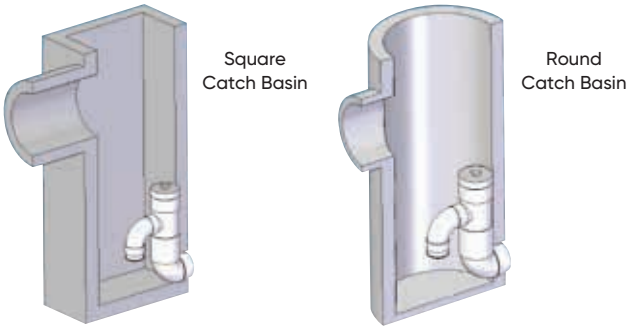
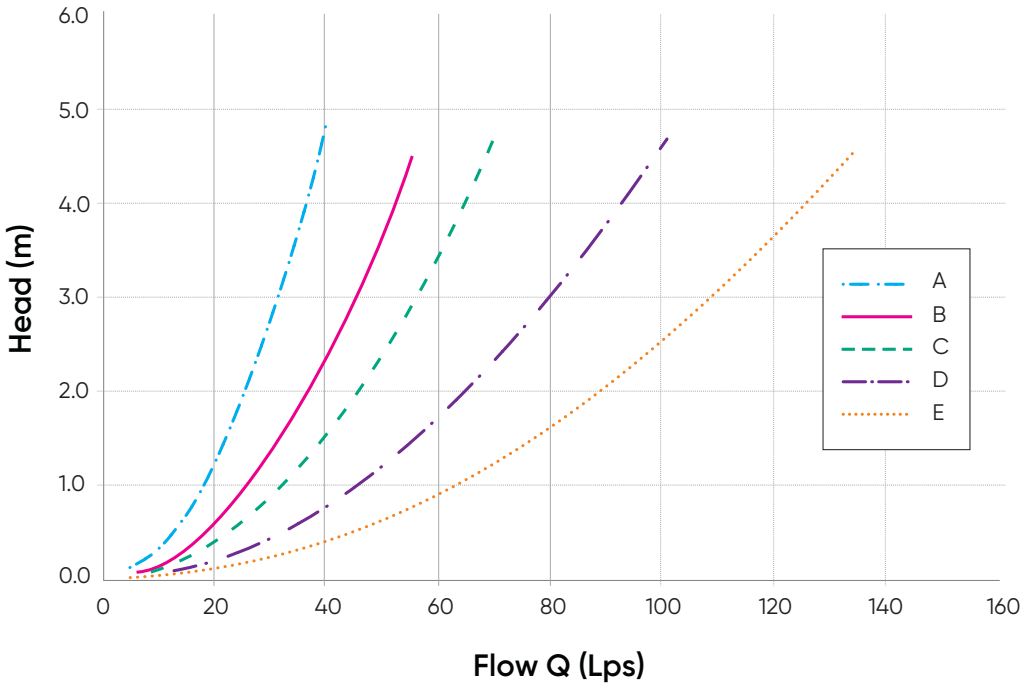


Chart 3: HF & MHF Preset Flow Curves



PRODUCT INSTALLATION

Instructions to assemble a TEMPEST HF or MHF ICD into a Square Catch Basin:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal wall mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF or MHF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the round catch basin spigot adaptor to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the spigot CB wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot CB wall plate and the catch basin wall.
6. Put solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

Instructions to assemble a TEMPEST HF Sump into a Square or Round Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, mastic tape and metal strapping
   - Material: (2) concrete anchor 3/8 x 3-1/2, (2) washers, (2) nuts, HF Sump pieces (2).
2. Apply solvent cement to the spigot end of the top half of the sump. Apply solvent cement to the hub of the bottom half of the sump. Insert the spigot of the top half of the sump into the hub of the bottom half of the sump.
3. Install the 8" spigot of the device into the outlet pipe. Use the mastic tape to seal the device spigot into the outlet pipe. You should use a level to be sure that the fitting is standing at the vertical.
4. Use an impact drill with a 3/8" concrete bit to make a series of 2 holes along each side of the body throat. The depth of the hole should be between 1-1/2" to 2-1/2". Clean the concrete dust from the 2 holes.
5. Install the anchors (2) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you hit the anchors. Remove the nuts from the ends of the anchors.
6. Cut the metal strapping to length and connect each end of the strapping to the anchors. Screw the nuts in place with a maximum torque of 40 N.m (30 lbf-ft). The device should be completely flush with the catch basin wall.

⚠ WARNING

- **Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.**
- **The solvent cement which is used in this installation is to be approved for PVC.**
- **The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.**
- **Call your IPEX representative for more information or if you have any questions about our products.**

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook shall be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above shall not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices shall consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

NOTES

SALES AND CUSTOMER SERVICE

IPEX Inc.
Toll Free: (866) 473-9462
ipexna.com

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

Products manufactured by IPEX Inc.
Tempest™ is a trademark of IPEX Branding Inc.

IPEX by aliaxis

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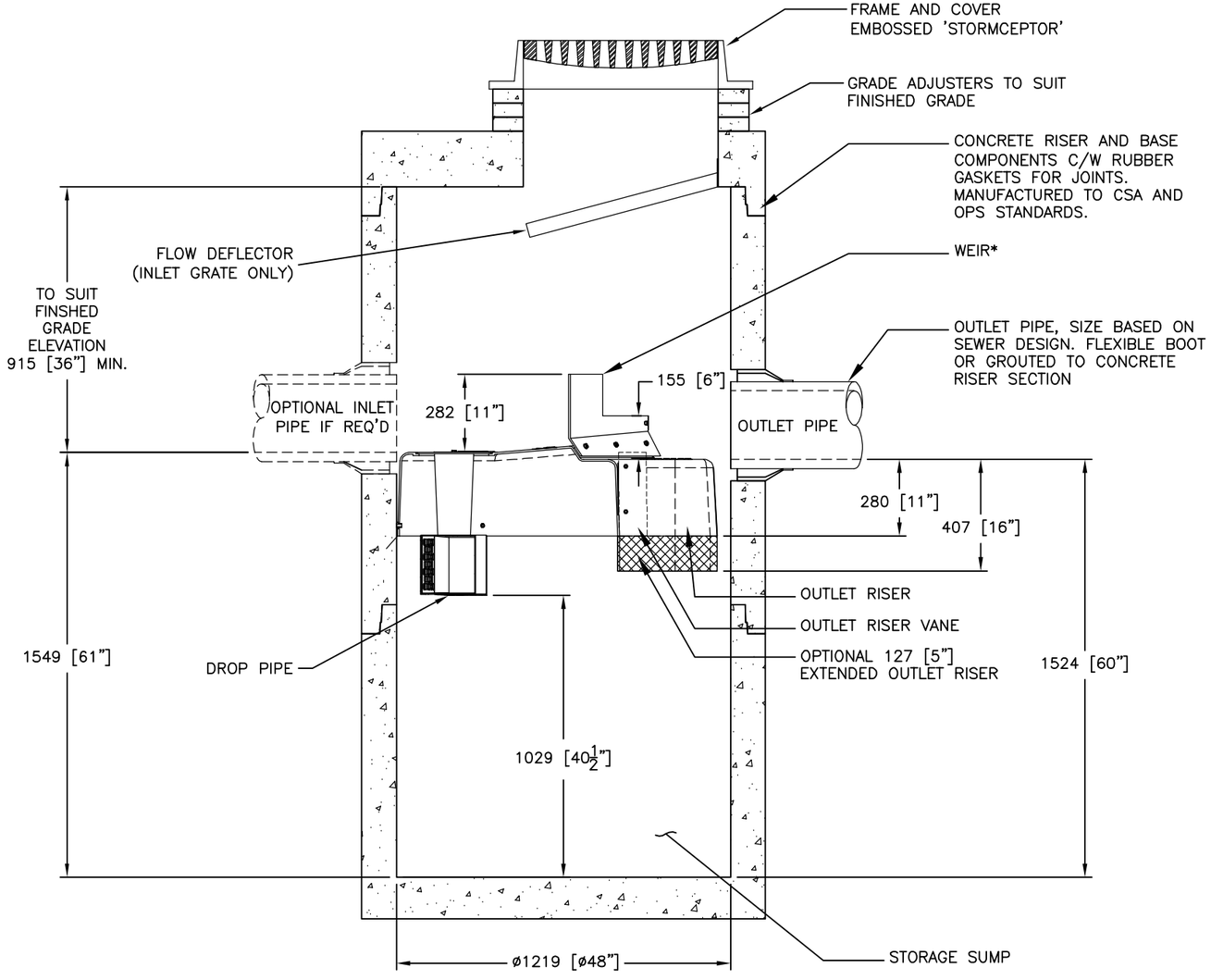
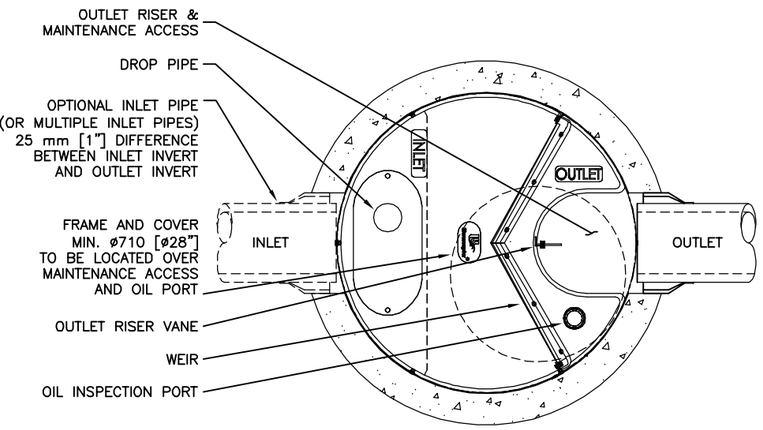
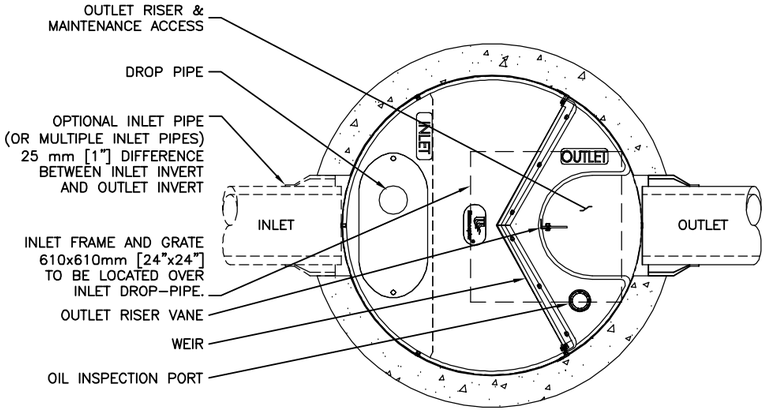


SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF4 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO4 (OIL CAPTURE CONFIGURATION). WEIR HEIGHT IS 150 mm (6 INCH) FOR EF04.

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

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 STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO4
STRUCTURE ID	*
HYDROCARBON STORAGE REQ'D (L)	*
WATER QUALITY FLOW RATE (L/s)	*
PEAK FLOW RATE (L/s)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
DRAINAGE AREA (HA)	*
DRAINAGE AREA IMPERVIOUSNESS (%)	*

PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

MARK	DATE	REVISION DESCRIPTION	BY
1	6/8/18	UPDATES	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON, L1N 9A9
TF 800-565-4501 CA 416-800-9000 INTL +1-416-800-9000

DATE: 10/13/2017

DESIGNED:	DRAWN:
JSK	JSK
CHECKED:	APPROVED:
BSF	SP
PROJECT No.:	SEQUENCE No.:
EFO4	*

SHEET: 1 OF 1

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Stormceptor® EF4 and EFO4 Oil-Grit Separators

Developed by Imbrium Systems, Inc.,
Whitby, Ontario, Canada

In accordance with

ISO 14034:2016

Environmental management —
Environmental technology verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

November 10, 2017
Vancouver, BC, Canada

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

Technology description and application

The Stormceptor® EF4 and EFO4 are treatment devices designed to remove oil, sediment, trash, debris, and pollutants attached to particulates from Stormwater and snowmelt runoff. The device takes the place of a conventional manhole within a storm drain system and offers design flexibility that works with various site constraints. The EFO4 is designed with a shorter bypass weir height, which accepts lower surface loading rate into the sump, thereby reducing re-entrainment of captured free floating light liquids.

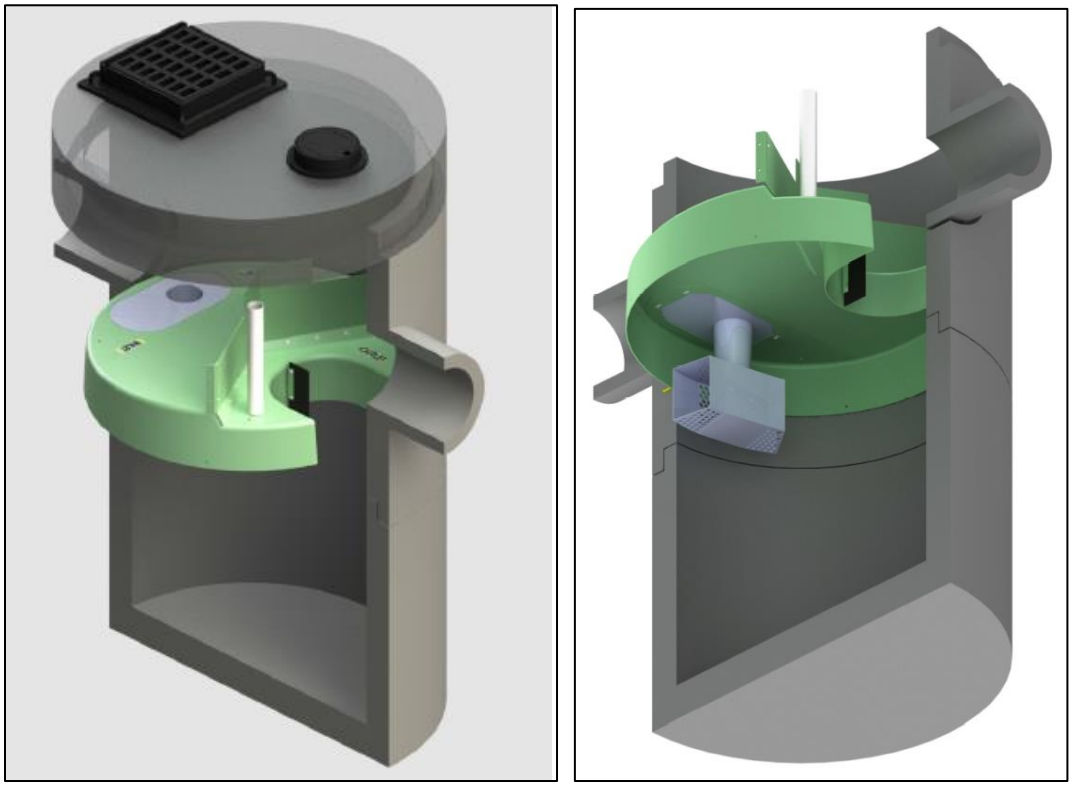


Figure 1. Graphic of typical inline Stormceptor® unit and core components.

Stormwater and snowmelt runoff enters the Stormceptor® EF/EFO's upper chamber through the inlet pipe(s) or a surface inlet grate. An insert divides the unit into lower and upper chambers and incorporates a weir to reduce influent velocity and separate influent (untreated) from effluent (treated) flows. Influent water ponds upstream of the insert's weir providing driving head for the water flowing downwards into the drop pipe where a vortex pulls the water into the lower chamber. The water diffuses at lower velocities in multiple directions through the drop pipe outlet openings. Oil and other floatables rise up and are trapped beneath the insert, while sediments undergo gravitational settling to the sump's bottom. Water from the sump can exit by flowing upward to the outlet riser onto the top side of the insert and downstream of the weir, where it discharges through the outlet pipe.

Maximum flow rate into the lower chamber is a function of weir height and drop pipe orifice diameter. The Stormceptor® EF and EFO are designed to allow a surface loading rate of 1135 L/min/m^2 (27.9 gal/min/ft^2) and 535 L/min/m^2 (13.1 gal/min/ft^2) into the lower chamber, respectively. When prescribed surface loading rates are exceeded, ponding water can overtop the weir height and bypass the lower treatment chamber, exiting directly through the outlet pipe. Hydraulic testing and scour testing demonstrate that the internal bypass effectively prevents scour at all bypass flow rates. Increasing the bypass flow rate does not increase the orifice-controlled flow rate into the lower treatment chamber where sediment is stored. This internal bypass feature allows for in-line installation, avoiding the cost of

additional bypass structures. During bypass, treatment continues in the lower chamber at the maximum flow rate. The Stormceptor® EFO's lower design surface loading rate is favorable for minimizing re-entrainment and washout of captured light liquids. Inspection of Stormceptor® EF and EFO devices is performed from grade by inserting a sediment probe through the outlet riser and an oil dipstick through the oil inspection pipe. The unit can be maintained by using a vacuum hose through the outlet riser.

Performance conditions

The data and results published in this Technology Fact Sheet were obtained from the testing program conducted on the Imbrium Systems Inc.'s Stormceptor® OGS device, in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014). The Procedure was prepared by the Toronto and Region Conservation Authority (TRCA) for Environment Canada's Environmental Technology Verification (ETV) Program. A copy of the Procedure may be accessed on the Canadian ETV website at www.etvcanada.ca.

Performance claim(s)

Capture test[a]:

During the capture test, the Stormceptor® EF OGS device, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 46, 44, and 49 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Stormceptor® EFO, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 42, 40, and 34 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Scour test[a]:

During the scour test, the Stormceptor® EF and Stormceptor® EFO OGS devices, with 10.2 cm (4 inches) of test sediment pre-loaded onto a false floor reaching 50% of the manufacturer's recommended maximum sediment storage depth, generate corrected effluent concentrations of 4.6, 0.7, 0, 0.2, and 0.4 mg/L at 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Light liquid re-entrainment test[a]:

During the light liquid re-entrainment test, the Stormceptor® EFO OGS device with surrogate low-density polyethylene beads preloaded within the lower chamber oil collection zone, representing a floating light liquid volume equal to a depth of 50.8 mm over the sedimentation area, retained 100, 99.5, 99.8, 99.8, and 99.9 percent of loaded beads by mass during the 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2.

[a] The claim can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)

Performance results

The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the testing procedure. The *Procedure for Laboratory Testing of Oil Grit Separators* requires that the three sample average of the test sediment particle size distribution (PSD) meet the specified PSD percent less than values within a boundary threshold of 6%. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 2 indicates that the test sediment used for the capture and scour tests met this condition.

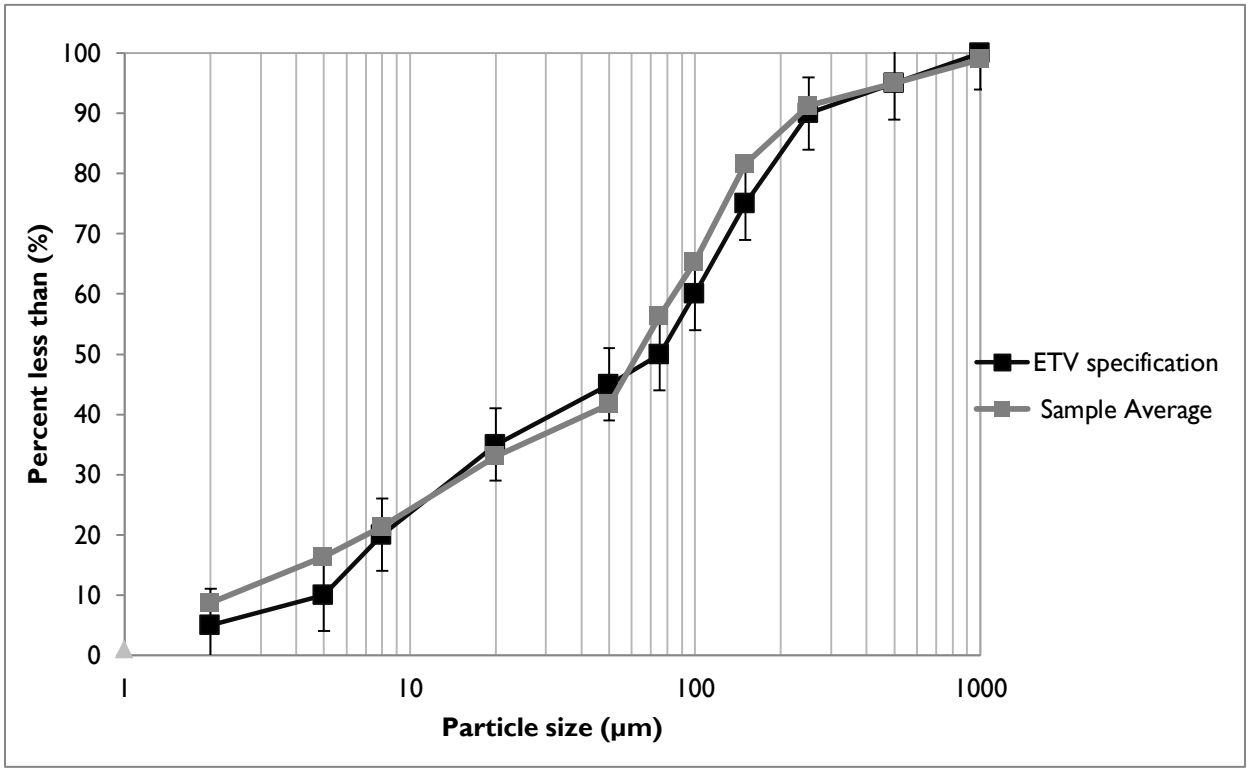


Figure 2. The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD.

The capacity of the device to retain sediment was determined at seven surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1). Since the EF and EFO models are identical except for the weir height, which bypasses flows from the EFO model at a surface loading rate of 535 L/min/m^2 (13.1 gpm/ft^2), sediment capture tests at surface loading rates from 40 to 400 L/min/m^2 were only performed on the EF unit. Surface loading rates of 600, 1000, and 1400 L/min/m^2 were tested on both units separately. Results for the EFO model at these higher flow rates are presented in Table 2.

In some instances, the removal efficiencies were above 100% for certain particle size fractions. These discrepancies are not unique to any one test laboratory and may be attributed to errors relating to the blending of sediment, collection of representative samples for laboratory submission, and laboratory

analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for "all particle sizes by mass balance" (see Table 1 and 2) are based on measurements of the total injected and retained sediment mass, and are therefore not subject to blending, sampling or PSD analysis errors.

Table 1. Removal efficiencies (%) of the EF4 at specified surface loading rates

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**						
	40	80	200	400	600	1000	1400
>500	90	58	58	100*	86	72	100*
250 - 500	100*	100*	100	100*	100*	100*	100*
150 - 250	90	82	26	100*	100*	67	90
105 - 150	100*	100*	100*	100*	100*	100*	100
75 - 105	100*	92	74	82	77	68	76
53 - 75	Undefined [a]	56	100*	72	69	50	80
20 - 53	54	100*	54	33	36	40	31
8 - 20	67	52	25	21	17	20	20
5 – 8	33	29	11	12	9	7	19
<5	13	0	0	0	0	0	4
All particle sizes by mass balance	**70.4**	**63.8**	**53.9**	**47.5**	**46.0**	**43.7**	**49.0**

[a] An outlier in the feed sample sieve data resulted in a negative removal efficiency for this size fraction.
* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 101 and 171% (average 128%). See text and Bulletin # CETV 2016-11-0001 for more information.

Table 2. Removal efficiencies (%) of the EFO4 at surface loading rates above the bypass rate of 535 L/min/m²

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**		
	600	1000	1400
>500	89	83	100*
250 - 500	90	100*	92
150 - 250	90	67	100*
105 - 150	85	92	77
75 - 105	80	71	65
53 - 75	60	31	36
20 - 53	33	43	23
8 - 20	17	23	15
5 – 8	10	3	3
<5	0	0	0
All particle sizes by mass balance	**41.7**	**39.7**	**34.2**

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 103 and 111% (average 107%). See text and Bulletin # CETV 2016-11-0001 for more information.

Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the sediment retained by the EF4 at each of the tested surface loading rates. Figure 4 shows the same graph for the EFO4 unit at surface loading rates above the bypass rate of 535 L/min/m².

As expected, the capture efficiency for fine particles in both units was generally found to decrease as surface loading rates increased.

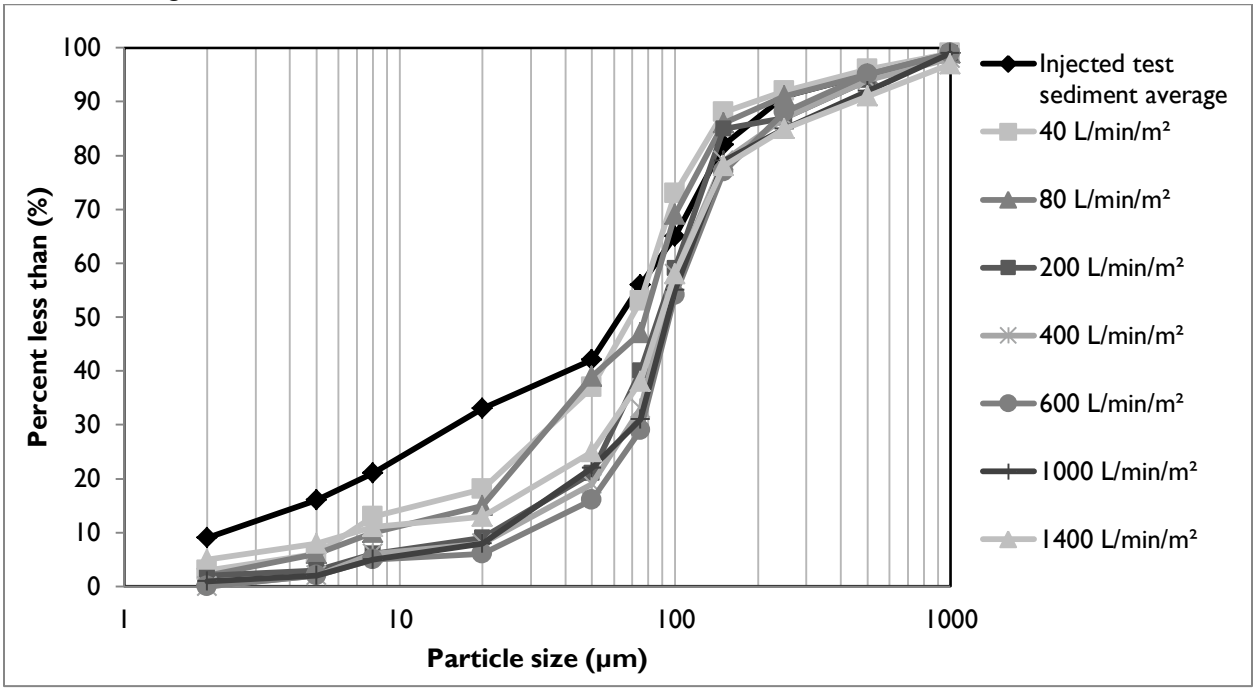


Figure 3. Particle size distribution of sediment retained in the EF4 in relation to the injected test sediment average.

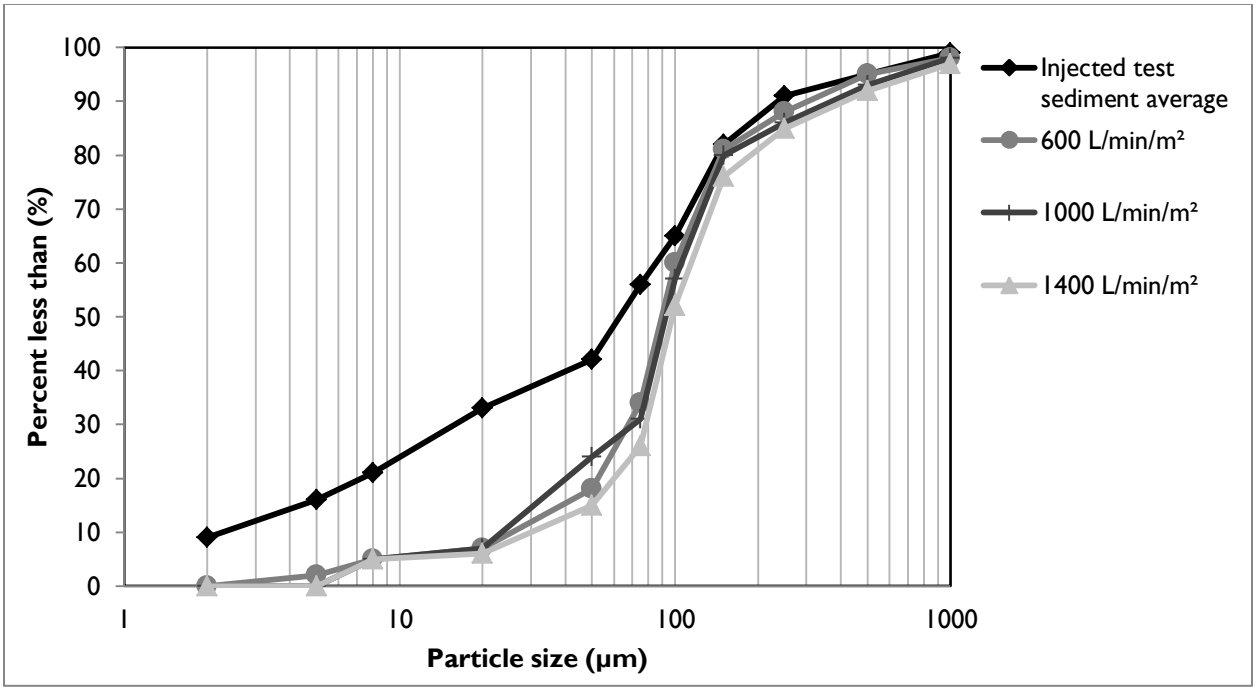


Figure 4. Particle size distribution of sediment retained in the EFO4 in relation to the injected test sediment average at surface loading rates above the bypass rate of 535 L/min/m²

Table 4 shows the results of the sediment scour and re-suspension test for the EF4 unit. The EFO4 was not tested as it was reasonably assumed that scour rates would be lower given that flow bypass occurs at a lower surface loading rate. The scour test involved preloading 10.2 cm of fresh test sediment into

the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Clean water was run through the device at five surface loading rates over a 30 minute period. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water. Typically, the smallest 5% of particles captured during the 40 L/min/m^2 sediment capture test is also used to adjust the concentration, as per the method described in Bulletin # CETV 2016-09-0001. However, since the composites of effluent concentrations were below the Reporting Detection Limit of the Laser Diffraction PSD methodology, this adjustment was not made. Results showed average adjusted effluent sediment concentrations below 5 mg/L at all tested surface loading rates.

It should be noted that the EF4 starts to internally bypass water at 1135 L/min/m^2, potentially resulting in the dilution of effluent concentrations, which would not normally occur under typical field conditions because the field influent concentration would contain a much higher sediment concentration than during the lab test. Recalculation of effluent concentrations to account for dilution at surface loading rates above the bypass rate showed sediment effluent concentrations to be below 1.6 mg/L.

Table 4. Scour test adjusted effluent sediment concentration.

Run	Surface loading rate (L/min/m^2)	Run time (min)	Background sample concentration (mg/L)	Adjusted effluent suspended sediment concentration (mg/L) [a]	Average (mg/L)
1	200	1:00	<RDL	11.9	4.6
		2:00		7.0	
		3:00		4.4	
		4:00		2.2	
		5:00		1.0	
		6:00		1.2	
2	800	7:00	<RDL	1.1	0.7
		8:00		0.9	
		9:00		0.6	
		10:00		1.4	
		11:00		0.1	
		12:00		0	
3	1400	13:00	<RDL	0	0
		14:00		0.1	
		15:00		0	
		16:00		0	
		17:00		0	
		18:00		0	
4	2000	19:00	1.2	0.2	0.2
		20:00		0	
		21:00		0	
		22:00		0.7	
		23:00		0	

		24:00		0.4	
5	2600	25:00	1.6	0.3	0.4
		26:00		0.4	
		27:00		0.7	
		28:00		0.4	
		29:00		0.2	
		30:00		0.4	

[a] The adjusted effluent suspended sediment concentration represents the actual measured effluent concentration minus the background concentration. For more information see Bulletin # CETV 2016-09-0001.

The results of the light liquid re-entrainment test used to evaluate the unit's capacity to prevent re-entrainment of light liquids are reported in Table 5. The test involved preloading 58.3 L (corresponding to a 5 cm depth over the collection sump area of 1.17m^2) of surrogate low-density polyethylene beads within the oil collection skirt and running clean water through the device continuously at five surface loading rates (200, 800, 1400, 2000, and 2600 L/min/m^2). Each flow rate was maintained for 5 minutes with approximately 1 minute transition time between flow rates. The effluent flow was screened to capture all re-entrained pellets throughout the test.

Table 5. Light liquid re-entrainment test results for the EFO4.

Surface Loading Rate (L/min/m2)	Time Stamp	Amount of Beads Re-entrained			
		Mass (g)	Volume (L)[a]	% of Pre-loaded Mass Re-entrained	% of Pre-loaded Mass Retained
200	62	0	0	0.00	100
800	247	168.45	0.3	0.52	99.48
1400	432	51.88	0.09	0.16	99.83
2000	617	55.54	0.1	0.17	99.84
2600	802	19.73	0.035	0.06	99.94
Total Re-entrained		295.60	0.525	0.91	--
Total Retained		32403	57.78	--	99.09
Total Loaded		32699	58.3	--	--

[a] Determined from bead bulk density of 0.56074 g/cm^3

Variances from testing Procedure

The following minor deviations from the *Procedure for Laboratory Testing of Oil-Grit Separators* (Version 3.0, June 2014) have been noted:

1. During the capture test, the 40 L/min/m^2 and 80 L/min/m^2 surface loading rates were evaluated over 3 and 2 days respectively due to the long duration needed to feed the required minimum of 11.3 kg of test sediment into the unit at these lower flow rates. Pumps were shut down at the end of each intermediate day, and turned on again the following morning. The target flow rate was re-established within 30 seconds of switching on the pump. This procedure may have allowed sediments to be captured that otherwise may have exited the unit if the test was

continuous. On the basis of practical considerations, this variance was approved by the verifier prior to testing.

2. During the scour test, the coefficient of variation (COV) for the lowest flow rate tested (200 L/min/m^2) was 0.07, which exceeded the specified limit of 0.04 target specified in the OGS Procedure. A pump capable of attaining the highest flow rate of 3036 L/min had difficulty maintaining the lowest flow of 234 L/min but still remained within +/- 10% of the target flow and is viewed as having very little impact on the observed results. Similarly, for the light liquid re-entrainment test the COV for the flow rate of the 200 L/min/m^2 run was 0.049, exceeding the limit of 0.04, but is believed to introduce negligible bias.

3. Due to pressure build up in the filters, the runs at 1000 L/min/m^2 for the Stormceptor® EF4 and 1000 and 1400 L/min/m^2 for the Stormceptor® EFO4 were slightly shorter than the target. The run times were 54, 59 and 43 minutes respectively, versus targets of 60 and 50 minutes. The final feed samples were timed to coincide with the end of the run. Since >25 lbs of sediment was fed, the shortened time did not invalidate the runs.

Verification

The verification was completed by the Verification Expert, Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the International Standard ***ISO 14034:2016 Environmental management -- Environmental technology verification (ETV)***. Data and information provided by Imbrium Systems Inc. to support the performance claim included the following: Performance test report prepared by Good Harbour Laboratories, and dated September 8, 2017; the report is based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

What is ISO14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV), and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on the Stormceptor® EF4 and EFO4 please contact:

Imbrium Systems, Inc.
407 Fairview Drive
Whitby, ON
L1N 3A9, Canada
Tel: 416-960-9900
info@imbriumsystems.com

For more information on ISO 14034:2016 / ETV please contact:

GLOBE Performance Solutions
World Trade Centre
404 – 999 Canada Place
Vancouver, BC
V6C 3E2 Canada
Tel: 604-695-5018 / Toll Free: 1-855-695-5018
etv@globeperformance.com

Stormceptor®

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Stormceptor® EF Sizing Report

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

04/02/2025

Province:	Ontario
City:	OTTAWA
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	OGS1

Drainage Area (ha):	0.32
% Imperviousness:	89.00

Runoff Coefficient 'c': 0.83

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

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	8.61
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	77.14
Influent TSS Concentration (mg/L):	100
Estimated Average Annual Sediment Load (kg/yr):	174
Estimated Average Annual Sediment Volume (L/yr):	142

Project Name:	Gastops
Project Number:	67372
Designer Name:	ROBBIE PICKARD
Designer Company:	EGIS
Designer Email:	robert.pickard@egis-group.com
Designer Phone:	613-808-3427
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	90
EFO5	94
EFO6	96
EFO8	99
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 90

Water Quality Runoff Volume Capture (%): > 90

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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.

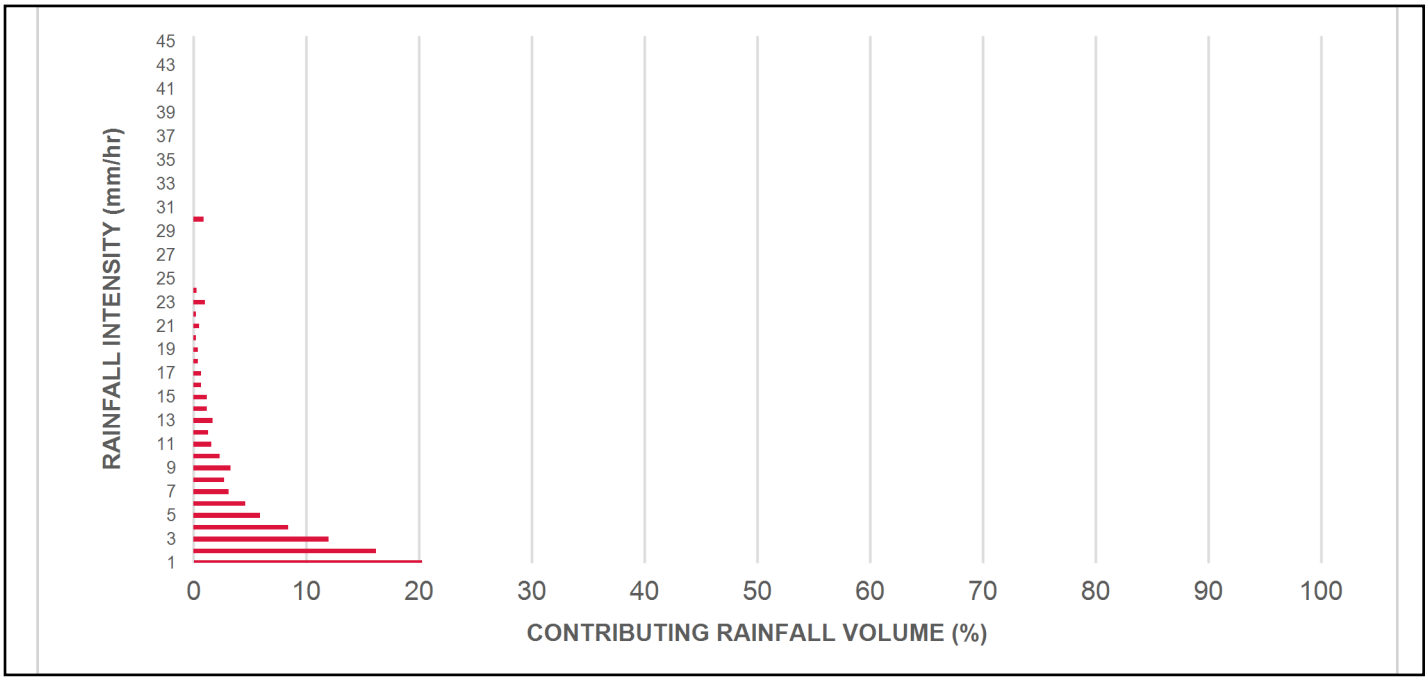
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

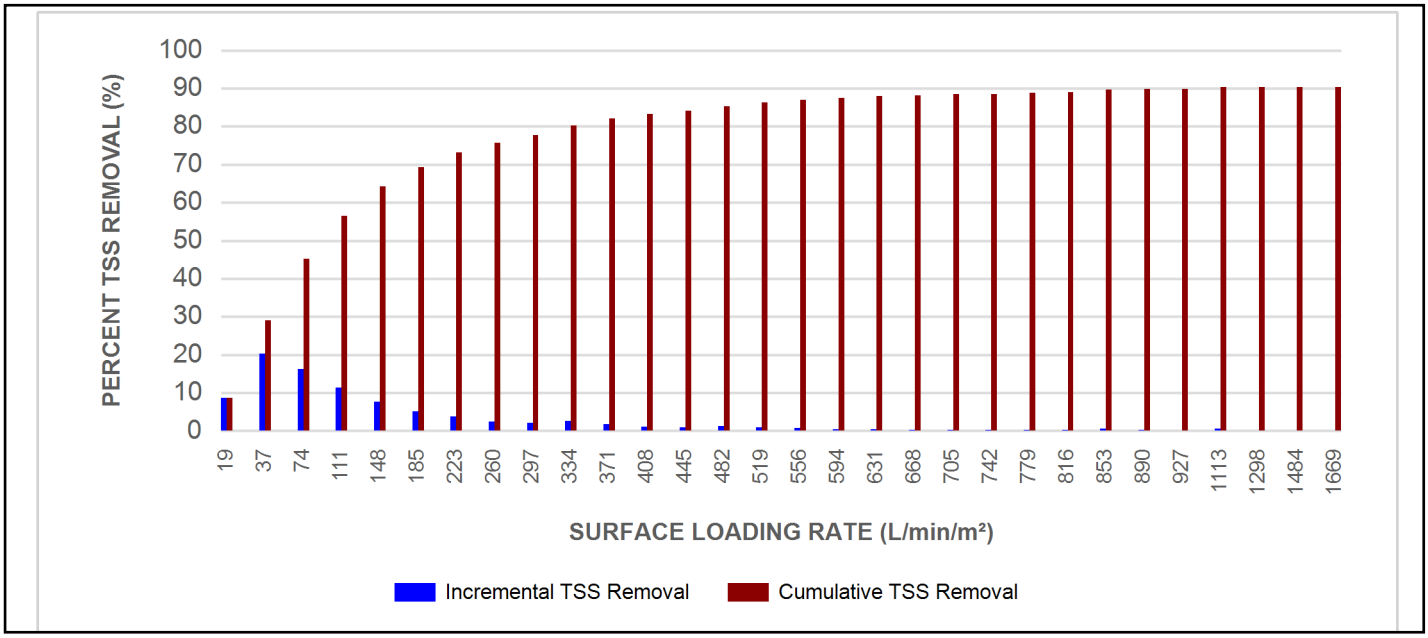
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.37	22.0	19.0	100	8.6	8.6
1.00	20.3	29.0	0.74	45.0	37.0	100	20.3	29.0
2.00	16.2	45.2	1.48	89.0	74.0	100	16.2	45.2
3.00	12.0	57.2	2.23	134.0	111.0	95	11.4	56.5
4.00	8.4	65.6	2.97	178.0	148.0	91	7.7	64.2
5.00	5.9	71.6	3.71	223.0	185.0	86	5.1	69.3
6.00	4.6	76.2	4.45	267.0	223.0	82	3.8	73.1
7.00	3.1	79.3	5.19	312.0	260.0	80	2.5	75.6
8.00	2.7	82.0	5.94	356.0	297.0	79	2.2	77.7
9.00	3.3	85.3	6.68	401.0	334.0	77	2.6	80.3
10.00	2.3	87.6	7.42	445.0	371.0	75	1.7	82.0
11.00	1.6	89.2	8.16	490.0	408.0	74	1.2	83.2
12.00	1.3	90.5	8.90	534.0	445.0	72	1.0	84.1
13.00	1.7	92.2	9.65	579.0	482.0	70	1.2	85.3
14.00	1.2	93.5	10.39	623.0	519.0	68	0.8	86.2
15.00	1.2	94.6	11.13	668.0	556.0	67	0.8	86.9
16.00	0.7	95.3	11.87	712.0	594.0	65	0.5	87.4
17.00	0.7	96.1	12.61	757.0	631.0	64	0.5	87.9
18.00	0.4	96.5	13.35	801.0	668.0	64	0.3	88.1
19.00	0.4	96.9	14.10	846.0	705.0	64	0.3	88.4
20.00	0.2	97.1	14.84	890.0	742.0	64	0.1	88.5
21.00	0.5	97.5	15.58	935.0	779.0	63	0.3	88.8
22.00	0.2	97.8	16.32	979.0	816.0	63	0.2	89.0
23.00	1.0	98.8	17.06	1024.0	853.0	63	0.6	89.6
24.00	0.3	99.1	17.81	1068.0	890.0	62	0.2	89.8
25.00	0.0	99.1	18.55	1113.0	927.0	62	0.0	89.8
30.00	0.9	100.0	22.26	1335.0	1113.0	59	0.6	90.3
35.00	0.0	100.0	25.97	1558.0	1298.0	55	0.0	90.3
40.00	0.0	100.0	29.68	1781.0	1484.0	49	0.0	90.3
45.00	0.0	100.0	33.39	2003.0	1669.0	44	0.0	90.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**90 %**

Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS 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
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
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

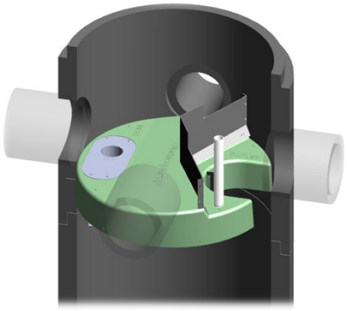
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

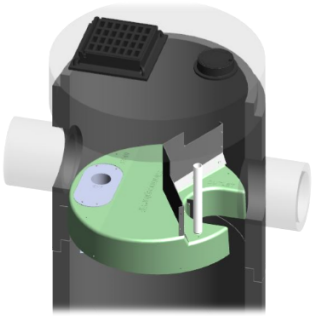
DESIGN FLEXIBILITY

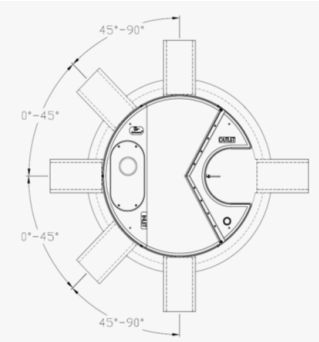
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
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 TREAMENT 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
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 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.

Stormceptor®

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Stormceptor® EF Sizing Report

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

04/02/2025

Province:	Ontario
City:	OTTAWA
Nearest Rainfall Station:	OTTAWA CDA RCS
Climate Station Id:	6105978
Years of Rainfall Data:	20

Site Name:	OGS2

Drainage Area (ha):	0.38
% Imperviousness:	91.00

Runoff Coefficient 'c': 0.84

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

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	10.38
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	98.86
Influent TSS Concentration (mg/L):	100
Estimated Average Annual Sediment Load (kg/yr):	207
Estimated Average Annual Sediment Volume (L/yr):	168

Project Name:	Gastops
Project Number:	67372
Designer Name:	ROBBIE PICKARD
Designer Company:	EGIS
Designer Email:	robert.pickard@egis-group.com
Designer Phone:	613-808-3427
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	88
EFO5	93
EFO6	95
EFO8	98
EFO10	99
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 88

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

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PERFORMANCE

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PARTICLE SIZE DISTRIBUTION (PSD)

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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

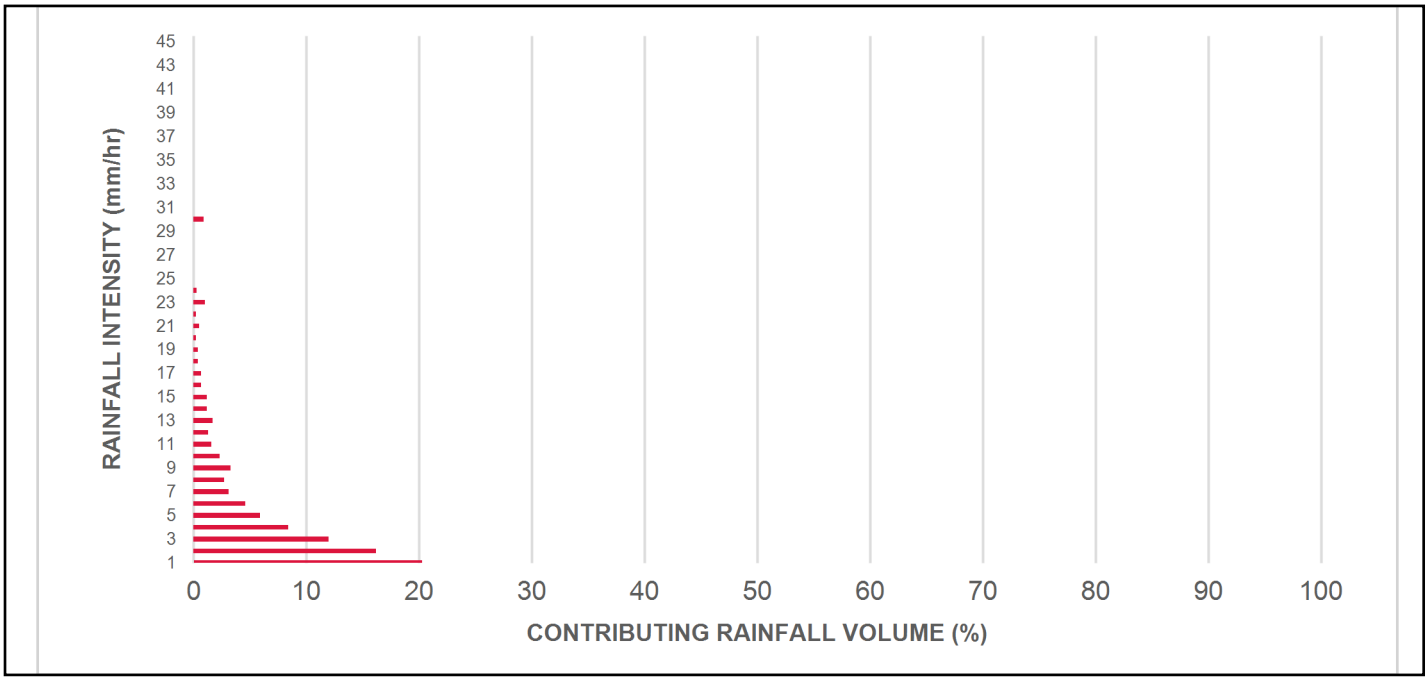
Stormceptor® EF Sizing Report

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	8.6	8.6	0.45	27.0	22.0	100	8.6	8.6
1.00	20.3	29.0	0.89	54.0	45.0	100	20.3	29.0
2.00	16.2	45.2	1.79	107.0	89.0	97	15.8	44.7
3.00	12.0	57.2	2.68	161.0	134.0	92	11.0	55.8
4.00	8.4	65.6	3.57	214.0	179.0	87	7.3	63.1
5.00	5.9	71.6	4.47	268.0	223.0	82	4.9	68.0
6.00	4.6	76.2	5.36	322.0	268.0	80	3.7	71.7
7.00	3.1	79.3	6.26	375.0	313.0	78	2.4	74.1
8.00	2.7	82.0	7.15	429.0	357.0	76	2.1	76.2
9.00	3.3	85.3	8.04	483.0	402.0	74	2.5	78.6
10.00	2.3	87.6	8.94	536.0	447.0	72	1.7	80.3
11.00	1.6	89.2	9.83	590.0	492.0	70	1.1	81.4
12.00	1.3	90.5	10.72	643.0	536.0	68	0.9	82.3
13.00	1.7	92.2	11.62	697.0	581.0	66	1.1	83.4
14.00	1.2	93.5	12.51	751.0	626.0	64	0.8	84.2
15.00	1.2	94.6	13.41	804.0	670.0	64	0.7	84.9
16.00	0.7	95.3	14.30	858.0	715.0	64	0.4	85.4
17.00	0.7	96.1	15.19	912.0	760.0	63	0.5	85.9
18.00	0.4	96.5	16.09	965.0	804.0	63	0.3	86.1
19.00	0.4	96.9	16.98	1019.0	849.0	63	0.3	86.4
20.00	0.2	97.1	17.87	1072.0	894.0	62	0.1	86.5
21.00	0.5	97.5	18.77	1126.0	938.0	62	0.3	86.8
22.00	0.2	97.8	19.66	1180.0	983.0	62	0.2	86.9
23.00	1.0	98.8	20.56	1233.0	1028.0	61	0.6	87.6
24.00	0.3	99.1	21.45	1287.0	1072.0	60	0.2	87.7
25.00	0.0	99.1	22.34	1341.0	1117.0	59	0.0	87.7
30.00	0.9	100.0	26.81	1609.0	1341.0	54	0.5	88.2
35.00	0.0	100.0	31.28	1877.0	1564.0	47	0.0	88.2
40.00	0.0	100.0	35.75	2145.0	1787.0	41	0.0	88.2
45.00	0.0	100.0	40.22	2413.0	2011.0	36	0.0	88.2
Estimated Net Annual Sediment (TSS) Load Reduction =								**88 %**

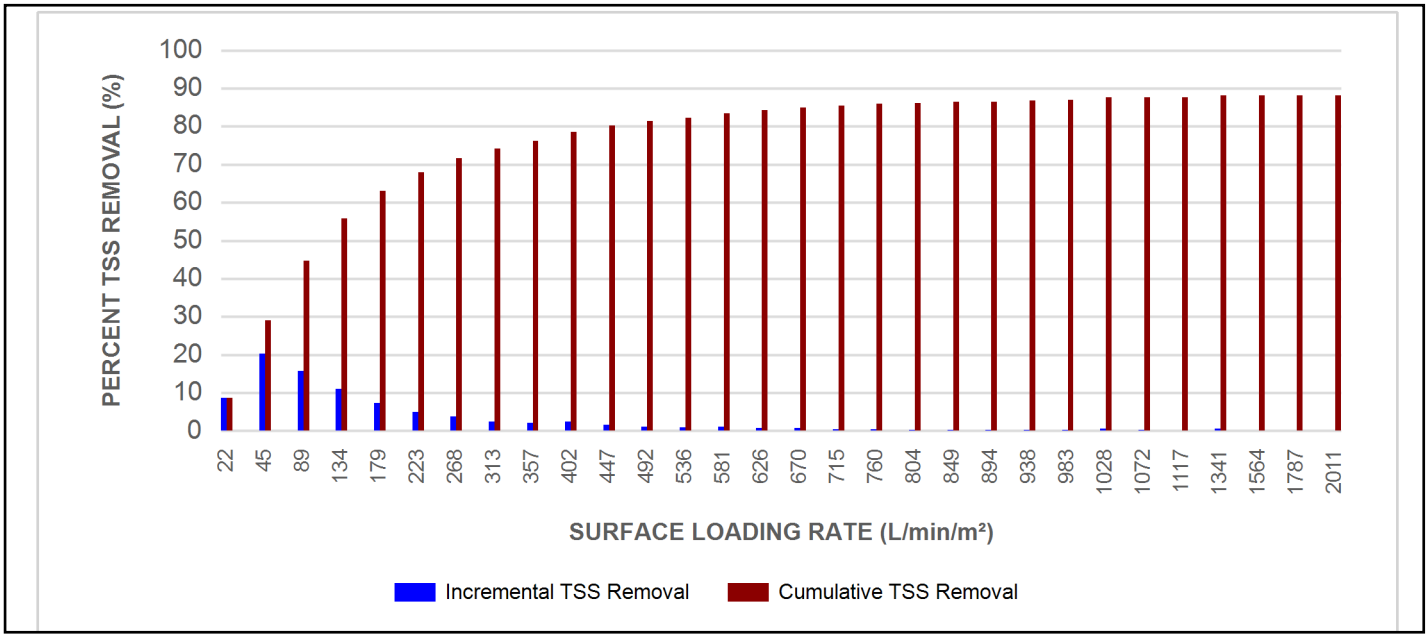
Climate Station ID: 6105978 *Years of Rainfall Data*: 20

imbrium

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



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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
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
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

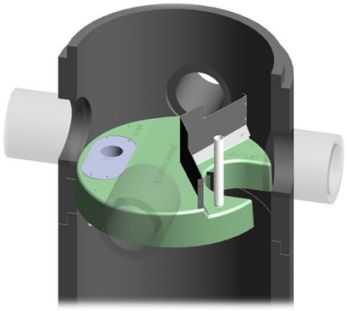
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

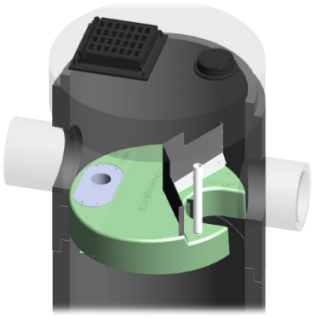
DESIGN FLEXIBILITY

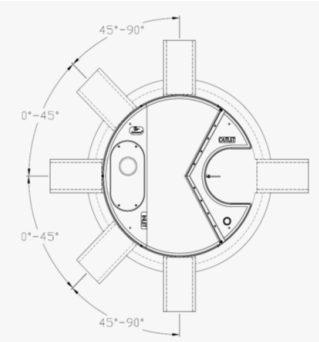
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
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 TREAMENT 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
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 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.

CB Shield Inc.
39 Uplands Drive
Brantford, ON N3R 6H5
(Tel) 647-271-5272
info@cbshield.com

January 31, 2024

Egis
via email

Attention: **Robbie Pickard, Engineering Intern**
Land Development, Canada

Reference: **Predicted Performance of CB Shield® Inserts**
Gastops Ltd. Headquarters, Riverside South Business Park
City of Ottawa, Ontario

Dear Robbie:

As requested, we are providing you with predicted performance of CB Shield best management practices (BMP's) for treating stormwater at the above-referenced project.

The summary chart below outlines catchment characteristics as obtained from the Site Servicing Plan you provided. The predicted CB Shield device performance is outlined in the chart as follows:

Location	Drainage Area (ha)	Imperviousness (%)	Predicted TSS (ETV Sediment) Removal
CB1	0.1515	81	50%
CB2	0.1011	87	51%
CB3	0.0767	90	53%
DCB1 (double cb)	0.3764	87	47%

The predicted long-term total suspended sediment (TSS) removal and capture rate has been obtained by interpolating values outlined in the sizing chart attached to this letter as Appendix A. Removal rates correspond to predicted capture of the ETV test-sediment particle size distribution (PSD).

The sizing chart in Appendix A was determined by completing long-term continuous hydrologic modelling (using PCSWMM) to simulate average runoff flow values for the nominal areas and impervious parameters indicated. Treatment capture rates indicated on the chart were obtained by matching the cumulative long-term continuous flow rates to CB Shield's independent ETV laboratory testing results (i.e., we matched predicted long-term hydrology to the verified capture rates obtained in our ETV testing).

CB Shield's lab testing results and verification are posted on ETV Canada's website and can be accessed at:

https://etvcanada.ca/wp-content/uploads/2022/10/ISO-14034-ETV-Verification-Statement-CB-Shield_2022-2025.pdf

Please note that CB Shield devices provide cost effective water quality without expensive maintenance costs. Under typical conditions, catch basins outfitted with CB Shield inserts will generally require a 3-year maintenance cycle. This frequency of maintenance is compatible with most municipalities' cleaning cycles and is comparable to other sedimentation technologies for stormwater runoff. Maintenance of catch basins is typically one of the least expensive when compared to other stormwater BMPs.

Closure

If you require additional information regarding our sizing methodology, or any other aspect of CB Shield products, please contact the undersigned or Mark Smith at (519) 212-9161.

Thank you.

Yours very truly,

CB Shield Inc.

Stephen Braun, P.Eng.

c. Mark Smith, CB Shield Inc.

Please note, statements made in this letter-review and attachments must not be relied upon by a third party outside of the context of this current review being completed. This review is being completed for Egis Group only, and only for their use in obtaining approval from the City of Ottawa and MECP for the above-referenced site.

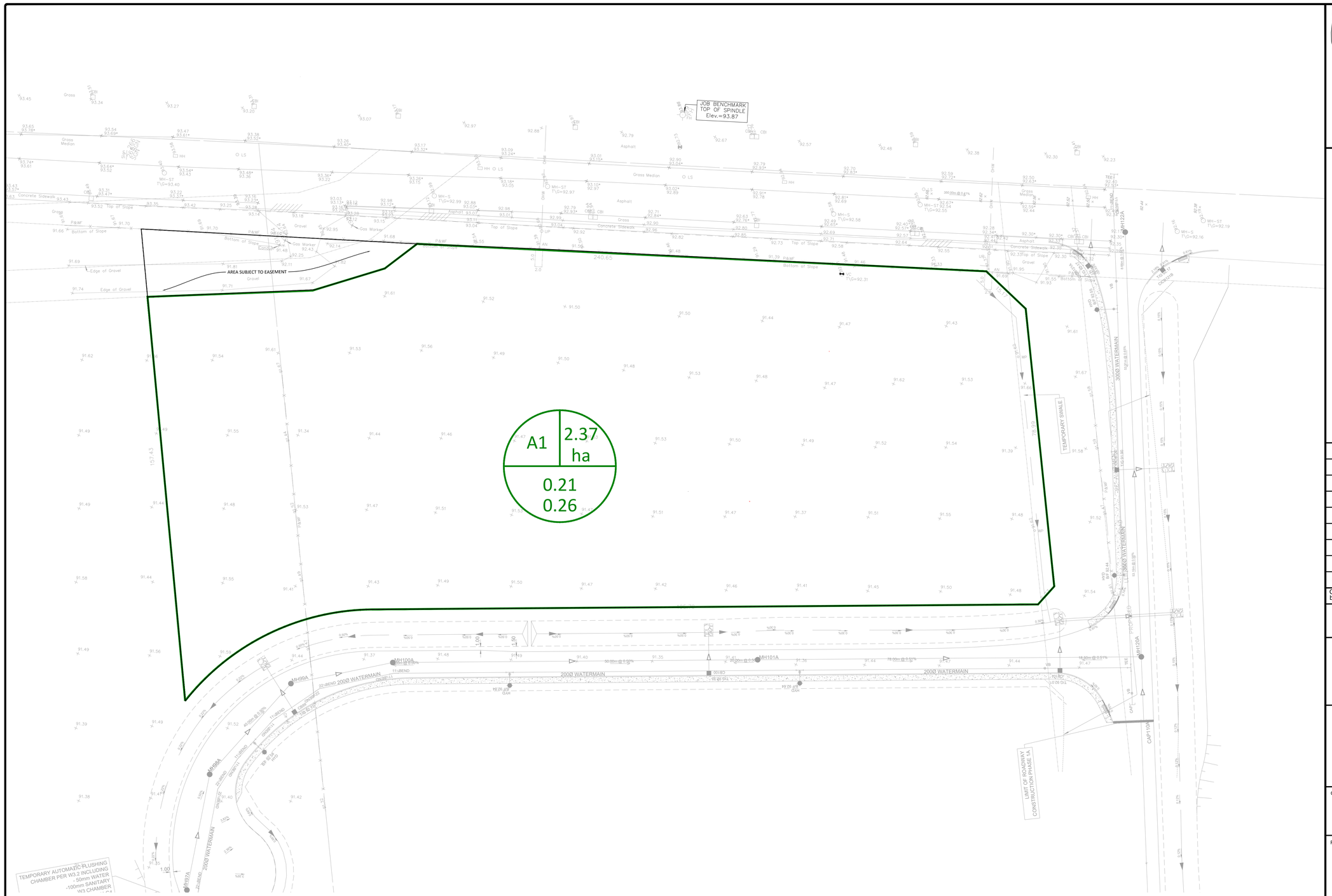
Appendix A

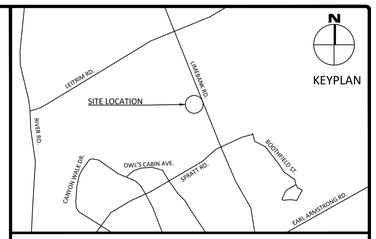
Average Annual Sediment Removal Rates (%) using a CB Shield (based on ETV Sediment - 1 to 1000 micron Particle Size Distribution)						
Area to CB (ha)	**Imperviousness[1] (%)**					
	20%	35%	50%	65%	80%	100%
0.02	57%	57%	57%	57%	56%	56%
0.05	56%	56%	56%	55%	55%	54%
0.10	56%	55%	54%	53%	52%	51%
0.20	54%	53%	51%	49%	48%	46%
0.30	53%	50%	48%	46%	45%	43%
0.40	51%	48%	46%	44%	42%	40%
0.50	50%	47%	44%	42%	40%	38%
0.60	49%	45%	43%	40%	39%	36%

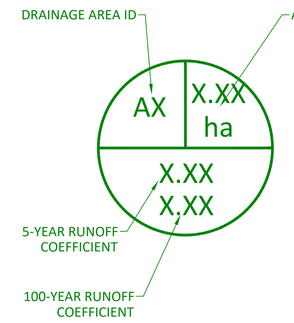
Notes:

1. Runoff Coefficient 'C' is approximately equal to 0.05 + 0.9*Impervious Fraction.
2. Above chart is based on long term continuous hydrologic analysis of Toronto, Ontario (Bloor St) rainfall data.
3. Assumes 0.6 m sump in CB and that maintenance is performed (i.e. CB cleaning) when required by sediment/pollutant build-up or otherwise.
4. See accompanying chart for suggested maintenance scheduling - AND - get CB Shield Inc. to monitor it for you in field.
5. Sediment/Pollutant removal rates based on third party certified laboratory testing using ETV sediment (PSD analysis available on request).
6. See additional discussion regarding scour protection from CB Shield during more infrequent runoff events.

APPENDIX F
PRE DEVELOPMENT







No.	Revisions	Date

Check and verify all dimensions before proceeding with the work

Do not scale drawings

SCALE 1 : 500

0 10 20 30 40 50 Metres

egis

Stamp:

Client:

CSV ARCHITECTS
190 O'CONNOR ST, SUITE 100
OTTAWA, ON

Project:

GASTOPS LTD. HEADQUARTERS
RIVERSIDE SOUTH BUSINESS PARK,
OTTAWA, ON

Drawing Title:

PRE DEVELOPMENT DRAINAGE PLAN

Scale: 1:500	Project Number: CO-24-2748
Drawn By: RP	
Checked By: CM	Drawing Number: PRE
Designed By:	

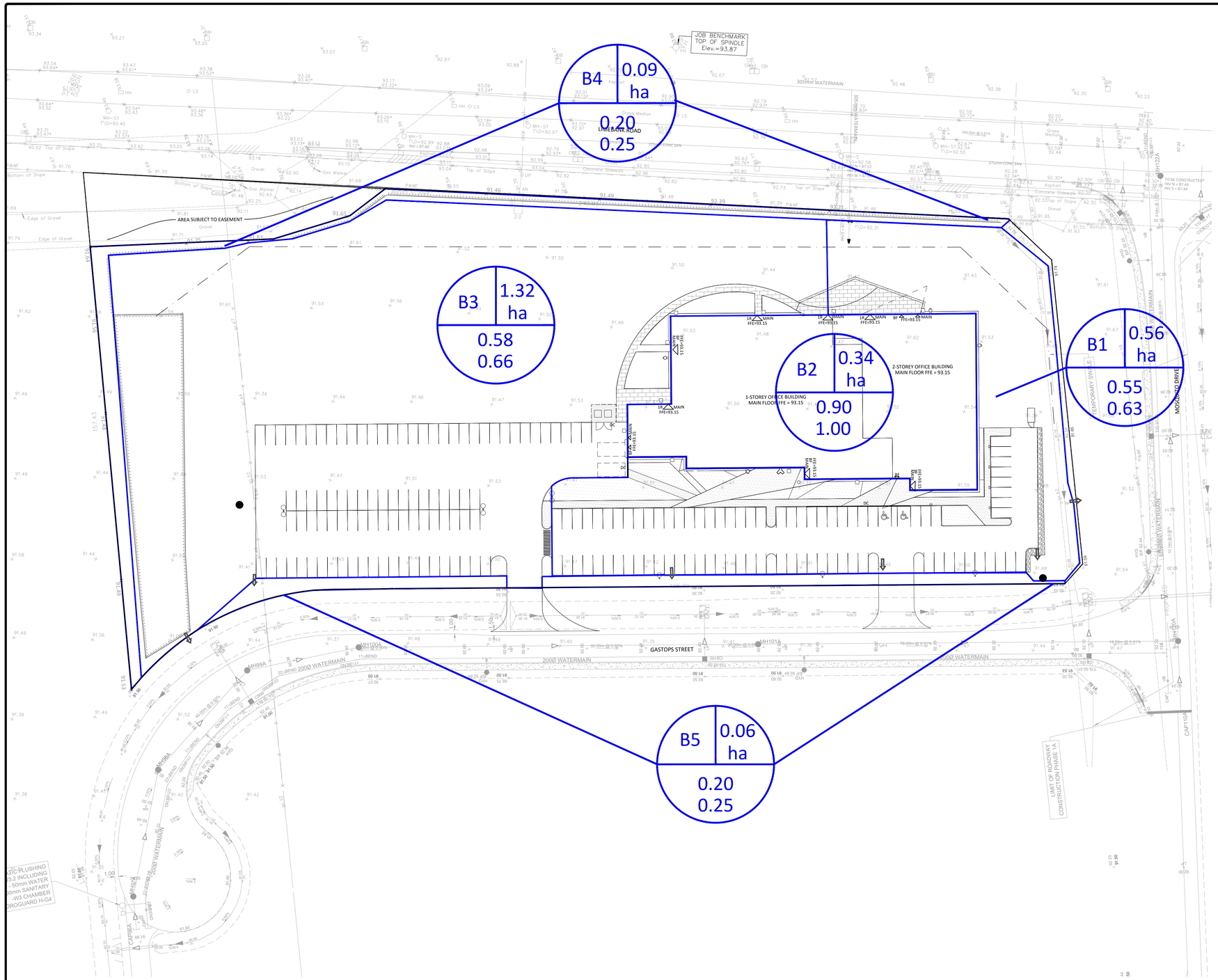
D07-00-000

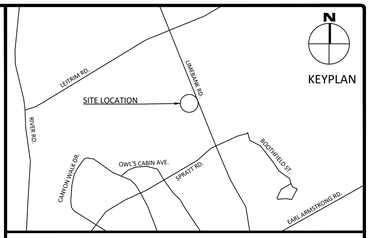
#18662

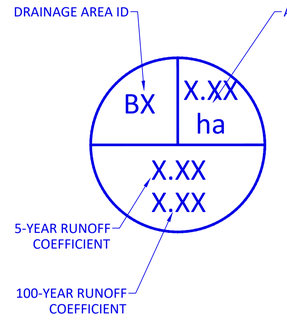
FOR REVIEW ONLY
NOT FOR CONSTRUCTION

FILENAME: I:\Ottawa\01 Project - Proposal\3204 Iabh\CCO\CO-24-2748 CSV_Gastops Ltd. World HQ_Riverside South Business Park\12 - Drawing\CO-24-2748 - Design.dwg
LAST SAVED: Monday, February 10, 2025 LAST SAVED BY: r.pickard
LAST PLOTTED: Monday, February 10, 2025 C:\Program Files\Autodesk\AutoCAD 2024\plotters\DWG To PDF.pc3

APPENDIX G
POST DEVELOPMENT







No.	Revisions	Date

Check and verify all dimensions before proceeding with the work

Do not scale drawings

SCALE 1 : 500

0 10 20 30 40 50 Metres

egis

Stamp:

Client:

CSV ARCHITECTS
190 O'CONNOR ST, SUITE 100
OTTAWA, ON

Project:

GASTOPS LTD. HEADQUARTERS
RIVERSIDE SOUTH BUSINESS PARK,
OTTAWA, ON

Drawing Title:

POST DEVELOPMENT DRAINAGE PLAN

Scale: 1:500	Project Number: CO-24-2748
Drawn By: RP	
Checked By: CM	Drawing Number: POST
Designed By:	

D07-00-000

#18662

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

FILENAME: U:\Ottawa\01 Project - Proposal\03\24 Jobs\CCO\CO-24-2748 CSV_Gastops Ltd. World HQ_Riverside South Business Park\12 - Drawings\CO-24-2748 - Design.dwg
LAST SAVED: Monday, February 10, 2025 LAST SAVED BY: r.pickard
LAST PLOTTED: Monday, February 10, 2025 7:58 PM EST

APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

Criteria	Location (if applicable)
☐ Executive Summary (for larger reports only).	N/A
☐ Date and revision number of the report.	On Cover
☐ Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix A
☐ Plan showing the site and location of all existing services.	N/A
☐ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	1.1 Purpose 1.2 Site Description 6.0 Storm Sewer Design
☐ Summary of pre-consultation meetings with City and other approval agencies.	Appendix B
☐ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	1.1 Purpose 1.2 Site Description 6.0 Storm Sewer Design
☐ Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary

☐ Identification of existing and proposed infrastructure available in the immediate area.	N/A
☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A
☐ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	N/A
☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐ Proposed phasing of the development, if applicable.	N/A
☐ Reference to geotechnical studies and recommendations concerning servicing.	N/A
☐ All preliminary and formal site plan submissions should have the following information: o Metric scale o North arrow (including construction North) o Key plan o Name and contact information of applicant and property owner o Property limits including bearings and dimensions o Existing and proposed structures and parking areas o Easements, road widening and rights-of-way o Adjacent street names	N/A

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
☐ Confirm consistency with Master Servicing Study, if available	N/A
☐ Availability of public infrastructure to service proposed development	N/A
☐ Identification of system constraints	N/A
☐ Identify boundary conditions	Appendix C
☐ Confirmation of adequate domestic supply and pressure	N/A
☐ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Appendix C
☐ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	N/A
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐ Address reliability requirements such as appropriate location of shut-off valves	N/A
☐ Check on the necessity of a pressure zone boundary modification.	N/A
☐ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Appendix C, Section 4.2 Proposed Water Servicing

☐ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Site Servicing Plan (C101)
☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☐ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix C
☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Criteria	Location (if applicable)
☐ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	N/A
☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☐ Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 5.2 Proposed Sanitary Servicing

☐ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 5.2 Proposed Sanitary Servicing
☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2 Proposed Sanitary Servicing
☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐ Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
☐ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Analysis of available capacity in existing public infrastructure.	N/A
☐ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre & Post-Development Plans
☐ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5-year event (dependent on the receiving sewer design) to 100-year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Set-back from private sewage disposal systems.	N/A
☐ Watercourse and hazard lands setbacks.	N/A
☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☐ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5-year return period) and major events (1:100-year return period).	Appendix G

☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Site Grading Plan (C101)
☐ Calculate pre-and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Appendix G, Section 7.0 Proposed Stormwater Management
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
☐ Identification of potential impacts to receiving watercourses	N/A
☐ Identification of municipal drains and related approval requirements.	N/A
☐ Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ 100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Site Grading Plan (C101)
☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

☐ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 8.0 Sediment & Erosion Control
☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐ Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

Criteria	Location (if applicable)
☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	N/A
☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐ Changes to Municipal Drains.	N/A
☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

Criteria	Location (if applicable)
☐ Clearly stated conclusions and recommendations	Section 9.0 Summary Section 10.0 Recommendations
☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	All are stamped
☐ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped