GEMTEC

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Environmental Impact Statement
Proposed Industrial Development
Ottawa, Ontario
1319 Johnston Road

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Submitted to:

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Environmental Impact Statement
Proposed Industrial Development
1319 Johnston Road
Ottawa, Ontario

August 28, 2023
Project: 101481.008

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EXECUTIVE SUMMARY

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Queastus Management Corp. to complete an Environmental Impact Statement (EIS) for a proposed industrial development on the property located at 1319 Johnston Road, Ottawa, Ontario (formerly known as 2079 Artistic Place). This EIS has been completed in support of a proposed industrial development application and was completed in accordance with all federal, provincial and municipal policies and guidelines, as applicable.

In support of this EIS, a desktop review and a single field investigation were completed in spring 2023 to identify the presence or absence of natural heritage features and species at risk (SAR) on-site. The focus of the site investigation was to describe, in general, the natural and physical setting of the subject property with a focus on surface water protection and confirming the presence or absence of natural heritage features and potential SAR or their habitat as identified in the desktop review.

Following completion of the desktop review and site investigation the following natural heritage features were identified on-site or within the study area: fish habitat, significant wildlife habitat for: special concern and rare wildlife habitat (snapping turtle). The following SAR and their habitat were identified as having a potential to occur on-site: eastern small-foot myotis, little brown myotis, and tri-colored bat. No SAR were observed on-site during the field investigation.

Potential impacts to the natural heritage features were primarily associated with a minor increase in stormwater runoff. Potential impacts to off-site fish habitat within Sawmill Creek are anticipated to be negligible given the nature of the project and the existing commercial and suburban development in the immediate surrounding area. To protect the water quality of Sawmill Creek and associated fish habitat, a 30 m setback from the top-of-bank of the watercourse is recommended. To protect the water quality and associated fish habitat within the unnamed tributary, 15 m setback from the top-of-bank of the watercourse is recommended.

Additionally, to provide protection to potential SAR and their habitat on-site, should any SAR be discovered throughout the course of the proposed works, operations should stop and the species at risk biologist with the local MECP district should be contacted immediately for further direction. Furthermore, to ensure compliance with all applicable legislation, all best management practices and adherence to vegetation clearing windows for birds and bats, outlined in Section 7 should be followed to ensure no negative impacts occur to natural heritage features on-site.

The proposed project complies with the natural heritage policies of the Provincial Policy Statement and the City of Ottawa Official Plan. No negative impacts to identified natural heritage features or their ecological functions are anticipated as a result of the proposed project as long as all mitigation measures in Section 7 are enacted and best management practices followed.

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1.0 INTRODUCTION

1.1 Purpose

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Queastus Management Corp. to complete an Environmental Impact Statement (EIS) for the property located at 1319 Johnston Road, Ottawa, Ontario (hereafter referred to as "the subject property"). The property is formerly known as 2079 Artistic Place. The location of the subject property is illustrated on Figure A.1 in Appendix A.

The proponent is seeking to develop portions of an existing 4.89 ha commercial property for industrial development. Based on Section 4 of the City-Wide Policies – City of Ottawa Official Plan (Ottawa, 2021), an EIS is required to show that the proposed development will not negatively impact any potential natural heritage features or surface water features, which may be present within the study area. The study area is defined as the property boundary and the adjacent lands encompassing an area of 120 m beyond the property boundary. The subject project and the extent of the study area are illustrated on Figure A.2 in Appendix A.

1.2 Objective

The 2020 Provincial Policy Statement (PPS) (MMAH, 2020) issued under Section 3 of the Planning Act states that "development and site alteration shall not be permitted in: significant wetlands in Ecoregions 5E, 6E and 7E." Furthermore, the 2020 Provincial Policy Statement dictates "development and site alteration shall not be permitted in: significant wetlands in the Canadian Shield north of Ecoregion 5E, 6E and 7E, significant woodlands in 6E and 7E, significant valleylands in 6E and 7E, significant wildlife habitat and significant areas of natural and scientific interest unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions." Similarly, the PPS dictates that "development and site alteration shall not be permitted in" fish habitat or habitat of endangered or threatened species "except in accordance with provincial and federal requirements."

The objective of the work presented herein is twofold; 1) to identify and evaluate the significance of any natural heritage features, as defined in the Provincial Policy Statement (MMAH, 2020), on the subject property and within the broader study area and; 2) to assess the potential impacts from the proposed severance on any natural heritage features identified and to recommend appropriate and defensible mitigation measures to ensure the long-term protection of any natural heritage features identified.

To meet these objectives, the EIS presented herein has been completed in accordance with the following provincial and municipal regulations, policies and guidelines:

- Provincial Policy Statement (MMAH, 2020);
- Endangered Species Act (Ontario, 2007);
- Conservation Authorities Act (Ontario, 1990);

- Natural Heritage Reference Manual (OMNR, 2010);
- City of Ottawa Official Plan (Ottawa, 2021);
- City of Ottawa EIS Guidelines (Ottawa, 2023);
- City of Ottawa Protocol for Wildlife Protection During Construction (Ottawa, 2022a); and
- City of Ottawa Significant Woodlands: Guidelines for Identification, Evaluation, and Impact Assessment (Ottawa, 2022b).

1.3 Physical Setting

The subject property is located at 1319 Johnston Road, City of Ottawa, formerly known as 2079 Artistic Place, City of Ottawa, Ontario. The subject site is currently occupied by a landscaping company, with gravel access roads and some trees scattered throughout. To the north the site is bound by an existing rail line, and to the south, by 1245, 1255, and 1265 Johnston Road. To the east, the site is bound by 3196 Albion Road South and 1325 Johnston Road. To the west, the site is bound by 2079 Artistic Place.

1.4 Land Use Context

The subject property is situated within a larger mixed-use area consisting of residential, commercial, and institutional uses. The existing land use designation from the City of Ottawa is suburban. The City of Ottawa zoning by-law is light industrial zone (IL).

2.0 METHODOLOGY

2.1 Desktop Review

A desktop information gathering exercise was completed to aid in the scoping of field investigations and to gather information relating to natural heritage features which may be present on the subject project or within 1 km of the subject property. An additional component of the desktop review was to assess the potential presence of SAR to occur on the subject property or within the study boundary based on a review of publicly accessible occurrence records and a review of SAR habitat requirements and range maps.

Information regarding the potential presence of natural heritage features and SAR within the vicinity of the site was obtained from the following sources:

- Make a Map: Natural Heritage Areas (OMNRF, 2014a)
- Land Information Ontario (OMNRF, 2011);
- City of Ottawa Official Plan (City of Ottawa, 2021)
- Ontario Geological Survey (OGS, 2019);
- Fisheries and Oceans Canada SAR Maps (DFO, 2019);
- Fish ON-Line (OMNRF, 2022);
- Natural Heritage Information Centre Biodiversity Explorer (OMNRF, 2013);
- Breeding Bird Atlas of Ontario (Cadman et al., 2007)
- Ontario Herpetofaunal Atlas (Oldham and Weller, 2000);
- Wildlife Values Area (OMNRF, 2020a);
- Wildlife Values Site (OMNRF, 2020b);
- Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019);
- Rideau Valley Conservation Authority Geoportal (RVCA, undated);
- City of Ottawa Official Plan (Ottawa, 2021); and
- Geo Ottawa (Undated).

2.2 Field Investigations

A single field investigation was undertaken to describe in general, the natural and physical setting of the subject property with a focus on natural heritage features and to identify any potential SAR or their habitat that may exist at the subject property.

The field investigation was completed on July 5, 2023, from 10:30 to 12:45. At the time of the field investigation, the conditions were full sun, no precipitation, 27°C and light wind (Beaufort 1).

Photographs of site features taken during field investigations are provided in Appendix B.

2.2.1 Ecological Land Classification

Vegetation communities on the subject property were delineated during the desktop review stage of this EIS using publicly available air photos and confirmed in the field on July 5, 2023, following the Ecological Land Classification System for Southern Ontario (Lee et al., 2008). Vegetation communities were confirmed in the field by employing the random meander methodology while documenting dominant vegetation species within the various vegetation community forms.

2.3 Data Analysis

An evaluation of the significance of natural heritage features, the sensitivity of identified flora and fauna and the potential impacts posed by the proposed development was undertaken through an analysis of desktop and field investigation data using the approaches and criteria outlined in the following documents:

- Natural Heritage Reference Manual (OMNR, 2010);
- Significant Wildlife Habitat Technical Guide (OMNR, 2000);
- Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNRF, 2015a); and
- Significant Wildlife Habitat Mitigation Support Tool (OMNRF, 2014b).

3.0 EXISTING ENVIRONMENT

3.1 Ecoregion

The site is situated Ecoregion 6E-12 (Lake Simcoe-Rideau), which extends from Lake Huron in the west to the Ottawa River in the east. The climate of Ecoregion 6E is categorized as humid, high to moderate temperate ecoclimate with a mean annual temperature range between 4.9°C to 7.8°C with annual precipitation ranging between 759 mm to 1,087 mm (Crins et al., 2009).

The eastern portion of the Ecoregion, which the subject property is located, is underlain by glaciomarine deposits as a result of the brief post-glacial incursion of salt water from the Champlain Sea along the St. Lawrence Valley. This Ecoregion falls with Rowe's (1972) Great Lakes-St. Lawrence Forest Region, including its Huron-Ontario and Upper St. Lawrence sections, and a small part of the Middle Ottawa Forest section (Crins et al., 2009).

3.2 Study Area Land-Use

Figure 1 below provides an illustration of the temporal changes in land within the study area from 1976, 1999, 2008 and 2021. Aerial imagery has been taken from GeoOttawa.

In 1976, the subject property is vacant. Development in the surrounding lands is limited to smaller subdivisions to the north and south of the study area, as well as some industrial/commercial business along Bank Street. The remainder of the surrounding area is primarily vacant or populated by agriculture. The transitway west of Bank Street is developed

By 1999, significant residential development has occurred to the south and southeast of the subject property, along with intensification of industrial and commercial buildings along Bank Street and Johnston Road.

By 2008, development of the constructed wetland (as outlined in the Sawmill Creek Subwatershed Study) is underway. The majority of surrounding residential and commercial/industrial development is in present day configuration.

By 2021, land use has not change significantly. Most of the land use is dominated by residential, followed by commercial and industrial, particularly along Bank and throughout the southern limits of the surrounding land. Forested and agricultural lands also occur in the southern outskirts of the surrounding land.

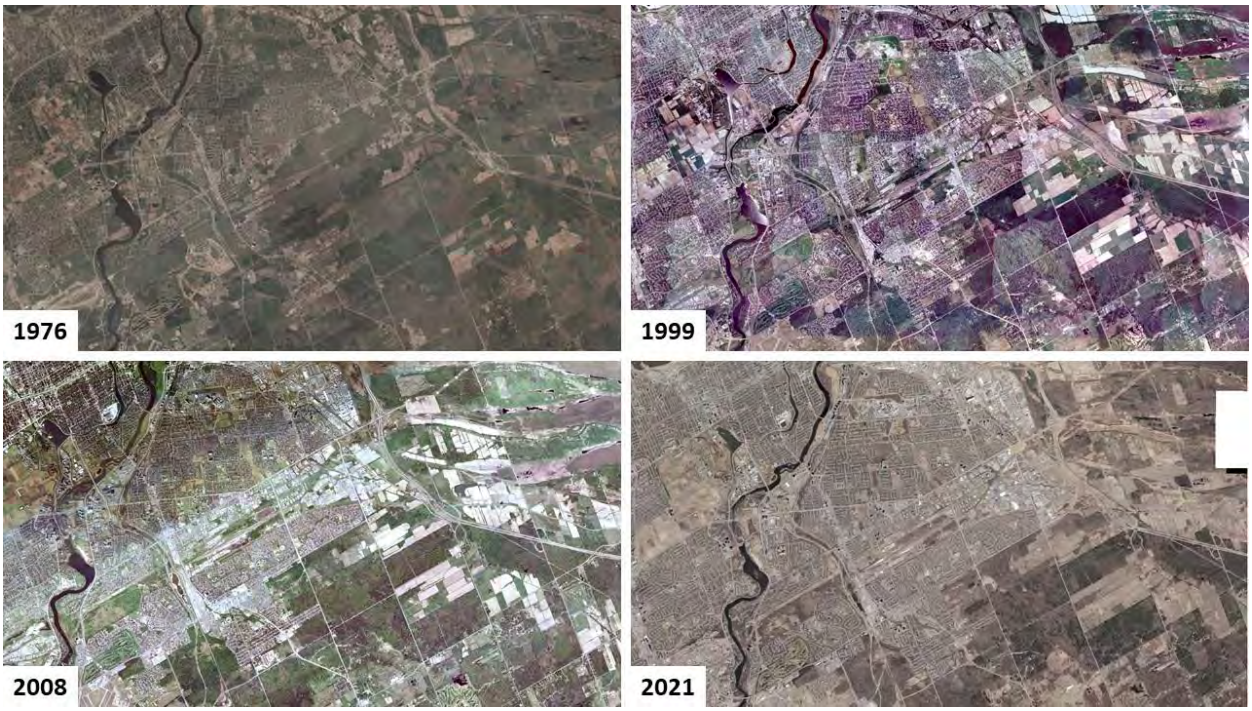

Figure 1 - Temporal Changes in Land Use Within Surrounding Area

3.3 Landforms, Soils and Bedrock Geology

The topography of the site is relatively flat, with a topographical high of 84 mASL and a topographical low of 81 mASL.

Two topographical landforms, as mapped by Chapman and Putnam (1984) are described on the subject property: till plains (drumlinized) and clay plains, both of the Ottawa Valley Clay Plains region. The clay plains occupy the majority of the site, excluding a band of till plains spanning across the site along the northern property boundary.

The Ontario Geological Survey (OGS, 2019) identifies two surficial soil units on the subject property, older alluvial deposits and fine-textured glaciomarine deposits. The older alluvial deposits occupy the majority of the site, stretching along the western, northern, and eastern property boundaries, and consist of clay, silt, sand, gravel, and may contain organic remains. An area of fine-textured glaciomarine deposits is located with the centre of the property and along portions of the southern property limit, and consist of silt and clay, minor sand and gravel.

Bedrock on the site is composed of the Georgian Bay Formation, Blue Mountain Formation, Billings Formation, Collingwood Member, and Eastview Member; comprised of shale, limestone, dolostone, and siltstone.

3.4 Surface Water, Groundwater and Fish Habitat

Surface water features on-site was limited to a single watercourse; Sawmill Creek. Sawmill Creek originates approximately 3.4 km south of the property, entering the site from the southern property boundary. On-site, Sawmill Creek flows northwards, along the western property boundary, exits the northern property boundary and continues for approximately 5.4 km before discharging into the Rideau River. An unnamed, permanent watercourse occurs along the northern property boundary and discharges into Sawmill Creek.

A fisheries assessment was not conducted as part of this EIS. However, Sawmill Creek is known to provide cool to warm water habitat to a number of fish species, according to the Sawmill Creek Catchment Report (RVCA, 2012). The report also states that the reach from Bank Street to Walkley Road has a poor water quality rating, which includes the reach on the subject property. Fish species confirmed in the Catchment Report (RVCA, 2012), surveyed approximately 150 m upstream of site, include brook stickleback, central mud minnow, sculpin species, creek chub, longnose dace, and white sucker. Additionally, approximately 250 m downstream of the site, the report confirms blacknose dace, creek chub, fathead minnow, longnose dace, mottled sculpin, and white sucker.

During the field investigation, Sawmill Creek was noted to have minimal in-stream vegetation, limited to submerged grasses in some sections. Substrate consisted of sand and silt, with occasional cobble and gravel along streambanks and within the stream bed. The flow was minimal to moderate, with multiple piles of fallen trees and debris obstructing continuous flow. The maximum depth observed of Sawmill Creek within the study area was approximately 20 cm. Small-bodied fish of approximately 4 – 8 cm were observed in Sawmill Creek.

The unnamed watercourse along the northern property boundary was observed to be in similar condition with similar characteristics as Sawmill Creek, during the site investigation. Small-bodied fish of similar sizes were also observed within the unnamed watercourse.

Groundwater investigations were not completed in support of this EIS.

3.5 Vegetation Communities

Vegetation communities on-site were characterized by GEMTEC on July 5, 2023, following protocols utilized in the Southern Ontario Ecological Land Classification System (Lee et al., 2008). Vegetation at the site is minimal, With communities on-site being characterized by small patches of deciduous forest and light industry.

Table 3.1 below provides a summary of the various vegetation communities identified on-site while Figure A.3 in Appendix A provides an illustration of the various vegetation communities.

Table 3.1 Vegetation Communities On-site

ELC Type	Description	Size (ha)
Fresh-Moist Willow Lowland Deciduous Forest (FODM7-3)	Located in a small patch along the northern property boundary is a lowland deciduous forest. The community was dominated by willow (*Salix* sp.) with a common associate of Manitoba Maple (*Acer negundo*). The shrub layer included European buckthorn (*Rhamnus cathartica*), elderberry (*Sambucus nigra*), and willow. The herbaceous layer included goldenrod (*Solidago sp.*), grapevine (*Vitis vinifera*), Virginia creeper (*Parthenocissus quinquefolia*), common hops (*Humulus lupulus*), jewelweed (*Impatiens capensis*), fringed loosestrife (*Lysimachia 8iliate*), thicket creeper (*Parthenocissus vitacea),* and grasses (*Poacea sp.*).	0.14
Light Industry (CVC_2)	The majority of the property is occupied by commercial use and light industry. Vegetation on-site was minimal, with bare soils and gravel roads throughout. Vegetation present was reflective of species common in disturbed areas with shallow soils. Herbaceous vegetation included goldenrod, daisy (*Bellis perennis*), creeping thistle (*Cirsium arvense*), and bird's foot trefoil (*Lotus corniculatus*). Planted tree species around the garden centre consisted of sugar maple (*Acer saccharum),* red oak (*Quercus rubra*), black locust (*Robinia pseudoacacia*), Norway spruce (*Picea abies*), and blue spruce (*Picea pungens*). A small deciduous inclusion is present along the southeast property boundary. Tree species include sugar maple, willow, and trembling aspen (*Populus tremuloides*). The shrub layer consisted of buckthorn, balsam poplar (*Populus balsamifera*), and willow. Herbaceous vegetation included daisy, creeping thistle, white vervain (*Verbena urticifolia*), tansy (*Tanacetum vulgare*), and goldenrod.	4.76

3.6 Wildlife

Wildlife observed on-site and within the study area during field investigations were typical of suburban neighbourhoods in the region, limited to common avian species and small-bodied fish. Seven avian species were identified on-site: American robin, American goldfinch, killdeer, northern cardinal, mourning dove, chipping sparrow, and song sparrow. Fish species were not identified but are likely common species as listed in Section 3.4.

4.0 NATURAL HERITAGE FEATURES

Natural heritage features are defined in the PPS as “features and areas, including *significant wetlands, significant coastal wetlands, fish habitat, significant woodlands* south and east of the Canadian Shield, *significant valleylands* south and east of the Canadian shield, *significant habitats of endangered species and threatened species, significant wildlife habitat* and *significant areas of natural and scientific interest*, which are important for their environmental and social values as a legacy of the natural landscape of an area”.

Natural heritage features identified in Section 4 below are illustrated on Figure A.4 in Appendix A.

4.1 Significant Wetlands

As described in the Natural Heritage Reference Manual (OMNR, 2010), wetlands mean “lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface.” While *significant* in regards to wetlands means “an area identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time.”

Both the RVCA Geoportal (Undated) and NHIC (OMNRF, 2014a) indicate the presence of local unevaluated wetlands within the subject property. However, the field investigation determined that the areas of the mapped wetlands were occupied by part of the existing development, and not wetlands. As such, local unevaluated wetlands are not present on-site.

No provincially significant or local wetlands were identified during the desktop review, nor were they identified on-site. As such, they are not discussed or evaluated further in this EIS.

4.2 Significant Woodlands

Significant woodlands are defined in the Natural Heritage Reference Manual (OMNR, 2010) as “an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history.”

At the local scale, significant woodlands are defined and designated by the local planning authority. Generally, most planning authorities have defined significant woodlands as any woodland that contains any of the four criteria listed in Section 7.2 of the Natural Heritage Reference Manual (OMNR, 2010), including: woodland size, ecological functions, uncommon characteristics and economic and social functional values. Furthermore, the City of Ottawa provides a supplementary document *Significant Woodland: Guidelines for Identification, Evaluation, and Impact Assessment* (Ottawa, 2022b), to evaluate woodlands and ensure compliance with the city’s policies.

As outlined in Significant Woodlands: Guidelines for Identification, Evaluation and Impact Assessment (Ottawa, 2022b), urban area woodlands are to be identified and evaluated based on the age and size of the woodlands. Ottawa's Official Plan defines all urban woodlands meeting minimum size and age thresholds as significant under NHRM Criterion 4 – Economic and Social Functional Values. However, the policy does not preclude the possibility that urban woodlands may also qualify as significant under other NHRM criteria.

The City of Ottawa established a minimum age threshold of 60 years for significant woodlands in urban areas, in order to exempt young, regenerating woodlands from the significant woodland designation. Furthermore, the City of Ottawa Official Plan policies established a minimum size threshold of 0.8 ha for significant woodlands in the urban area. In application, only the areas of urban woodlands that are greater than 60 years old are counted towards the 0.8 ha size threshold.

Based on a review of GeoOttawa aerial imagery, between 2002 and 2010 the majority of the woodlands on-site were removed. As such, trees on-site do not meet the City of Ottawa age requirement for significant urban woodlands. In addition, the small patches of trees on-site do not meet the size threshold for significant urban woodlands.

As such, significant woodlands are not present on-site or within the study area, and are therefore not discussed or evaluated further in this EIS.

4.3 Significant Valleylands

Valleylands are defined in the Natural Heritage Reference Manual (OMNR, 2010) as 'a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of time". The identification and evaluation of significant valleys lands in Ontario is based on the recommended criteria from the MNRF and is the responsibility of local planning authorities.

In Southern Ontario, conservation authorities have identified valleylands as part of their regulation mapping (i.e., floodplain mapping); however, where valleys lands have not been defined, their physical boundaries are generally determined as the 'top-of-bank', or 'top-of-slope' associated with a watercourse. For less well-defined valleys, the physical boundary may be defined by riparian vegetation, flooding hazard limits, ordinary high-water marks or the width of the stream meander belt (OMNR, 2010).

As discussed in Section 3.2, the site is relatively flat, furthermore no valleylands were identified on-site during the desktop review or the site investigations. As such, significant valleylands are not discussed or evaluated further in this EIS.

4.4 Significant Areas of Natural and Scientific Interest

The MNRF identifies two types of areas of natural and scientific interest (ANSI) in Ontario: life sciences ANSIs typically represent significant segments of Ontario's biodiversity and natural

landscapes, while earth science ANSIs typically represent significant examples of bedrock, fossils or landforms in Ontario (OMNR, 2010).

No ANSI were identified on-site or within the study area during the desktop review or field investigation.

As no ANSI have been identified on-site or within the study area, ANSI are not discussed or evaluated further in this EIS.

4.5 Significant Wildlife Habitat

The Natural Heritage Reference Manual (OMNR, 2010), in combination with the Significant Wildlife Habitat Technical Guide (MNRF, 2000) and the Significant Wildlife Habitat Ecoregion Criterion Schedules (MNRF, 2015) were used to identify and evaluate potential significant wildlife habitat (SWH) on-site. The SWH is broadly categorized as habitats of seasonal concentration of animals, rare vegetation communities, specialized habitats for wildlife, habitats of species of conservation concern and animal movement corridors. Tables C.1, C.2, C.3 and C.4 in Appendix C, provide the screening rationale for each category of SWH, respectively, with the exception of rare vegetation communities.

4.5.1 Habitats of Seasonal Concentrations of Animals

Seasonal concentration areas are habitats where large numbers of species congregate at one particular time of the year. The Significant Wildlife Habitat Technical Guide (OMNR, 2000) and Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNRF, 2015a) identify 12 types of seasonal concentration habitats that may be considered SWH. These 12 types of seasonal habitat are presented in Table C.1 in Appendix C, including a brief description of the rationale as to why they are or are not assessed further in this EIS.

Following review of Table C.1 in Appendix C, no habitats of seasonal concentrations of animals have been identified on-site. As such, they are not discussed or evaluated further in this EIS.

4.5.2 Rare Vegetation Communities

Rare vegetation communities in the province are described generally as those with an S1 to S3 ranking by the NHIC, and typically include communities such as sand barrens, alvars, old growth forests, savannahs and tallgrass prairies.

The vegetation communities identified on-site and described in Section 3.4 of this report are not ranked by the NHIC as S1, S2 or S3 and are therefore not considered to be rare vegetation communities. As such, rare vegetation communities are not discussed or evaluated further in this EIS.

4.5.3 Specialized Habitats for Wildlife

Specialized wildlife habitats are microhabitats that provide a critical resource to some groups of wildlife. The Significant Wildlife Habitat Technical Guide (OMNR, 2000) defines eight specialized habitats that may constitute SWH, these eight types of specialized wildlife habitats are evaluated in Table C.2 in Appendix C.

Following review of Table C.2 in Appendix C, no specialized habitats for wildlife have been identified on-site or within the study area, as such they are not discussed or evaluated further in this EIS.

4.5.4 Habitats of Species of Conservation Concern

Provincial rankings are used by the Natural Heritage Information Centre to set protection priorities for rare species, similar to those described in Section 4.5.2 above for vegetation communities. Provincial rankings (S-ranks) are not legal designations such as those used to define the various protection statuses of species at risk, they are only intended to consider factors within the political boundaries of Ontario that might influence a particular species abundance, distribution or population trend.

Based on the guidance provided in the Significant Wildlife Habitat Ecoregion Criterion Schedules (MNRF, 2015), when a plant or animal element occurrence is recorded for any species with an S-rank of S1 (extremely rare), S2 (very rare), S3 (rare to uncommon) or SH (historically present), the corresponding vegetation ecosite is considered to provide *candidate* habitat for species of conservation concern and further consideration within the EIS is warranted.

The Significant Wildlife Habitat Ecoregion Criterion Schedules (OMNRF, 2015) Provides five general habitat types known to support a wide range of species of conservation concern in Ontario. The five general habitat types for Ecoregion 6E-12 are provided in Table C.3 in Appendix C, including a brief rationale as to why they are or are not considered further in this EIS.

Following review of Table C.3 in Appendix C, one habitat of species of conservation concern has been identified on-site, habitat for special concern and rare wildlife species for snapping turtle.

4.5.4.1 Special Concern and Rare Wildlife Species SWH

Based on observation data from the NHIC one species of special concern has been identified on-site and within the broader study area, snapping turtle. No other species of special concern or rare wildlife species were identified on-site or within the broader study area.

The snapping turtle (*Chelydra serpentina*) is a highly aquatic turtle species with an S-rank of S3 (rare to uncommon) in Ontario. Snapping turtles are aquatic generalists, found in a variety of wetlands, water bodies and watercourses. The NHIC identified snapping turtle as having historically occurred within 1 km of the site. However, observation data from NHIC for snappers, likely associated with the waterbodies located approximately 460 m west of the site as it provides

more suitable aquatic habitats to support overwintering and foraging habitats. Sawmill Creek on-site may support snapping turtles, but limited to foraging and transitory pathways between other habitats. Snapping turtles were not observed during field investigation. Aquatic habitat on-site consisted of Sawmill Creek, which may provide foraging and transitory habitat between other aquatic habitats, but does not provide suitable over-wintering habitats. Potential impacts to snapping turtles are discussed in Section 6.

No other species of special concern or rare wildlife species were identified on-site or within the broader study area.

4.5.5 Animal Movement Corridors

Animal movement corridors are elongated areas used by wildlife to move from one habitat to another and allow for the seasonal migration of animals (OMNRF, 2015). The Significant Wildlife Habitat Ecoregion Criterion Schedules for Ecoregion 6E-12 (OMNRF, 2015) identifies two types of animal movement corridor: amphibian movement corridors and deer movement corridors. As per guidance presented in MNRF, 2015, animal movement corridors should only be identified as significant wildlife habitat when a *confirmed or candidate* significant wildlife habitat has been identified by the MNRF district office or by the regional planning authority.

Following review of Table C.4 in Appendix C, no animal movement corridors have been identified on-site. Furthermore, the MNRF has not identified any animal movement corridors on the publicly available data sets for wildlife values area (OMNRF, 2020a) or wildlife values site (OMNRF, 2020b). As such, animal movement corridors are not discussed or evaluated further in this EIS.

4.6 Fish Habitat

The protection of fish and fish habitat is a federal responsibility and is administered by the Department of Fisheries and Oceans Canada (DFO). Fish habitat as defined in the Fisheries Act (Canada, 1985) means, “spawning grounds and nursery, rearing food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.”

When development is unable to avoid resulting in the harmful alteration, disturbance or destruction (HADD) of fish habitat from typical project impacts such as temperature change, sedimentation, infilling, reduction of nutrient and food supply, etc., an authorization under the Fisheries Act is required for the project to proceed.

A fisheries assessment was not conducted as part of this EIS. However, as discussed in Section 3.3 above, Sawmill Creek is known to provide cool/warm water habitat to a variety of fish species, of which, small-bodied species were observed during the site investigation.

Potential impacts to fish and fish habitat from the proposed development are discussed in Section 6.

4.7 Species at Risk

The probability of occurrence for species at risk (SAR) to occur on-site and within the broader study area was determined through the desktop review stage of this EIS, as described in Section 2.1, and through the site-specific field investigation conducted as part of this EIS, outlined in Section 2.2.

Table C.5 in Appendix C, provides a summary of all SAR which were determined to have the potential to occur on-site or within the broader study area, their protection status under the provincial Endangered Species Act (Ontario, 2007), their regional distribution, their probability of occurrence and a brief rationale of that probability. Impacts to endangered or threatened SAR determined to have a moderate or high potential to occur on-site or within the broader study area are discussed further in the Section 6.3.

5.0 PROPOSED PROJECT

The proposed project assessed for potential impacts on the natural heritage features determined to be present within the broader study area, is in support the proposed industrial development for the property located at 1319 Johnston Road, Ottawa, Ontario, formerly known as 2079 Artistic Place.

The proposed development consists of eight buildings with footprints ranging from approximately 1200 – 2500 square metres, on an existing 4.89 ha commercial property. The proposed development also includes sidewalks and areas for parking. Access to the proposed development will be from Johnston Road. The proposed development plan is provided on Figure A.4.

Future components of the proposed project considered in the impact assessment presented in Section 6 include: tree clearing and vegetation grubbing, fill placement and elevation grading, laneway construction, excavation and pouring of foundations, and general landscaping activities.

Stormwater runoff collected on the subject site will be discharged to the existing 1800 storm sewer that runs in an easement through the site and ultimately discharges to the Sawmill Creek. Existing stormwater runoff is directed to the boundaries of the property. Ditches/streams that are tributary to Sawmill Creek run along the property lines to collect the sites current stormwater runoff.

The Site Servicing and Stormwater Management Report (Robinson, 2023) is provided in Appendix E. The stormwater management plan for the property will include quality control so pre- and post-levels are maintained. Quality Control Quality control will be provided by oil-grit separators to achieve 80% TSS reduction prior to discharge.

6.0 IMPACT ASSESSMENT

Potential impacts to natural heritage features on-site and within the broader study area are assessed for direct, indirect and cumulative effects based on the proposed project outlined in Section 5. Natural heritage features identified in Section 4 of this report as present or likely to be present are discussed in the subsections below.

Potential effects to the environment of the site from the proposed development outlined in Section 5 include: an increase in impervious surface, increase in stormwater generation, short-term increases in sedimentation and/or erosion and increased noise generation.

6.1 Significant Wildlife Habitat

The potential presence of SWH on-site and within the study area was evaluated in Section 4.5. As a result of this assessment, one type of SWH was determined to be present on-site or within the study area special concern and rare wildlife habitat for snapping turtle.

6.1.1 Special Concern and Rare Wildlife Species SWH – Snapping Turtle

Snapping turtle is the largest freshwater turtle found in Canada; in central Ontario, males average 32 cm in carapace length and have an average mass of 9.3 kg (COSEWIC, 2008). The carapace is keeled and can be brown, black or olive in colour (COSEWIC, 2008). The plastron is cross-shaped and is small, leaving the limbs and sides of the body exposed (COSEWIC, 2008). The head of a snapping turtle is large with a hooked upper jaw, relatively long neck, and tail that can be as long as the carapace (COSEWIC, 2008). In Ontario, the snapping turtle is listed as a species of special concern.

Threats to snapping turtle are primarily related to their life history: their slow recruitment, late maturity, long lifespan and high adult survival makes them extremely vulnerable to a variety of anthropogenic impacts (COSEWIC, 2008). Short, cool summers also reduce hatching success. In Canada, snapping turtles are most impacted by events that increase adult mortality, such as harvesting of adults, persecution and road mortality (COSEWIC, 2008). Other threats include loss of habitat, environmental contamination, and nest predation (COSEWIC, 2008).

Snapping turtle was not observed on-site during the field investigation but occurrence data from NHIC indicates the species has occurred within 1 km of the property.

As no in-water work is anticipated and considering the scope of the project, impacts are anticipated to be minimal, mostly indirect and temporary in nature. Impacts to snapping turtle are primarily associated with impacts to surface water features, specifically Sawmill Creek and the off-site unnamed permanent watercourse.

Indirect impacts to snapping turtle may include alterations to water quality due to nutrient and sediment loading and alterations to the hydrologic regime due to slight increases in impermeable

surfaces and stormwater runoff, as well as encroachment resulting in compaction of soils and vegetation loss. Additional indirect impacts may also include increased human-wildlife interaction associated with migrating turtles, particularly during nesting season, when turtles move between winter and summer habitats.

Other potential impacts may include short duration construction impacts, including: heavy machinery encroachment, fill placement and long term human disturbance such as noise generation, dumping or refuse and yard waste and trampling.

However, given the nature of the proposed development, in an already heavily disturbed area, as well as abundance of better suited and available aquatic habitat approximately 380 m west of the site, impacts from the proposed development are anticipated to be negligible.

Mitigation measures intended to prevent negative impacts to snapping turtles are presented in Section 7.

6.2 Fish Habitat

According to the Provincial Policy Statement (MMAH, 2020), “development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.” Fish habitat as defined in the Fisheries Act (Canada, 1985) means “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.”

Under the Fisheries Act, protection is afforded to all fish and fish habitat, not just those that support either a recreational, commercial or Aboriginal fishery. Under the Fisheries Act, work that is conducted in or near waterbodies must avoid “the death of fish, other than by fishing” (Canada, 1985). Furthermore, the new Fisheries Act states that work must avoid “the harmful alteration, disruption or destruction (HADD) of fish habitat” (Canada, 1985).

When activities are unable to avoid or mitigate harm to fish or fish habitat from typical project impacts such as temperature change, sedimentation, infilling, reduction of nutrient and food supply, etc., an authorization under Subsection 35 (2) of the Fisheries Act is required for the project to proceed without contravening the Act.

As no in-water work is proposed, direct impacts to fish habitat are not anticipated. However, considering the scope of the project and abundance of available habitat, impacts are anticipated to be minimal, mostly indirect and temporary in nature.

Potential indirect impacts to surface water features resulting from construction activities and from increased runoff following construction may include alterations to water quality, increased storm water runoff, overland flow and concomitant sediment transport caused by an increase in impervious surface area and vegetation loss, as well as increased nutrient loading through both

overland and subsurface pathways, and landscaping practices. However, impacts are anticipated to be negligible when considering the scope of the project, surrounding existing land use, and abundance of habitat available up and downstream of site.

Mitigation measures intended to protect fish and fish habitat from negative impacts are discussed in Section 7.

6.3 Species at Risk

As outlined in the Endangered Species Act (Ontario, 2007), only species listed as threatened or endangered and their general habitat receive automatic protection. When a species-specific recovery strategy is developed, a specific habitat regulation will be established, which eventually replaces the automatic habitat protection. Species of special concern and their habitat do not receive protection under the ESA.

Potential impacts associated with the proposed project to threatened or endangered species identified as having a moderate or high potential to occur on-site in Section 4.7, are discussed on a species-by-species basis in the subsections below.

6.3.1 Eastern Small-footed Myotis

Eastern small-footed myotis (*Myotis leibii*) is the smallest (typically 3-5 g), insectivorous bat found in Ontario. The fur of an eastern small-footed myotis is golden-brown in colour, with a distinct black mask across the face. The eastern small-footed myotis is very similar in appearance to the little brown myotis and is distinguishable by their small foot and keeled calcar (Fraser, MacKenzie & Davy, 2007).

The eastern small-footed myotis is found throughout eastern North America. In Ontario, the species has been observed in the areas south of Lake Superior across to the Ontario-Quebec border (Humphrey, 2017).

Eastern small-footed myotis overwinter primarily in caves and abandoned mines with low humidity and temperatures and stable microclimates (Humphrey, 2017). In comparison to other Ontario bat species, they are able to tolerate much colder temperatures, drier conditions and draftier locations for hibernating (Humphrey, 2017). During the spring and summer months, they utilize a variety of habitats for roosting, including under rocks or rock outcrops, in buildings, under bridges, or in caves, mines or hollow trees (Ontario, 2021a).

Although the vegetation community on-site does not meet the requirements to support bat maternity colonies, given the availability of habitat and buildings within the study area, there is a potential for eastern small-footed myotis to occur on the property, primarily for foraging or non-maternal roosting. Impacts to eastern small-footed myotis are primarily associated with habitat loss, encroachment and increased wildlife-human interaction.

Mitigation measures intended to protect eastern small-footed myotis from impacts of the proposed development are discussed in Section 7.

6.3.2 Little Brown Myotis

Little brown myotis (*Myotis lucifugus*) is a small (typically 4-11 g), insectivorous bat. The fur of a little brown myotis is bi-coloured; fur is a glossy brown with a darker coloured base. The tragus of the little brown myotis is long and thin, with a rounded tip (Fraser, MacKenzie & Davy, 2007).

In Canada, little brown myotis' occur throughout all of the provinces and territories (except Nunavut), with its range extending south through the majority of the United States as well. In Ontario, the little brown myotis is widespread in southern Ontario and has been found as far north as Moose Factory and Favourable Lake (Ontario, 2021b).

Little brown myotis overwinter in caves and abandoned mines, they require highly humid conditions and temperatures that remain above the freezing mark (Ontario, 2021b). During the summer months, maternity colonies are often located in buildings or large-diameter trees. Little brown myotis roost in trees and buildings. Foraging occurs over water and along waterways, forest edges and in gaps in the forest. Open fields and clear-cuts are not typically utilized for foraging (COSEWIC, 2013).

Although the vegetation community on-site does not meet the requirements to support bat maternity colonies, given the availability of habitat and buildings within the study area, there is a potential for little brown myotis to occur on the property, primarily for foraging or non-maternal roosting. Impacts to little brown myotis are primarily associated with habitat loss, encroachment and increased wildlife-human interaction. Mitigation measures intended to protect little brown myotis from impacts of the proposed development are discussed in Section 7.

6.3.3 Tri-colored Bat

Tri-colored bat (*Perimyotis subflavos*) is a small (typically 5-7 g), insectivorous bat. The fur is uniformly coloured on the ventral and dorsal sides, however, when parted fur shows three distinct colour bands. The base of the hair is blackish, with a blonde middle and brownish tip. The snout of the tri-coloured bat is also distinct, with swollen bulbous glands present (Fraser, MacKenzie & Davy, 2007).

In Canada, the tri-colored bat has only been recorded in southern parts of Nova Scotia, New Brunswick, Quebec and central Ontario. In Ontario, it occurs primarily from the southern edge of Lake Superior across to the Ontario-Quebec border and south (COSEWIC, 2013).

Tri-colored bat overwinter in caves or mines and have very rigid habitat requirements; they typically roost in the deepest parts where temperatures are the least variable and have the strongest correlation with humidity levels and warmer temperatures (COSEWIC, 2013). In the spring and summer, tri-colored bat utilizes trees, rock crevices and buildings for maternity

colonies. Foraging is mainly done over watercourses and streamside vegetation (COSEWIC, 2013).

Although the vegetation community on-site does not meet the requirements to support bat maternity colonies, given the availability of habitat and buildings within the study area, there is a potential for tri-colored bat to occur on the property, primarily for foraging or non-maternal roosting. Impacts to tri-colored bat are primarily associated with habitat loss, encroachment and increased wildlife-human interaction. Mitigation measures intended to protect tri-colored bat from impacts of the proposed development are discussed in Section 7.

6.4 Cumulative Impacts

Potential cumulative impacts associated with the proposed project include minor increases in stormwater generation, sediment and nutrient loading to aquatic features, and the minor loss of young regenerative vegetation.

Cumulative impacts to the natural environment at the site due to increased human presence, increased wildlife and human interaction and increased noise, are expected to be negligible given the existing commercial and suburban development in the surrounding study area.

Cumulative impacts such as those listed above can be mitigated by implementing the proposed setbacks and recommended mitigation measures outlined in Section 7 below.

7.0 RECOMMENDED AVOIDANCE AND MITIGATION MEASURES

The following avoidance and mitigation measures have been recommended by GEMTEC in order to minimize or eliminate potential environmental impacts identified in Section 6. As such, the following avoidance and mitigation measures should be enforced throughout the development through application of Site Plan Controls.

For the purpose of this report, a setback is defined as the minimum required distance between any structure, development or disturbance and a specified line. A buffer, for the purpose of this report, is defined as the area located between a natural heritage feature and the prescribed setback. For the purpose of the following subsections, buffers should be located between natural heritage features and lands subject to development or alteration, be permanently vegetated by native or non-invasive, self-sustaining vegetation and protect the natural heritage feature against the impact of the adjacent land use.

Vegetated buffers, particularly buffers that are vegetated with a mix of grassy herbaceous vegetation and shrubby or woody vegetation are most effective in mitigating impacts associated with anthropogenic activities in adjacent lands (Beacon, 2012). Buffers recommended in the following subsections and illustrated on Figure A.6, are done so within the context of the existing environmental disturbances but also to promote reasonable natural rehabilitation. In the subsections below, where possible, literature references for studies used as the basis of the recommended buffer widths are provided.

Where applicable, mitigation measures provided in the subsections below follow the guidelines as outlined in the City of Ottawa Protocol for Wildlife Protection during Construction (Ottawa, 2022b).

7.1 Fish Habitat

No negative impacts on the integrity of fish habitat within Sawmill Creek or other tributaries are anticipated as a result of the proposed development if all mitigation measures recommended below are enacted, and best management practices are followed.

Watercourse buffer widths have a moderate risk of not providing adequate mitigation for water quality impacts and for human disturbance/land use change impacts at widths between 11 metre and 30 metre and low risk at widths of less than 5 metre to 10 metre. Watercourse buffer widths have a low risk of not providing adequate mitigation for core habitat protection at widths between 5 metre and 20 metre (Beacon, 2012).

In consideration of Sawmill Creek, and in accordance with the City of Ottawa's OP policies a minimum 30 m setback from top of bank is required and sufficient to protect fish habitat within Sawmill Creek.

In consideration of the tributary of Sawmill Creek that runs along the north property boundary, a minimum 15 m setback from top of bank is required and sufficient to protect fish habitat within the tributary.

With the exception of work necessary for re-planting and re-vegetating in accordance with the proposed Landscape Plan, no development, site alteration or vegetation removal is permitted within the prescribed setbacks. Work within the proposed setbacks will be limited to those that contribute to the enhancement of the riparian and stream corridor and may include removal of structures and degraded areas currently within the setbacks, alterations to support grading for landscaping, placement of suitable topsoil, landscape plantings, and other activities required to make the area suitable for planting and ecological remediation. Any work completed within the setback should be demarcated using sediment fencing along the creek-side edge of disturbance.

The location of the setbacks in relation to site features is illustrated on Figure A.5 in Appendix A.

General mitigation measures recommended for the protection of water quality and fish habitat include:

- Buffers should be comprised of a mixture of native, self-sustaining trees, shrubs, and tall grasses.
- As much of the surrounding vegetation and natural environment as possible, should be maintained, while still allowing for buildout of the proposed development.
- Sediment fencing should be installed along the creek-side edge of the working area to provide visual demarcation of the setbacks, and to prevent machinery encroachment and sediment transport. While working within the proposed setbacks for the purpose of landscaping and remediation of the stream corridor, the minimum footprint required to conduct the necessary construction activities should be considered as the working area.
- All future development and construction activities within the study area, including ditching, culvert installation, erosion and sediment control, and stormwater management, should be completed in accordance with Ontario Provincial Standard Specification 182 and OPSS 805.
- Install and maintain effective sediment and erosion control measures before starting work.
- Schedule work to avoid wet, windy and rainy periods.
- When native soil is exposed, sediment and erosion control work in the form of heavy-duty sediment fencing shall be positioned along the down gradient edge of any construction envelopes adjacent to waterbodies.
- No in-water work is anticipated for this project. Should any in-water work be required, a DFO Request for Review will be required and no in-water work should occur between October 1 and March 15 of any year to protect spawning fish habitat adjacent to the development area. All in-water habitat features, including aquatic vegetation, natural woody debris and boulders should be left in their current locations in the near shore area.

7.2 Significant Wildlife Habitat

7.2.1 Habitats of Species of Concern and Rare Wildlife Species – Snapping Turtle

Mitigation measures as prescribed above for the protection of fish habitat are sufficient to protect habitats of species of conservation concern; snapping turtle.

7.3 Species at Risk

7.3.1 Eastern Small-footed Myotis, Little Brown Myotis & Tri-colored Bat

To protect roosting and foraging bats, tree removal where required should take place outside of the spring and summer active season (typically March 15 to November 30), when bats are more likely to be using forest habitat. If vegetation clearing must be conducted during the spring and summer timing window, then a roost survey should be conducted by a qualified professional.

7.4 Wildlife

The following avoidance and mitigation measures are provided in effort to minimize impacts to on-site and off-site wildlife:

- To protect wildlife during construction, construction should be completed in accordance with the best practices outlined in Protocols for Wildlife During Construction, from the City of Ottawa (Ottawa, 2022b), and Bird-Safe Design Guidelines from the City of Ottawa (Ottawa, 2022a).
- Vegetation removal should occur outside of March 15 to November 30 to avoid the key breeding bird period and bat summer active season. The timing window protects migratory birds and roosting bats and avoids contravention of the Migratory Bird Convention Act and Endangered Species Act. If vegetation clearing activities must take place during the aforementioned timing window, then a nest and roost survey shall be conducted by a qualified professional.
- Silt fence barriers should be installed around the entire construction envelope to prohibit the emigration of wildlife into the construction area. Silt fencing should be checked daily and following each precipitation event.
- Reptile exclusion fencing should be installed around the entire construction area prior to construction commencing to prohibit the movement of turtles and amphibians into the construction area. Reptile exclusion fencing should follow guidelines established in *Species at Risk Branch Best Practices Technical Note – Reptile and Amphibian Exclusion Fencing* (OMNRF, 2013b).
- Cover all stockpiled material with a geotextile to prevent turtles from nesting in the material between April 1 and October 31.
- Perform daily pre-work sweeps of the construction area to ensure no species at risk are present and to remove any wildlife from inside the construction area.
- Should any species at risk be discovered throughout the course of the proposed works, the species at risk biologist with the local MECP district shall be contacted immediately

and operations ceased to avoid any negative impacts to species at risk or their habitat until further direction is provided by the MECP.

7.5 Best Practice Measures for Mitigation of Cumulative Impacts

The following best practice measures are provided for the mitigation of cumulative impacts resulting from general construction and development activities;

- To protect trees identified to be retained during construction, the Critical Root Zone (CRZ) should be identified and fenced. The CRZ is defined as 10 cm from the base of the tree for every centimetre in diameter of the tree trunk measured at breast height.
- Maintain as much permeable surface as possible in future development plans to minimize the generation of stormwater runoff.
- Sediment fencing should be installed along all setbacks of the working areas to provide visual demarcation of the setbacks and to prevent machinery encroachment and sediment transport.
- Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized.
- In an effort to offset the effect of vegetation clearing, consideration should be given to landscape planting with native species indicative of the Great Lakes – St. Lawrence Forest region, such as white cedar, white spruce, red maple and red oak.

A landscape plan (James B. Lennox & Associates Inc.) detailing vegetative plantings has been provided and included in Appendix D. The plan illustrates vegetative cover to be planted between Sawmill Creek, its tributaries and the development area on-site. This plan effectively vegetates the 30 m setback buffer prescribed for the protection of fish habitat and water quality. Where the 30 m buffer currently exists, will see an increase in approximate 1.4 ha of vegetation plantings, ultimately resulting in a net positive result in tree / vegetation cover on-site. The plan makes notes that some existing trees and vegetation groups will remain, in addition the planting of a mixture of vegetative species including deciduous trees, coniferous trees, shrubs, grasses, sod, and riparian plantings.

8.0 CONCLUSIONS

The proposed project supported by this EIS is a proposed industrial development including eight buildings, sidewalks, and parking areas on an existing 4.89 ha commercial property.

Based on the results of the impact analysis, impacts to the natural environment are anticipated to be minimal. Provided that mitigation measures recommended in Section 7 are implemented as proposed, no significant residual negative impacts are anticipated from the proposed future development.

Following review of the information pertaining to the natural heritage features of the site, the following general conclusions are provided by GEMTEC in regards to the Environmental Impact Statement.

- No significant negative impacts to natural heritage features identified on-site, including fish habitat, significant wildlife habitat and habitats of species at risk, from future industrial construction are anticipated.
- The proposed project complies with the natural heritage policies of the Provincial Policy Statement.
- The proposed development complies with the natural heritage policies of the City of Ottawa Official Plan.

9.0 LIMITATION OF LIABILITY

This report and the work referred to within it have been undertaken by GEMTEC Consulting Engineers and Scientists Ltd (GEMTEC) and prepared for Queastus Management Corp. and is intended for the exclusive use of Queastus Management Corp. This report may not be relied upon by any other person or entity without the express written consent of GEMTEC, or Queastus Management Corp. Nothing in this report is intended to provide a legal opinion.

The investigation undertaken by GEMTEC with respect to this report and any conclusions or recommendations made in this report reflect the best judgements of GEMTEC based on the site conditions observed during the investigations undertaken at the date(s) identified in the report and on the information available at the time the report was prepared.

This report has been prepared for the application noted and it is based, in part, on visual observations made at the site, all as described in the report. Unless otherwise stated, the findings contained in this report cannot be extrapolated or extended to previous or future site conditions, or portions of the site that were unavailable for direct investigation.

Should new information become available during future work or other studies, GEMTEC should be requested to review the information and, if necessary, re-assess the conclusions presented herein.

We trust this report provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.

Sincerely,

Emily Pentz, B.Sc.
Junior Biologist

Adam Alaimo, B.Sc.
Biologist

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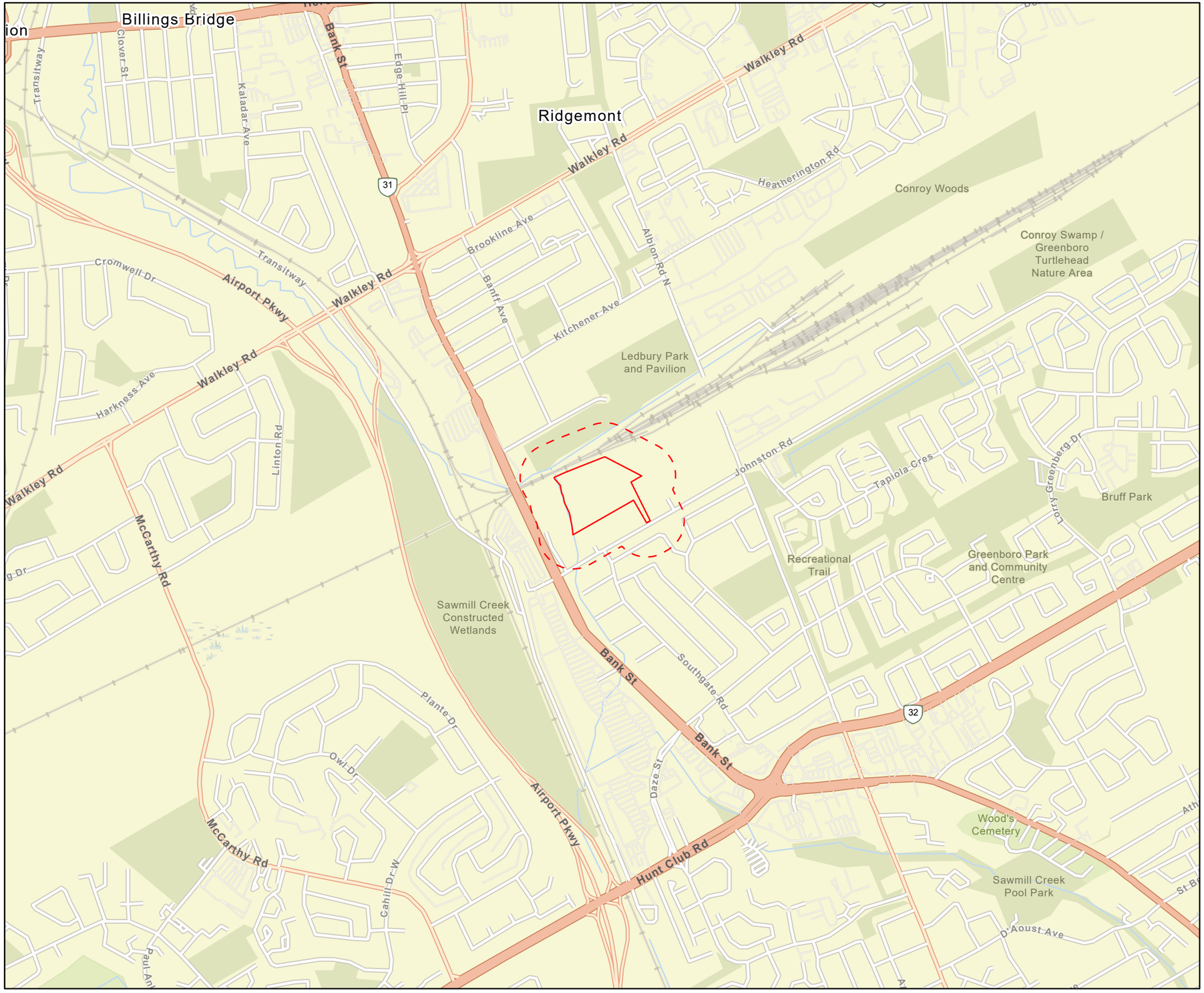
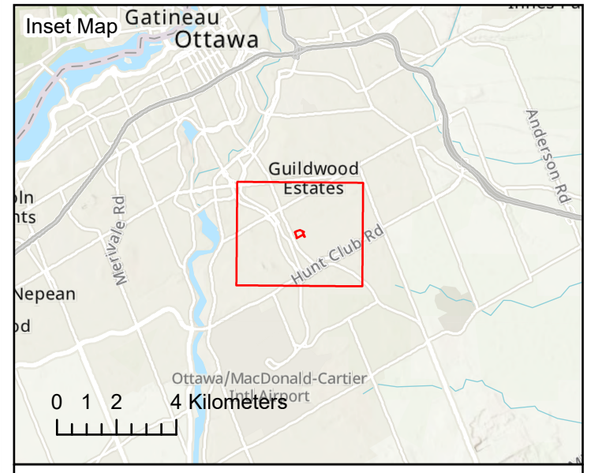
APPENDIX A

Report Figures
Figure A.1 – Site Location
Figure A.2 – Site Layout
Figure A.3 – Vegetation Communities
Figure A.4 – Development Concept
Figure A.5 – Natural Heritage Features
Figure A.6 – Mitigation Measures



Legend

- Property Boundary
- Study Area



Scale
1:20,000
0 250 500 1,000 1,500 Meters

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Client: Queastus Management Corp.

Project: 101481.008

Location: 1319 Johnston Road, Ottawa, Ontario

Drwn By: EP | Chkd By: TW

Site Location

Date: August 2023

Rev. 1

Figure: A.1

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World Topographic Map: City of Ottawa, Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, USDA, NRCan, Parks Canada
World Street Map: City of Ottawa, Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

Legend

- Property Boundary
- Study Area
- Watercourse

Scale
1:3,000
0 25 50 100 150 200 Meters

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Project: 101481.008

Location
1319 Johnston Road
Ottawa, Ontario

Drwn By: EP | Chkd By: AA | Site Layout

Date: August 2023

Rev. 1

Figure: A.2

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World Imagery: Maxar, Microsoft
Hybrid Reference Layer: Esri Community Maps Contributors, City of Ottawa, Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

Legend

- Property Boundary
- Study Area
- Watercourse
- Vegetation Community

CVC_2 = Light Industry
FODM7-3 = Fresh - Moist Willow Lowland Deciduous Forest

Scale
1:3,000
0 25 50 100 150 200 Meters

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Location
1319 Johnston Road
Ottawa, Ontario

Drwn By: EP
Chkd By: AA

Vegetation Communities

Date: August 2023

Rev. 1

Figure: A.3

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World Imagery: Maxar, Microsoft
Hybrid Reference Layer: Esri Community Maps Contributors, City of Ottawa, Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

Legend

- Property Boundary
- Study Area
- Watercourse

Development Concept

- Proposed Building
- Proposed Concrete
- Proposed Waste Management Enclosure
- Proposed Easement
- Proposed Landscape Plan
- Proposed Service Road
- Proposed Parking
- Proposed Curb

Scale
1:2,000
0 25 50 100 150 Meters

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Client: Queastus Management Corp.
Project: 101481.008

Location: 1319 Johnston Road, Ottawa, Ontario

Drwn By: EP | Chkd By: AA | Development Concept

Date: August 2023

Rev. 1

Figure: A.4

Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World Imagery: Maxar, Microsoft
Hybrid Reference Layer: Esri Community Maps Contributors, City of Ottawa, Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

Legend

- Property Boundary
- Study Area
- Watercourse
- Proposed Development Concept
- Proposed Landscape Plan
- 15 m Setback
- 30 m Setback

Scale
1:3,000
0 25 50 100 150 200 Meters

GEMTEC
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Client: Queastus Management Corp.

Project: 101481.008

Location
1319 Johnston Road
Ottawa, Ontario

Drwn By:	Chkd By:	Mitigation Measures
EP	AA	

Date: August 2023

Rev. 1

Figure: A.5

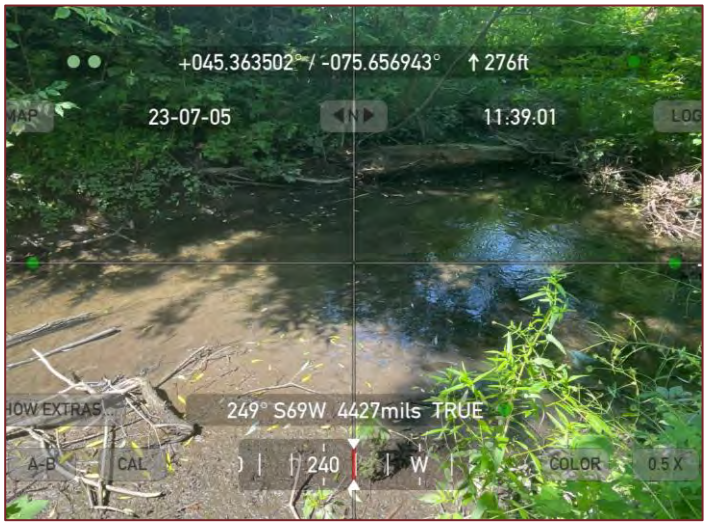
Coordinate System: NAD 1983 UTM Zone 18N
Service Layer Credits: World Imagery: Maxar, Microsoft
Hybrid Reference Layer: Esri Community Maps Contributors, City of Ottawa, Province of Ontario, Esri Canada, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, NRCan, Parks Canada

APPENDIX B

Site Photographs

Site Photograph 1: Stockpile area for landscape business (CVC_2).

Site Photograph 2: Garden center within CVC_2.



Site Photograph 3: Sawmill Creek near confluence.

Site Photograph 4: Sawmill Creek throughout CVC_2.

Site Photograph 5: Example of deciduous inclusion within CVC_2.

Site Photograph 6: Fresh-Moist Willow Lowland Deciduous Forest (FODM7-3).

Site Photograph 7: Patch of vegetation within CVC_2.

Site Photograph 8: Permanent unnamed watercourse along northern property boundary.

APPENDIX C

Report Summary Tables

TABLE C.1
SCREENING RATIONALE FOR HABITATS OF SEASONAL CONCENTRATION AREAS

Wildlife Habitat	Further Considered in EIS	Rationale
Waterfowl Stopover and Staging Areas	No	No suitable aquatic or terrestrial habitat on-site to provide SWH for waterfowl stopover and staging areas. No indicator species observed on-site during the site investigation.
Shorebird Migratory Stopover Area	No	Shorebird stopover sites are typically well-known and have a long history of use. The site does not contain suitable shoreline habitat for shorebird foraging.
Raptor Wintering Area	No	The site does not contain both forest and upland habitat, and does not meet the candidate habitat criteria to support raptor wintering area.
Bat Hibernacula	No	Cave and crevice habitat is not present on-site or within the study area.
Bat Maternity Colonies	No	No woodland habitat on-site to meet the minimum snag density (>10 snags/hectare) requirement for bat maternity colonies.
Turtle Wintering Area	No	No suitable wetlands are present on-site to support turtle wintering areas.
Reptile Hibernaculum	No	No structures such as large rock piles, bedrock outcrops, cervices or other karstic features have been identified on-site.
Colonial Bird Nesting Habitat	No	No suitable habitat located on-site or within the study area to support colonial bird nesting.
Migratory Butterfly Stopover Area	No	The site is not located within 5 km of Lake Ontario and therefore does not meet the defining criteria.
Landbird Migratory Stopver Area	No	The site is not located within 5 km of Lake Ontario and therefore does not meet the defining criteria.
Deer Yarding Areas and Winter Congregation Areas	No	As outlined in the the Signficant Wildlife Habitat Criteria Schedules (OMNRF, 2015) winter deer yards and deer managment are an MNRF responsibility. Based on review of publically available data from the OMNRF on Land Information Ontario Geo-hub, no Stratum I deer yards, Stratum II deer yards, or winter congregation areas have been identified on-site or within the broader study area. The closest deer yard to site is a patch of Stratum I deer yard located approximately 11 km to the west.

TABLE X.X
SCREENING RATIONALE FOR RARE VEGETATION COMMUNITIES

Rare Vegetation Community	Further Considered in EIS	Rationale
Cliffs and Talus Slopes		
Sand Barren		
Alvar		
Old Growth Forest		
Savannah		
Tallgrass Prarie		
Other Rare Vegetation Communities		

Client:
Project Number:

TABLE C.2
SCREENING RATIONALE FOR SPECIALIZED WILDLIFE HABITATS

Specialized Wildlife Habitat	Further Considered in EIS	Rationale
Waterfowl Nesting Area	No	No wetland or upland habitat on-site to support waterfowl nesting area.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	No	The site is located >120 m from any habitat which could support foraging bald eagles or osprey. Nesting sites for these species are uncommon in Ecoregion 6E (MNRF, 2012).
Woodland Nesting Raptor Habitat	No	Nesting may occur in any ecosite and species preference is towards mature forest stands >30 ha with >10 ha of interior habitat with a 200 m buffer. Contiguous forest stands >30 ha are not present on-site and no sticks nests were observed on-site.
Turtle Nesting Habitat	No	No wetland or suitable habitat (exposed mineral soil with minimal vegetation cover) are present on-site.
Seeps and Springs	No	No seeps or springs were observed on-site.
Woodland Amphibian Breeding Habitat	No	Suitable wetland habitat adjacent to forest is not present on-site to support wetland amphibian breeding.
Wetland Amphibian Breeding Habitat	No	Suitable wetland habitat is not present on-site to support wetland amphibian breeding.
Woodland Area-Sensitive Bird Breeding Habitat	No	Woodland area-senstive birds require interior forest habitat located >200 m from the forest edge in large (>30 ha) forest stands. Woodlands on-site do not meet the defining criteria.

TABLE C.3
SCREENING RATIONALE FOR HABITATS OF SPECIES OF CONSERVATION CONCERN

General Habitats of Species of Conservation Concern	Further Considered in EIS	Rationale
Marsh Breeding Bird Habitat	No	No suitable wetland habitat have been identified on-site or within the study area.
Open Country Breeding Bird Habitat	No	No suitable meadow habitat on-site or withinn study area to support open country bird breeding.
Shrub/Early Successional Breeding Bird Habitat	No	Candidate early successional breeding bird habitat typically includes fallow fields transitioning to early successional forest habitats that are > 30 ha but have not been actively used for farming. No meadow habitat is present on-site to support successional breeding bird habitat.
Terrestrial Crayfish Habitat	No	Terrestrial crayfish are only found within southwestern Ontario (MNRF, 2012).
Special Concern and Rare Wildlife Species	Yes	No species of special concern were identified on-site during the site investigation. NHIC online ocurrance data indicates eastern wood-pewee and snapping turtle present within the 1km2 grid encompassing the site. Neither species observed on-site during investigation.

TABLE C.4
SCREENING RATIONALE FOR ANIMAL MOVEMENT CORRIDORS

General Habitats of Species of Conservation Concern	Further Considered in EIS	Rationale
Amphibian Movement Corridor	No	No amphibian movement corridors have been identified on-site during the site investigation, nor has it been identified by MNRF mapping. Additionally, no wetlands have been identified on site or within the study area.
Deer Movement Corridor	No	No cervid movement corridors have been identified on-site during the site investigation, nor has it been identified by MNRF mapping

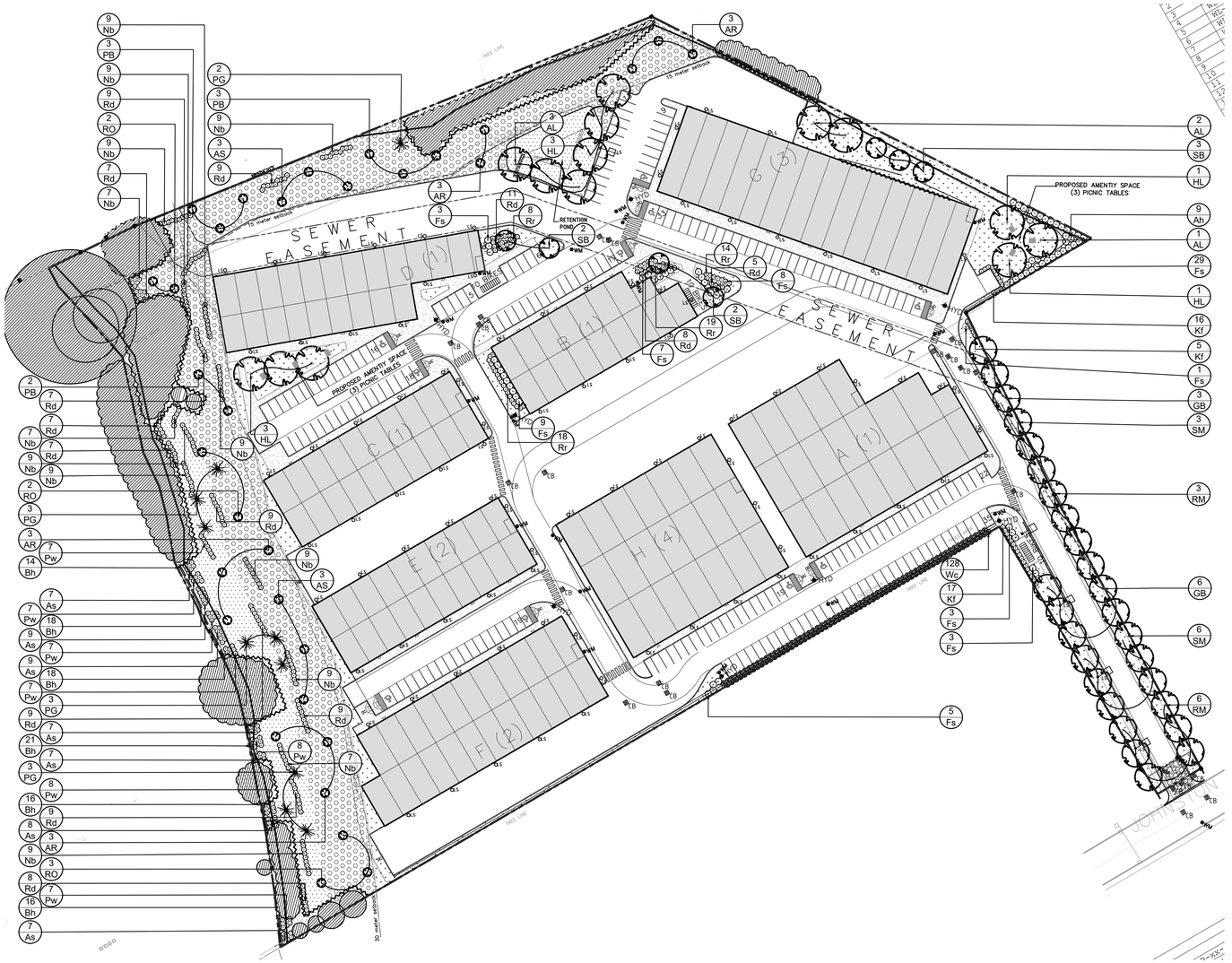
TABLE C.5
SCREENING RATIONALE FOR POTENTIAL SPECIES AT RISK ON-SITE OR WITHIN STUDY AREA

Species	ESA Status	Habitat Use	Probability of Occurrence On-Site or Within Study Area	Rationale
Avian				
Bank Swallow	Threatened	Colonial nester, burrows in eroding silt, to sand banks, sand pit walls, etc.	Low	Site lacks suitable habitat for nesting. Species not observed. No historical records for species in study area.
Barn Swallow	Special Concern	Nests in barns and other semi-open structures. Forages over open fields and meadows.	Low	Site lacks suitable structures and habitat to support nesting and foarging. Species not observed. No historical records for species in study area.
Bobolink	Threatened	Nests in dense tall grass fields and meadows, low tolerance for woody vegetation.	Low	No suitable grassland habitat on-site to support bobolink nesting or foraging.
Canada Warbler	Special Concern	Prefers wet forests with dense shrub layers	Low	Site lacks suitable habitat to support species.
Cerulean Warbler	Threatened	Prefers mature deciduous forest habitat.	Low	Site lacks suitable habitat to support species.
Chimney Swift	Threatened	Nests in traditional-style open brick chimneys.	Low	No anthropogenic structures on-site or within the study area to provide preferred habitat.
Common Nighthawk	Special Concern	Nests in a variety of open sites: beaches, fields and grave rooftops.	Low	Site lacks suitable habitat to support species.
Eastern Meadowlark	Threatened	Nests and forages in dense tall grass fields and meadows, higher tolerance to woody vegetation.	Low	No suitable grassland habitat on-site to support eastern meadowlark nesting or foraging.
Eastern Whip-poor-will	Threatened	Nests on the ground in open deciduous or mixed woodlands with little underbrush, and bedrock outcrops.	Low	NHIC online database indicates species present within 1km of site. However, no suitable habitat occurs on-site or within the study area to support species. Species not observed during site investigation.
Eastern Wood-Pewee	Special Concern	Woodland species, often found near clearings and edge habitat.	Low	NHIC online database indicates species present within 1km of site. Species not observed during site investigation. Suitable habitat may be present within study area, but not on-site.
Evening Grosbeak	Special Concern	Nests in trees or large shrubs, preference to large coniferous forests, will use deciduous. Overwinters in Ottawa.	Low	Suitable nesting habitat does not occur on-site.
Golden Eagle	Endangered	Nests on remote, bedrock cliffs, overlooking large burns, lakes or tundras	Low	Suitable nesting habitat does not occur on-site.
Golden-winged Warbler	Special Concern	Ground nesting, edge species. Breeds in successional scrub habitats surrounded by forests.	Low	Successional scrub habitat to support species not present on-site.
Grasshopper Sparrow	Special Concern	Ground-nesting grassland species. Prefers fields with low sparse vegetation on sand, alvars or poor soils.	Low	Suitable grassland habitat not present on-site.
Henslow's Sparrow	Endangered	Prefers open, moist, tallgrass fields.	Low	Suitable grassland habitat not present on-site.
Least Bittern	Threatened	Prefers marshes, shrub swamps, usually near cattails	Low	NHIC indicates species to be present within 1km of site, likely associated with wetlands west of site. No suitable habitat on-site or within the study area to support prefered habitat. Species not observed during site investigation.
Loggerhead Shrike	Endangered	Prefers grazed pastures with short grass and scattered shrubs, especially hawthorn.	Low	Preferred pasture habitat and shrub vegetation does not occur on-site.
Olive-sided Flycatcher	Special Concern	Forest edge species, forages in open areas from high vantage points in trees.	Low	No suitable forest on-site to provide suitable edge habitat to support species.
Peregrine Falcon	Special Concern	Nests on cliffs near water and on more anthropogenic structures such as tall buildings, bridges, and smokestacks.	Low	Suitable nesting habitat does not occur on-site.
Red-headed Woodpecker	Endangered	Prefers open deciduous woodlands, particularly those dominated by oak and beech.	Low	No suitable forest on-site to provide suitable habitat.
Rusty Blackbird	Special Concern	Wet wooded or shrubby areas (nests at edges of Boreal wetlands)	Low	Suitable habitat does not occur on-site.
Short-eared Owl	Threatened	Ground nester, prefers open habitats, fields and marshes.	Low	No suitable field or marsh on-site to support nesting habitat.
Wood Thrush	Special Concern	Prefers deciduous or mixed woodlands.	Low	No suitable forest on-site to provide suitable habitat.
Mammalian				

Eastern small-footed Myotis	Endangered	Roosts in rock crevices, barns and sheds. Overwinters in abandoned mines. Summer habitats are poorly understood in Ontario, elsewhere prefers to roost in open, sunny rocky habitat and occasionally in buildings (Humphrey, 2017).	Moderate	Available habitat on-site does not meet bat maternity colony requirements however the site and surrounding area may provide foraging and non-maternal roost habitat.
Little Brown Myotis	Endangered	Maternal colonies known to use buildings, may also roost in trees during summer. Affinity towards anthropogenic structures for summer roosting habitat and exhibit high site fidelity (Environment Canada, 2015).	Moderate	Available habitat on-site does not meet bat maternity colony requirements however the site and surrounding area may provide foraging and non-maternal roost habitat.
Northern myotis (Northern Long-eared Bat)	Endangered	Occurs throughout eastern North America in associated with Boreal forests. Roosts mainly in trees, occasionally anthropogenic structures during summer (Environment Canada, 2015). Overwinters in caves and abandoned mines.	Low	Species affinity is for Boreal forests and rarely roosts in anthropogenic structures. Subject property occurs at extreme southern end of species range and lacks preferred boreal forest habitat.
Tri-colored Bat	Endangered	Roosts in trees, rock crevices and occasionally buildings during summer. Overwinters in caves and mines.	Moderate	Available habitat on-site does not meet bat maternity colony requirements however the site and surrounding area may provide foraging and non-maternal roost habitat.
Reptilian				
Blanding's Turtle	Threatened	Inhabits quiet lakes, streams and wetlands with abundant emergent vegetation. Frequently occurs in adjacent upland forests.	Low	Site lacks aquatic habitats to support species. No hisotrical occurrence data present for species. Species not observed during site investigation.
Eastern Musk Turtle	Special Concern	Wetlands. Highly aquatic habtiats.	Low	Site lacks aquatic habitats to support species. No hisotrical occurrence data present for species. Species not observed during site investigation.
Eastern Ribbonsnake	Special Concern	Marshy edfes of wetlands and watercourses.	Low	Site lacks habitats to support species. No hisotrical occurrence data present for species. Species not observed during site investigation.
Northern Map Turtle	Special Concern	Highly aquatic species, found only in lakes and large rivers.	Low	Site lacks aquatic habitats to support species. No hisotrical occurrence data present for species. Species not observed during site investigation.
Snapping Turtle	Special Concern	Highly aquatic species, found in a wide variety of wetlands, water bodies and watercourses.	Moderate	NHIC database indicates species present within 1km of site. Species not observed during on-site investigation. Sawmill Creek may provide suitable foraging habtiat for species. Overwintering habitat not present on-site or study area.
Spotted Turtle	Endangered	Secretive wetland species.	Low	Site lacks aquatic habitats to support species. No hisotrical occurrence data present for species. Species not observed during site investigation.
Wood Turtle	Endangered	Primarily terrestrial forest species. Associated with clear, gravelly streams.	Low	Site lacks aquatic habitats to support species. No hisotrical occurrence data present for species. Species not observed during site investigation.
Plants				
American Ginseng	Endangered	Rich, moist, relatively mature deciduous forests.	Low	No suitable habitat on-site.
Black Ash	Endangered	Predominantly a wetland species, found in swamps, floodplains and fens.	Low	No suitable habitat on-site.
Butternut	Endangered	Inhabits a wide range of habitats including upland and lowland deciduous and mixed forests.	Low	Portions of the property are in an open and regenerative state. No Butternut were observed on-site. No historical butternut occurences have been reported on-site.
Lichens				
Pale-bellied Frost Lichen	Endangered	Grows on the bark of hardwood trees such as white ash, black walnut, American elm and ironwood. Can also be found growing on fence posts and boulders.	Low	Species believed to be extirpated from the Ottawa area.
Fish				
American Eel	Endangered	Primarily nocturnal, hiding in soft substrate or submerged vegetation during the day.	Low	Suitable habitat is not present on-site.
Bridle Shiner	Special Concern	Prefers clear water with abundant vegetation over silty or sandy vegetation	Low	Suitable habitat is not present on-site.
Channel Darter	Special Concern	Prefers clear water with abundant vegetation over silty or sandy vegetation	Low	Suitable habitat is not present on-site.

APPENDIX D

Landscape Plan (James B. Lennox & Associates Inc., 2023)



1 L.1 LANDSCAPE PLAN
SCALE 1:750

0 5 10 15 20m

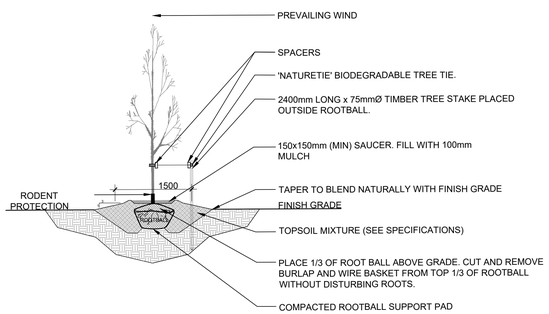
GENERAL NOTES:

1. IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR OR OFFICIAL TO REPORT ANY ERRORS, OMISSIONS OR DISCREPANCIES ON THIS PLAN WITH ACTUAL SITE CONDITIONS TO THE LANDSCAPE ARCHITECT BEFORE PROCEEDING WITH CONSTRUCTION.
2. THE CONTRACTOR IS TO NOTIFY ALL UTILITY COMPANIES AND AUTHORITIES PRIOR TO ANY EXCAVATION AND ASCERTAIN LOCATIONS OF UNDERGROUND SERVICES.
3. THE CONTRACTOR IS TO REINSTATE ALL AREAS AND ITEMS DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITY.
4. THE CONTRACTOR IS TO COMPLY WITH ALL PERTINENT CODES AND BY-LAWS.
5. THE CONTRACTOR IS TO MAINTAIN A POSITIVE SURFACE RUN-OFF THROUGHOUT THE ENTIRE CONSTRUCTION PERIOD.
6. THE LANDSCAPE ARCHITECT IS NOT RESPONSIBLE FOR SUBSURFACE CONDITIONS.
7. THE CONTRACTOR IS TO IDENTIFY ALL EXISTING TREES TO REMAIN ON SITE WITH THE LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR IS TO STAKE THE PROPOSED LOCATION OF ALL PLANT MATERIAL IN CONJUNCTION WITH THE LANDSCAPE ARCHITECT PRIOR TO EXCAVATION.
9. MINIMUM DISTANCES FOR SELECTED DECIDUOUS TREES ARE AS FOLLOWS:
   - 9.1. BUILDING FOUNDATIONS - 7.5M
   - 9.2. SIDEWALKS - 1.5M
   - 9.3. PUBLIC STREETS - 2.5M
   - 9.4. UNDERGROUND INFRASTRUCTURE - 2.0M
10. ALL TREES WITHIN 1M OF UNDERGROUND UTILITY TRENCHES ARE TO BE EXCAVATED BY HAND.
11. REMOVE ALL PROTECTIVE WRAPPING FROM TREE TRUNKS AFTER INSTALLATION.
12. STAKING OF TREES SHALL ONLY BE PERFORMED IF NECESSARY.
13. ENSURE THAT MULCH IS PULLED BACK A MINIMUM DISTANCE OF 75MM FROM BASE OF TREE TRUNK.

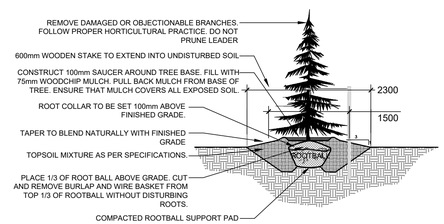
PROPOSED PLANT LIST (QTY. KEY)

KEY	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONDITION	REMARKS
TREES						
AL	6	*Tilia americana*	American Linden	50mm cal.	B&B	
AR	11	*Acer rubrum*	Red Maple	50mm cal.	B&B	
AS	6	*Acer saccharum*	Sugar Maple	3m HT	Potted	
GB	9	*Ginkgo biloba*	Maidenhair Tree	50mm cal.	B&B	
HL	8	*Gleditsia triacanthos var. inermis 'Shademaster'*	Shademaster Honey Locust	50mm dia.	B&B	
PB	8	*Betula papyrifera*	Paper Birch	3m HT	Potted	
PG	4	*Picea glauca*	White Spruce	1800mm ht.	B&B	
RM	9	*Acer rubrum*	Red Maple	3m HT. Potted	Potted	
RO	7	*Quercus rubra*	Red Oak	3m HT. Potted	Potted	
SB	7	*Amelanchier canadensis*	Serviceberry	50mm cal.	B&B	
SM	9	*Acer saccharum*	Sugar Maple	50mm cal.	B&B	
SHRUBS						
Ah	9	*Hydrangea arborescens*	Annabelle Hydrangea	600mm ht.	Potted	Space 1000mm O.C.
As	54	*Myrica gale*	Sweetgale	600mm ht.	Potted	Space 1000mm O.C.
Bh	103	*Diervilla lonicera*	Bush Honeysuckle	250mm ht.	Potted	Space 1000mm O.C.
Fs	70	*Sobaria sorbifolia 'Sem'*	Sem False Spirea	600mm ht.	Potted	Space 1000mm O.C.
Nb	102	*Viburnum lentago*	Nannyberry	600mm Potted	Potted	Space 1800mm O.C.
Pw	51	*Salix discolor*	American Pussy Willow	600mm Potted	Potted	Space 1200mm O.C.
Rd	102	*Cornus sericea*	Red Osier Dogwood	800mm ht.	Potted	Space 1200mm O.C.
Rr	76	*Rosa rugosa*	Rugosa Rose	600mm ht.	Potted	Space 1000mm O.C.
Wc	128	*Thuja occidentalis 'Clumps'*	Eastern White Cedar Clumps	1500mm ht.	Potted	Space 800mm O.C. 3 or more trunks
ORNAMENTAL GRASSES						
Kf	38	*Calamagrostis x acutiflora 'Karl Foerster'*	Karl Foerster Grass	250mm Potted	Potted	Space 800mm O.C.

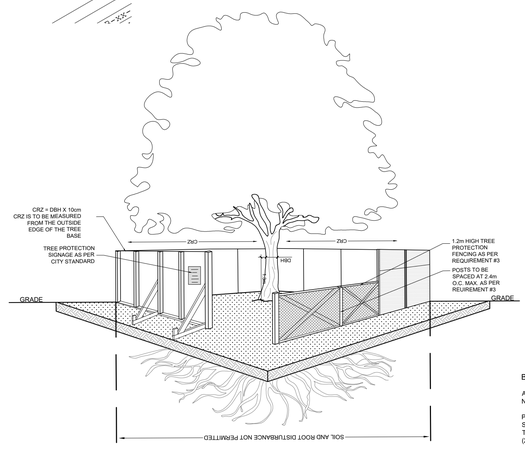
4 L.1 SHRUB/PERENNIAL PLANTING
SCALE: NTS



2 L.1 DECIDUOUS TREE PLANTING
SCALE: NTS



3 L.1 CONIFEROUS TREE PLANTING
SCALE: NTS



TREE PROTECTION REQUIREMENTS:

1. PRIOR TO ANY WORK ACTIVITY WITHIN THE CRITICAL ROOT ZONE (CRZ = 10X DIAMETER) OF A TREE, TREE PROTECTION FENCING MUST BE INSTALLED SURROUNDING THE CRITICAL ROOT ZONE AND REMAIN IN PLACE UNTIL THE WORK IS COMPLETE.

2. UNLESS PLANS ARE APPROVED BY CITY FORESTRY STAFF, FOR WORK WITHIN THE CRZ;
   - DO NOT PLACE ANY MATERIAL OR EQUIPMENT INCLUDING OUTHOUSES;
   - DO NOT ATTACH ANY SIGNS, NOTICES OR POSTERS TO ANY TREE;
   - DO NOT RAISE OR LOWER THE EXISTING GRADE;
   - TUNNEL OR BORE WHEN DIGGING;
   - DO NOT DAMAGE THE ROOT SYSTEM, TRUNK, OR BUNCHES OR ANY TREE;
   - ENSURE THAT EXHAUST FUMES FROM ALL EQUIPMENT ARE NOT DIRECTED TOWARD ANY TREE CANOPY.
   - DO NOT EXTEND HARD SURFACE OR SIGNIFICANTLY CHANGE LANDSCAPING

3.TREE PROTECTION FENCING MUST BE AT LEAST 1.2m IN HEIGHT, AND BE CONSTRUCTED OF RIGID OR FRAMED MATERIALS (E.G. MODULOC • STEEL,PLYWOOD HOARDING, OR SNOW FENCE ON A 2"X4" WOOD FRAME) WITH POSTS 2.4m APART, SUCH THAT THE FENCE LOCATION CANNOT BE ALTERED. ALL SUPPORTS AND BRACING MUST BE PLACED OUTSIDE OF THE CRZ, AND INSTALLATION MUST MINIMISE DAMAGE TO EXISTING ROOTS. (SEE DETAIL)

4. THE LOCATION OF THE TREE PROTECTION FENCING MUST BE DETERMINED BY AN ARBORIST AND DETAILED ON ANY ASSOCIATED PLANS FOR THE SITE (E.G. TREE CONSERVATION REPORT, TREE DISCLOSURE REPORT, ETC). THE PLAN AND CONSTRUCTED FENCING MUST BE APPROVED BY CITY FORESTRY STAFF PRIOR TO THE COMMENCEMENT OF WORK.

5. IF THE FENCED TREE PROTECTION AREA MUST BE REDUCED TO FACILITATE CONSTRUCTION, MITIGATION MEASURES MUST BE PRESCRIBED BY AN ARBORIST AND APPROVED BY CITY FORESTRY STAFF. THESE MAY INCLUDE THE PLACEMENT OF PLYWOOD, WOOD CHIPS OR STEEL PLATING OVER THE ROOTS FOR PROTECTION OR THE PROPER PRUNING AND CARE OF ROOTS WHERE ENCOUNTERED.

BY-LAWS:

ALL CITY-OWNED TREES ARE PROTECTED UNDER THE MUNICIPAL TREES AND NATURAL AREAS PROTECTION BY-LAW (2006-279), WITHIN THE URBAN AREA,

PRIVATELY-OWNED TREES GREATER THAN 50cm IN DIAMETER ON LOTS 1 HECTARE IN SIZE OR LESS, AND TREES GREATER THAN 10cm IN DIAMETER ON LOTS GREATER THAN 1 HECTARE, ARE PROTECTED UNDER THE URBAN TREE CONSERVATION BY-LAW (2009-200).

5 L.1 TREE PROTECTION FENCE
SCALE: NTS

CLIENT

JFSA

CONSULTANTS

ARCHITECTS:

CIVIL ENGINEERS:

Robinson Consultants Inc.

LEGEND

- EXISTING TREE TO REMAIN
- EXISTING VEGETATION GROUP TO REMAIN
- PROPOSED DECIDUOUS TREE
- PROPOSED CONIFEROUS TREE
- PROPOSED SHRUBS/ ORNAMENTAL GRASSES
- PROPOSED SOD
- PROPOSED CONCRETE
- PROPOSED RYE SEED MIX
- PROPOSED RIPARIAN SEED MIX
- TREE PROTECTION FENCE
- 6 FOOT PICNIC TABLE
- SILT FENCE (CIVIL)
- FIRE HYDRANT (CIVIL)
- CATCH BASIN (CIVIL)
- WATERMAIN (CIVIL)
- LIGHT SYSTEM (LIGHTING)

No.	Issue	Date MM/DD/YY	DR	CK
10	UPDATED PER COMMENTS	08/23/2023	CM	JL
9	UPDATED PER LIGHTING PLAN	08/22/2023	CM	JL
8	UPDATED PER CIVIL PLAN	08/16/2023	CM	JL
7	ISSUED FOR DISCUSSION AND REVIEW	08/09/2023	CM	JL
6	ISSUED PER NEW SITE PLAN	07/31/2023	CM	JL
5	ISSUED PER COMMENTS	07/26/2023	CM	JL
4	ISSUED FOR DISCUSSION AND REVIEW	07/24/2023	CM	JL
3	ISSUED PER NEW SITE PLAN	07/19/2023	CM	JL
2	ISSUED PER NEW SITE PLAN	07/10/2023	CM	JL
1	ISSUED FOR DISCUSSION AND REVIEW	07/06/2023	CM	JL

JAMES B. LENNOX & ASSOCIATES INC.
LANDSCAPE ARCHITECTS
3332 CARLING AVE. OTTAWA, ONTARIO K2H 5A8
Tel. (613) 722-5168 **Fax. 1(866) 343-3942**

PROJECT

1319 Johnston Road, Ottawa ON

DRAWING

LANDSCAPE PLAN

STAMP

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS — JAMES B. LENNOX — MEMBER

SCALE: AS SHOWN

START DATE: July 2023

PROJECT NO.: 23MIS2360

PROJECT NORTH

DRAWING NO.: L.1

PLOT SIZE ARCH-E

APPENDIX E

Servicing and Stormwater Management Report
(Robinson Land Development, 2023)

Robinson
Land Development

1319 Johnston Road Site Plan
Light Industrial Development
Servicing and Stormwater Management Report

Prepared For:

2079 Artistic Place Inc.

Prepared By:

Robinson Land Development

Project No. 23034
August 2023

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LEGAL NOTIFICATION

This report was prepared by Robinson Land Development for the account of **2079 Artistic Place Inc.**

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. **Robinson Land Development** accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project

1.0 INTRODUCTION

Robinson Land Development has been retained by 2079 Artistic Place Inc. to prepare a servicing and stormwater management design for a proposed commercial development located at 1319 Johnston Road, located in the corner of Johnston Road and Bank Street (and Artistic Place). The subject site is proposed to be developed into eight separate light industrial buildings. The extent of the development is bounded by Sawmill Creek on the west and tributary ditches to Sawmill Creek on the north and east side of the property. Refer to architectural site plan provided in **Appendix A** for reference.

This report will detail the proposed means of servicing the site and provide details on how to meet the stormwater management requirements. Pre-consultation notes from the City of Ottawa have been provided in **Appendix A** for reference.

2.0 EXISTING CONDITIONS

The 4.89 ha subject site is zoned Light Industrial (IL) and is currently partially developed for concreting/landscaping yardworks. These existing works will be demolished for the proposed development. The only municipal ROW access the site has is a 15.25 m wide strip at the southeast corner of the site that connects to Johnston Road.

The following infrastructure exists adjacent to the site:

- 300 mm dia. cast iron watermain along Johnston Road.
- 750 mm dia. concrete sanitary sewer along Johnston Road.
    - 250 mm dia. concrete sanitary sewer along Johnston Road that crosses in front of the site entrance ties and discharges into the 750 mm dia. sanitary.
- 450 to 1050 mm dia. concrete storm sewer along Johnston Road.
    - The storm sewer along Johnston Road collects to an 1800 mm dia. sewer and travels north adjacent to the site, crosses the property from the east edge to the northwest corner in a 9 m wide easement. This storm sewer discharges to Sawmill Creek shortly downstream.

Refer to GeoOttawa screen captures of the existing watermain, sanitary, and storm infrastructure provided in **Appendix A** for more details.

3.0 DEVELOPMENT PROPOSAL

The Owner is proposing to develop the subject site into eight separate light industrial buildings and associated parking lots. Only 3.70 ha of the site are proposed for development, allowing a 30 m setback from the west property line and a 15 m setback from the north property line for the Sawmill Creek tributaries. The eight commercial buildings are sized as follows, following clockwise around the site beginning at Building A:

- Building A: 2,439 m^2
- Building H: 2,439 m^2
- Building F: 2,019 m^2
- Building E: 1,464 m^2
- Building C: 1,463 m^2
- Building B: 1,207 m^2
- Building D: 1,588 m^2
- Building G: 2,453 m^2

Refer to the Site Plan, prepared by Allan Stone Architect, in **Appendix A** for more details.

The proposed development will be provided with new water, sanitary and storm services per City requirements. The proposed civil design drawings are provided in **Appendix B** including:

- Servicing Plan
- Grading Plan
- Notes & Details Plan
- Erosion & Sediment Control Plan
- Existing Conditions & Removals Plan
- Storm Drainage Area Plan

4.0 WATER SERVICING

The subject site will receive water supply via a twinned 200 mm watermain connected to the existing 300 mm watermain on Johnston Road, looped within the site for supply redundancy. The watermain system has been designed according to the following standards and guidelines:

- Ottawa Design Guidelines – Water Distribution (2010) periodically amended as part of Technical Bulletins
- Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (2020)
- MOECC Design Guidelines for Drinking-Water Systems (2008)

Accordingly, the following watermain design criteria have been utilized for the subject site:

- Minimum Pressure During Peak Hour 276 kPa (40 psi)
- Minimum Pressure During Maximum Day Plus Fire 140 kPa (20 psi)
- Maximum Pressure in Unoccupied Areas 689 kPa (100 psi)
- Maximum Pressure in Occupied Areas 552 kPa (80 psi)

4.1 Boundary Conditions

The City of Ottawa provided boundary conditions for the subject site at the proposed connections to the existing 300 mm watermain on Johnston Road. Refer to **Appendix C** for proposed domestic and fire demand calculations and received boundary conditions. The boundary conditions have been summarized in **Table 1** below:

Table 1 – Boundary Conditions

Demand Scenario	Head (m)	Pressure (psi)
Maximum HGL (Average Day)	131.3	73.8
Minimum HGL (Peak Hour)	123.9	63.3
Max Day + Fire	123.7	63.0

4.2 Fire Protection

The nearest existing municipal hydrant to the site is located approximately 45 m from the site entrance on Johnston Road. Fire protection for the subject site will be provided by proposed on-site private hydrants fed from the same 200 mm private watermain loop. The proposed hydrants will be located to provide coverage of all buildings based on their calculated fire demand, with a maximum spacing of 90 m. The buildings will not be sprinklered so there is no need to consider hydrant distance to fire department connections.

The required fire flow for the subject site was calculated using the Fire Underwriter's Survey (FUS) long form for each building (refer to **Appendix C**). Based on the building construction, occupancy and ground floor area for each building, the maximum required fire flow is 14,000 L/min (233.3 L/s).

Secondary confirmation of hydrant coverage is shown in **Table 2** below based on the City of Ottawa Technical Bulletin ISTB-2018-02 Table 18.5.4.3 maximum fire flow hydrant capacity:

Table 2 – Hydrant Coverage

Building	Fire Demand (L/min)	Hydrants within 76m (5,678 L/min)	Hydrants 76-152m (3,785 L/min)	Hydrants within 305m (2,839 L/min)	Total Theoretical Private Hydrant Capacity (L/min)
A	**14,000**	HYD-1, HYD-2, HYD-3, HYD-7, HYD-8	HYD-4, HYD-5, HYD-6		**39,745**
H	**14,000**	HYD-1, HYD-2, HYD-3, HYD-4, HYD-5, HYD-6	HYD-7, HYD-8		**41,638**
F	**13,000**	HYD-3, HYD-4. HYD-5	HYD-1, HYD-2, HYD-6, HYD-7	HYD-8	**35,013**
E	**12,000**	HYD-3, HYD-4, HYD-5, HYD-6	HYD-1, HYD-2, HYD-7, HYD-8		**37,852**
C	**12,000**	HYD-4, HYD-5, HYD-6, HYD-7	HYD-2, HYD-3, HYD-8	HYD-1	**36,906**
B	**10,000**	HYD-4, HYD-5, HYD-6, HYD-7	HYD-1, HYD-2, HYD-3, HYD-8		**37,852**
D	**12,000**	HYD-5, HYD-6, HYD-7	HYD-3, HYD-4, HYD-8	HYD-1, HYD-2	**34,067**
G	**14,000**	HYD-1, HYD-7, HYD-8	HYD-2, HYD-3, HYD-4, HYD-5, HYD-6		**35,959**

4.3 Hydraulic Model Results

The hydraulic model results for Maximum HGL, Peak Hour and Maximum Day + FF have been calculated and summarized in **Table 3** below. The fire demand scenario was rendered for the set of three hydrants nearest a building and its associated fire demand.

Table 3 – Hydraulic Model Results

Criteria	Fire Demand (L/min)	Min. Pressure (psi)	Max. Pressure (psi)	Allowable Pressure Range
Avg Day	-	67.9	72.8	40 – 80 psi
Peak Hour	-	57.2	62.3	40 – 80 psi
Max Day + Fire (Hyd 8,1,2 - Bldg A)	14,000	37.3	-	>20 psi
Max Day + Fire (Hyd 2,3,4 - Bldg H)	14,000	24.5	-	>20 psi
Max Day + Fire (Hyd 3,4,5 - Bldg E)	12,000	31.0	-	>20 psi
Max Day + Fire (Hyd 4,5,6 - Bldg C)	12,000	28.0	-	>20 psi
Max Day + Fire (Hyd 5,6,7 - Bldg D)	12,000	28.0	-	>20 psi

Max Day + Fire (Hyd 7,8,1 - Bldg G)	14,000	35.7	-	>20 psi

As indicated in **Table 3** above, the subject site can be adequately serviced for both domestic and fire demands. Refer to the hydraulic model outputs provided in **Appendix C** for details.

5.0 SANITARY SERVICING

5.1 Design Criteria

Sanitary flows from the site will discharge to the 750 mm sanitary sewer on Johnston Road. The sanitary sewer system has been designed according to the following standards and guidelines:

- Ottawa Sewer Design Guidelines (2012) periodically amended as part of Technical Bulletins
- MOECC Design Guidelines for Sewage Works (2008)

Accordingly, the following design parameters have been implemented for the subject site:

- Light Industrial Flow: 35,000 L/ha/d
- Peaking Factor: 1.5
- Infiltration Allowance: 0.33 L/s/ha
- Minimum Velocity: 0.60 m/s
- Maximum Velocity: 3.0 m/s

5.2 Proposed Design

All proposed sanitary sewers have been designed to have capacities to convey the peak design flows and meet minimum full flow velocities. Refer to the sanitary sewer design sheet in **Appendix D** for more details. Confirmation from the City of Ottawa that the existing 750 mm sanitary on Johnston Rd. has sufficient capacity for the proposed development is provided in **Appendix D**.

A monitoring maintenance hole is located at the site entrance near the property line immediately prior to discharge to the existing 750 mm municipal sewer.

6.0 STORM SERVICING

6.1 Design Criteria

Stormwater runoff collected on the subject site will be discharged to the existing 1800 mm storm sewer that runs in an easement through the site and ultimately discharges to the Sawmill Creek shortly downstream. Existing stormwater runoff is directed to the boundaries of the property. Ditches/streams that are tributary to Sawmill Creek run along the property lines to collect the sites current stormwater runoff.

The storm sewer system has been designed according to the following standards and guidelines:

- Ottawa Sewer Design Guidelines (2012) periodically amended as part of Technical Bulletins
- MOECC Stormwater Management Planning and Design Manual (2003)
- Sawmill Creek Subwatershed Study Update (2003) by CH2M Hill
- Site Plan Application pre-consultation meeting minutes

Accordingly, the following design parameters have been implemented for the subject site:

- Quantity Control: 100-year post-development to 2-year pre-development
- Quality Control: Enhanced (80% TSS reduction)
- Infiltration: Provide infiltration for 40% of hard surfaces
- Ponding: No ponding during 2-year, max. 300mm ponding
- Minimum Velocity: 0.80 m/s
- Maximum Velocity: 3.0 m/s

Additionally, the storage system must remain above the 100-year hydraulic grade line of the 1800 mm storm sewer as confirmed by the City. These criteria were confirmed with the City and provided in **Appendix E** for reference.

The 2-year pre-development flow rate was calculated for the development area. For the controlled drainage areas the required storage to achieve 100-year post-development to 2-year pre-development quantity control was also calculated, accounting for the uncontrolled area. Refer to **Appendix E** for details of the calculations. The summary of the calculations are as follows:

- 2-year Pre-Development Flow Rate: 127 L/s
- 100-year Post- to 2-year Pre-Development Storage: 1741.2 m^3

6.2 Minor System

Because of the 1800mm storm sewer and its easement that crosses the site, the drainage system is effectively split into two sections: the Main Site and Building G. Stormwater runoff from the Main Site will be captured and discharge to a new MH installed on the 1800 mm storm sewer. Stormwater runoff from the Building G site will be captured and discharge to the existing MH on the 1800 mm storm sewer. A portion of the entrance driveway cannot be captured by the storm system and will be captured by the existing catch basins on Johnston Rd. immediately outside the site entrance (which is also conveyed through the 1800 mm storm sewer). The buildings are assumed to have no roof storage capacity (most will be sloped roofs) and roof drainage discharging at-grade at downspouts identified on the plan. Refer to the 2-year storm sewer design sheet in **Appendix E** for details of the calculations and the Storm Drainage Area Plan in **Appendix B** for reference. Accordingly, under the 2-year storm no ponding will occur.

6.3 Major System/Quantity Control

The major system flows of the site involve ponding in the respective drainage areas. Quantity storage is provided by surface ponding at catch basins, an underground storage tank in the centre of the site, and a dry pond at the north end of the site. No spillover will occur during the 5-year storm. During the 100-year storm some spillover will occur between the individual drainage areas, though no emergency spillover off-site up to and including the 100-year storm. Surface ponding depths are limited to 300mm measured from the catch basin T/G, with all local overflow elevations minimum 300mm below building entrance elevations. Emergency overflow flow routes are directed towards:

- Johnston Road (Drainage Areas 10,13 and 14);
- Existing Sawmill Creek along the west property line (Drainage Areas 1-5,7-9,15,17, and 18);
- Existing tributary ditch along the east property line (Drainage Area 16)

Refer to the 5-year and 100-year storm sewer design sheets in **Appendix E** for details of the calculations and the Storm Drainage Area Plan in **Appendix B** for reference.

While individual drainage areas were designed to operate independently during the 2-year and 5-year storms, due to the flow restrictions the Main Site and Building G systems will each operate as a whole (though still independent of one another). Flow restrictions were calculated

for the site with the use of inlet control devices at the end of the respective sewer trains, but before the oil-grit separators. The details of the calculations are provided in **Appendix E** and summarized in **Table 4** below.

Table 4 – 100-Year Post-Development Discharge Rates

Drainage Area	Max Discharge Rate (L/s)
Main Site (1-14)	91.1
Building G (15-18)	8.7
Uncontrolled Entranceway	26.8
Total	**126.6**

Based on these flow restrictions the total storm storage was calculated for the Main Site and Building G portions. Since ICD flow rate is a function of head pressure, for total storage calculations the discharge rate was assumed at 50% of the maximum rate. Elevations were to the minimum spillover elevation (82.80 m emergency spillover elevation of the Main Site, and 82.50 m emergency spillover elevation of the Building G dry pond). The details of the calculations are provided in **Appendix E** and summarized in **Table 5** below.

Table 5 – 100-Year Post-Development Storage Volumes

Drainage Area	Required Storage (m^3)	Available Storage (m^3)
Main Site (1-14)	1,565	1,572
Building G (15-18)	534	842
Total		**2,414**

The underground storage tank is proposed as a GreenStorm ST underground storage module or equivalent which provides high volume efficiency storage capacity, highway-rated vehicle loading, and infiltration capacity with exposed bottom construction. Typical details of the GreenStorm system are provided in **Appendix E** for reference. The tank ICD will be secured in a dedicated maintenance hole immediately downstream of the tank but before the oil-grit separator. The ICD for the Main Site drainage portion is proposed as a Tempest HF Model E or equivalent to provide high flow-rate control along with additional level of control against the discharge of floatable contaminants prior to the OGS. Typical details of the Tempest ICDs are provided in **Appendix E** for reference. The dry pond will be a simple grassed open area with 3:1 side walls and concrete headwalls for the inlet and outlet pipes. The pond ICD orifice plate will be secured at the outlet headwall, with the oil-grit separator immediately downstream.

6.4 Hydraulic Grade Line

As confirmed by the City the hydraulic grade line of the 1800mm storm sewer will be above the obvert of the pipe during the 100-year storm. Accordingly, the connecting storm storage system will be above the hydraulic grade line at the connection point to avoid backflow of the system and negating storage capacity. The hydraulic grade line provided by email is shown in **Appendix E** and summarized as follows:

- Main Site (underground tank): Minimum elevation at MHST33692 of 80.77 m
- Building G (dry pond): Minimum elevation at MHST33693 of 80.56 m

The bottom of the underground storage tank is set to 80.77 m and the bottom of the dry pond is set to 80.60 m.

6.5 Infiltration

In line with the Sawmill Creek Subwatershed Study, infiltration of minimum 40% of the impervious area is desired for maintaining overall creek baseflow volumes and water table recharging. Infiltration capacity of a site is impacted by soil type, and bedrock and groundwater level, with a minimum difference between bottom of infiltration and top of either bedrock or groundwater around 1 m. Per the geotechnical investigation for 1319 Johnston Road prepared by Gemtec dated July 24, 2023, bedrock elevations (or auger refusal) ranged from 73.9-78.9 m and groundwater levels ranged from 79.6-80.5 m. The bedrock elevations are well below the underground storage tank and dry pond, however the measured groundwater level is less than the typical 1 m desired difference (though still below the minimum system elevations). This does not mean that infiltration will not occur, but that the system has a reduced infiltration capacity.

The impervious drainage areas that lead to the infiltration areas (underground tank and dry pond) account for 98% of the developed impervious area (3.53 ha of 3.59 ha) or 70% of the total property (3.53 ha or 5.03 ha). As no specific infiltration rate is identified and such a high percentage of the impervious development will be provided infiltration opportunity (well above the minimum 40% of impervious area), we conclude that this requirement is met.

Additionally, from the geotechnical investigation, the locations of infiltration will be within or just above areas of silty-clayey sand but below a layer of stiff silty clay that was found through most of the site with thicknesses between 0.21-1.25 m. This layer of stiff silty clay would impact the site's existing infiltration capacity.

6.6 Quality Control

Quality control will be provided by oil-grit separators prior to discharge to the 1800 mm storm sewer sized for 80% TSS reduction based on the restricted flow rates of the Main Site and Building G drainage portions. Refer to OGS sizing cutsheets in **Appendix E** for more details. While unrealized in the TSS reduction calculations, additional settlement potential exists in the underground tank and dry pond systems where inflow velocity is significantly reduced.

7.0 EROSION AND SEDIMENT CONTROL

Prior to construction and until vegetation has been re-established in disturbed areas, erosion and sediment control measures must be implemented to mitigate the impact on receiving watercourses and existing infrastructure. The following erosion and sediment control (ESC) measures have been proposed for the subject site:

- Limiting the extent of exposed soils at any given time.
- Erosion and sediment control measures shall be maintained until vegetation has been re-established in all disturbed areas. Re-vegetate disturbed areas in accordance with approved Landscape Plan as soon as possible.
- Stockpile soil away (15 metres or greater) from watercourses, drainage features and top of steep slopes.
- Installation of silt sacks between frame and cover on all proposed and existing catch basins and open cover storm manholes until construction is completed.
- Silt fence to be installed and maintained along the property boundaries.
- Install mud mats at all construction entrances.

- During active construction periods, visual inspections shall be undertaken on a weekly basis and after major storm events (>25mm of rain in 24 hour period) on ESC and any damage repaired immediately.
- ESC shall also be assessed (and repaired as required) following significant snowmelt events.
- Visual inspections shall also be undertaken in anticipation of large storm events (or a series of rainfall and/or snowmelt days) that could potentially yield significant runoff volumes.
- Care shall be taken to prevent damage to ESC during construction operations.
- In some cases, barriers may be removed temporarily to accommodate construction operations. The affected barriers shall be reinstated immediately after construction operations are completed.
- ESC should be adjusted during construction to adapt to site features as the site becomes developed.
- ESC shall be cleaned of accumulated sedimentation as required and replaced as necessary.
- During the course of construction, if the Engineer believes that additional prevention methods are required to control erosion and sedimentation, the Contractor shall implement additional measures, as required, to the satisfaction of the Engineer.
- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) 805.

Refer to the Erosion and Sediment Control Plan provided in **Appendix B** for more details.

8.0 APPROVALS

The proposed development is subject to City of Ottawa site plan approval with criteria from the Rideau Valley Conservation Authority. Since stormwater quantity and quality control is being provided for an industrial-use site an Environmental Compliance Approval from the Ontario Ministry of Environment, Conservation and Park will also be required.

9.0 CONCLUSIONS

This servicing and stormwater management report has been prepared to support the Site Plan Application for the development of the property located at 1319 Johnston Road. The report has detailed the proposed means of servicing the site for potable water and sanitary sewer and provided details on how to meet the stormwater management requirements in accordance with City of Ottawa standards and the Sawmill Creek Subwatershed Study. The proposed servicing and stormwater management designs will be achieved by implementing the following key features:

- Domestic water supply will be provided by a 200 mm diameter watermain connection to the existing 300 mm diameter watermain on Johnston Road.
- Fire protection will be provided by proposed on-site hydrants.
- Sanitary flows will be conveyed to the existing 750 mm diameter sanitary sewer on Johnston Road via a proposed 250 mm diameter sanitary sewer.
- Stormwater runoff (minor system) will be conveyed by the proposed storm sewer system to the existing 1800 mm storm sewer that runs through the site at two locations: a new MH on the 1800 mm and at an existing MH immediately downstream.
- Stormwater runoff for all storm events up to and including the 100-year design storm will be controlled on-site at maximum the 2-year pre-development flow rate.
- On-site storage will be provided for all storm events up to and including the 100-year design storm event through surface ponding, underground storage, and a dry pond.

- Emergency overland flows will be conveyed to Sawmill Creek and its tributary ditches along the property boundaries as well as Johnston Road.
- Infiltration opportunity is provided at the underground storage tank and dry pond
- Quality control will be provided by oil-grit separators immediately downstream of the ICD flow restrictions and immediately prior to discharge to the existing 1800 mm system.
- Erosion and sediment control measures will be implemented prior to construction and maintained until vegetation has been re-established in disturbed areas.

Report Prepared By:

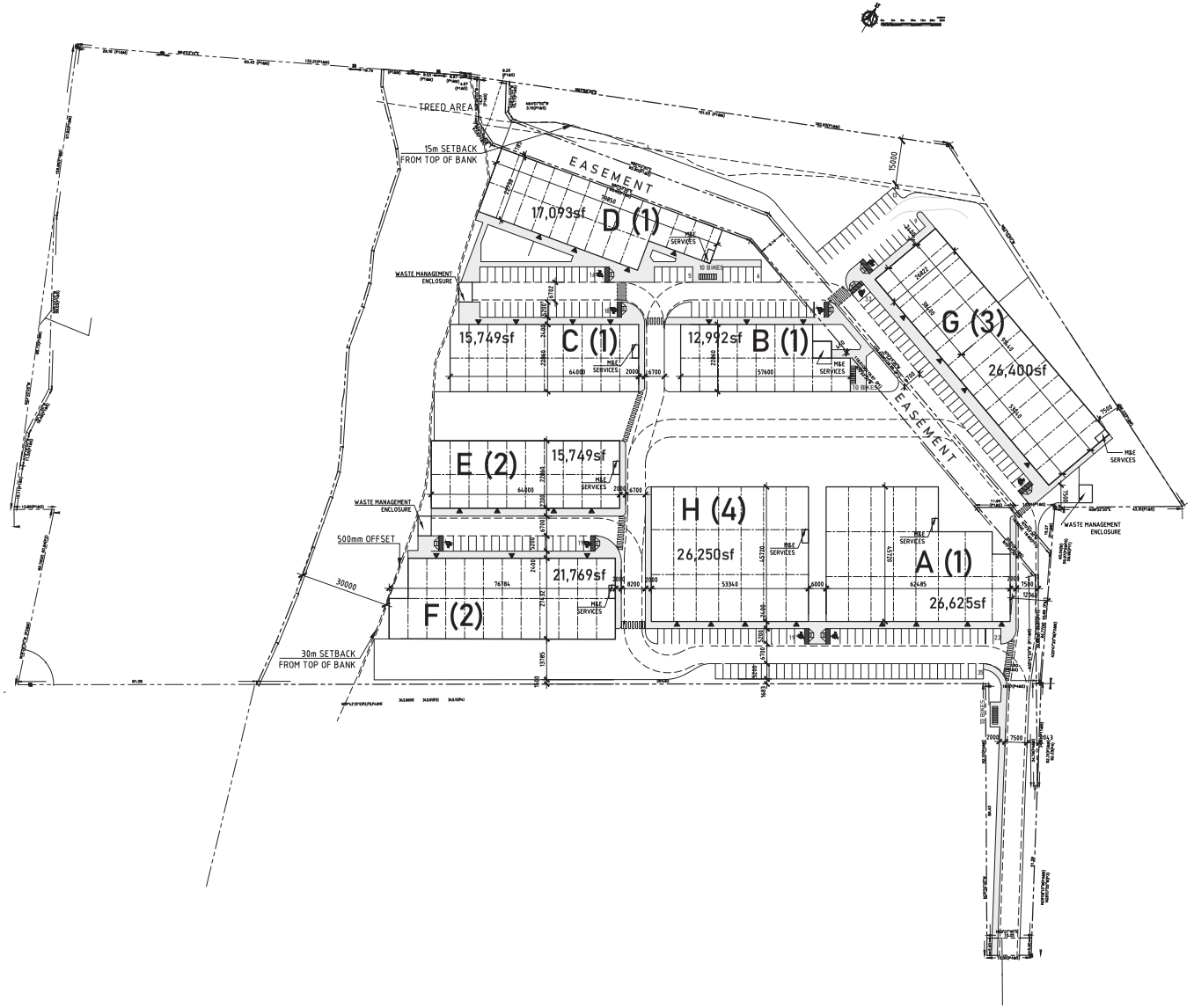
Stephen McCaughey, P.Eng.
Project Engineer

Appendix A

Architectural Site Plan

Pre-Consultation Notes

GeoOttawa existing watermain, sanitary and storm



INDUSTRIAL DEVELOPMENT

1319 Johnston Road • Ottawa • Ontario

ALLAN STONE ARCHITECT

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Toronto Ontario M5T 3K7
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T 416.550.1585

SITE PLAN

1:750 A100r26

DATE: Jul 26, 2023 - 3:25pm

2059 Artistic Place

Meeting Summary Notes

June 17th, 2022. Online Teams Meeting

Attendees:

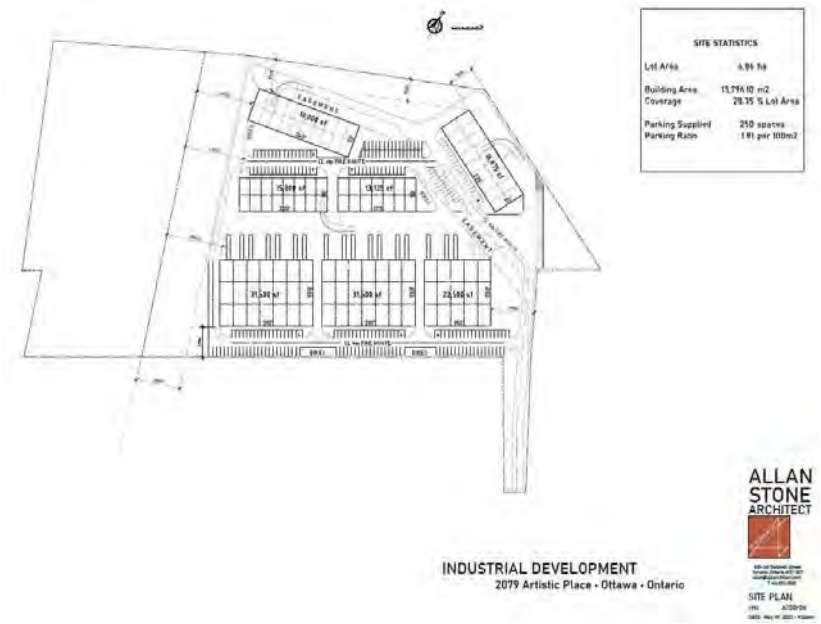
- Jocelyn Chandler (Applicant, JFSA)
- Barry Godfrey (Applicant, Quaestus)
- David Meikle (DBM Consulting)
- Tim Eisner (JFSA)
- Allan Stone (CMV Arch)
- Alex Meacoe (Gemtec)
- Andrew Harte (CGH)
- Michelle Chen (CGH)
- Chris Collins (EXP)
- Morphet, Katie (File Lead, Planner, City of Ottawa)
- Cassidy, Tyler (Project Manager, City of Ottawa)
- Charie, Kelsey (EIT, City of Ottawa)
- Richardson, Mark (Forestry, City of Ottawa)
- Elliott, Mark (Environmental Planner, City of Ottawa)
- Jamie Batchelor (RVCA)

Not in Attendance:

- Christopher Moise (Urban Design, City of Ottawa)
- Neetu Paudel (Transportation Project Manager, City of Ottawa)
- Phil Castro (Parks, City of Ottawa)

Issue of Discussion:

- Site Plan Control for 7 new 1-storey light industrial buildings.



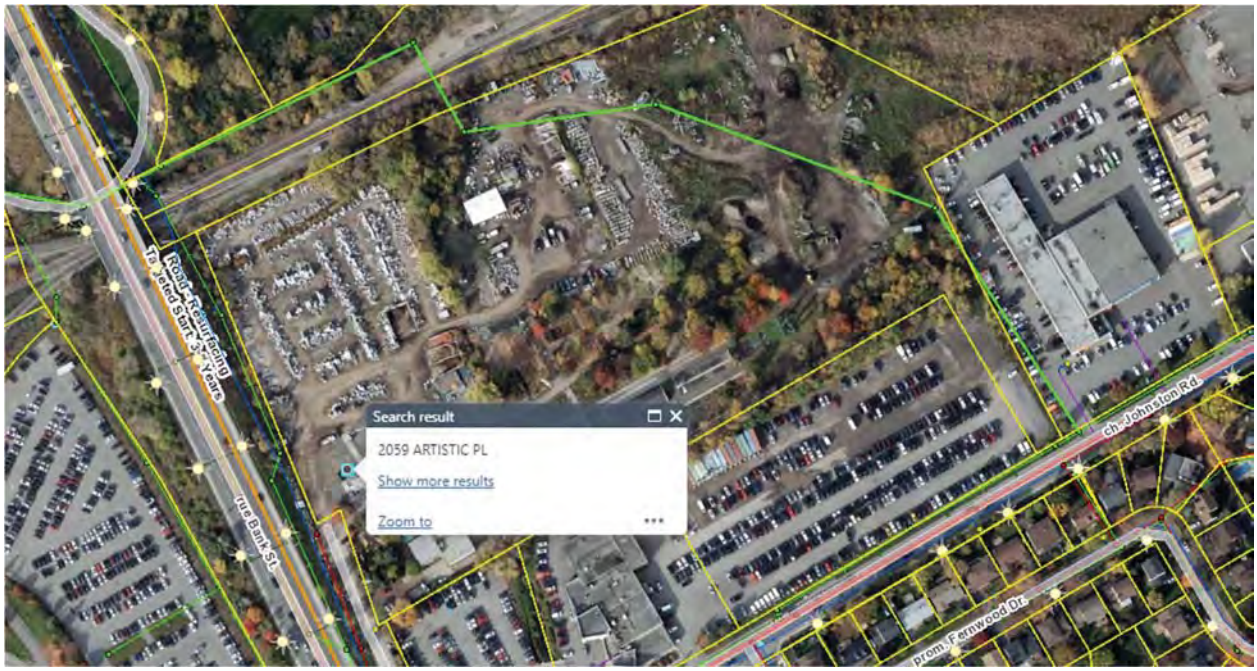
1. Infrastructure/Servicing – Tyler Cassidy

Please note the following information regarding the engineering design submissions for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans
2. Servicing and site works shall be in accordance with the following documents:
   - Ottawa Sewer Design Guidelines (October 2012) and all the Technical Bulletins including, Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
   - Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
   - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
   - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - City of Ottawa Environmental Noise Control Guidelines (January, 2016)
   - City of Ottawa Park and Pathway Development Manual (2012)
   - City of Ottawa Accessibility Design Standards (2012)
   - Ottawa Standard Tender Documents (latest version)
   - Ontario Provincial Standards for Roads & Public Works (2013)

3. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x 44455
4. The Stormwater Management Criteria, for the subject site, is to be based on the following (as established in the "**Sawmill Creek Subwatershed Study – Final Report**" dated May 2003:
    - The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
    - Flows to the storm sewer in excess of the 2-year storm release rate, up to and including the 100-year storm event, must be detained on site.
    - Ensure no overland flow for all storms up to and including the 100-year event.
    - Use of Low Impact Development (LIDs) are considered Best Management Practices (BMP) for this site.
    - The 2-yr storm or 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
    - A calculated time of concentration (Cannot be less than 10 minutes).
    - Quality control requirements to be provided by Rideau Valley Conservation Authority (RVCA). **(As determined in the sawmill creek subwatershed).
    - This property is located within the **Sawmill Creek** subwatershed. Please verify any subwatershed specific SWM criteria with the RVCA.

5. Deep Services:



i. A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:

a. Connections (Johnson Road):

i. Existing 450 mm dia. STM (Conc.)
ii. Existing 305 mm dia. Watermain (CI)
iii. Existing 250 mm dia. SAN (Conc.)

b. Connections (Sawmill Creek Storm Trunk Sewer):

i. Existing 1800 mm dia. STM (Conc.) * Note that the connection must be to a maintenance hole, and drop pipes will most likely be required.

ii. Direct discharge to the Sawmill Creek is not permitted as there are available storm connections fronting the property.

*Note that only one (1) san, stm, or water connection to the right of way is permitted per site.

ii. Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.

iii. Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).

iv. Provide information on the type of connection permitted

Sewer connections to be made above the springline of the sewermain as per:

a. Std Dwg S11.1 for flexible main sewers – *connections made using approved tee or wye fittings.*

b. Std Dwg S11 (For rigid main sewers) – *lateral must be less that 50% the diameter of the sewermain,*

c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – *for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,*

d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.

e. No submerged outlet connections.

6. Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

i. Location of service(s)
ii. Type of development and the amount of fire flow required (as per FUS, 1999).
iii. Average daily demand: ___ l/s.
iv. Maximum daily demand: ___l/s.
v. Maximum hourly daily demand: ___ l/s.
vi. Hydrant location and spacing to meet City's Water Design guidelines.

vii. Water supply redundancy will be required for more than 50 m3/day water demand.

7. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
8. MECP ECA Requirements (Standard) –

   All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP);

   a. Consultant determines if an approval for sewage works under Section 53 of OWRA is required. Consultant then determines what type of application is required and the City's project manager confirms. (If the consultant is not clear if an ECA is required, they will work with the City to determine what is required. If the consultant it is still unclear or there is a difference of opinion only then will the City PM approach the MECP.
   b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.
   c. Standard Works ToR Draft ECA's are sent to the local MECP office (moeccottawasewage@ontario.ca) for information only
   d. Additional ToR draft ECAs require a project summary/design brief and require a response from the local MECP (10 business day window)
   e. Site plan Approval, or Draft Approval, is required before an application is sent to the MECP
9. General/ additional comments:

   i. Only one watermain connection per site. However, looping would be required if proposed demand is 50m3/day or greater.
   ii. A pre and post construction CCTV inspection is required for re-using any existing servicing connections.

2. Initial Planning Comments

- Please include a table on the Site Plan drawing which identifies all required Zoning By-law required provisions and how they are being achieved onsite.

- Please ensure that the required planning rationale includes policy analysis for the current Official Plan and the City's new Official Plan.

- If possible, we would like to see additional landscaping added onsite.

- Please delineate any intended employee pedestrian connections using alternative materials or line painting.

- I was able to confirm that a Future land Use Study will not be required for this site if no Zoning By-law Amendment is being sought.

3. Urban Design Comments – Christopher Moise

- This proposal does not run along or does not meet the threshold in one of the City's Design Priority Areas and need not attend the City's UDRP. Staff will be responsible for evaluating the proposal and providing design direction;
- We appreciate the material presented and have the following comments/questions about the proposal:
    - **Parking**: Minimize quantity of vehicular parking as much as use will allow, provide in discreet locations and screened with landscaping. We recommend using minimum parking requirements to reduce the surface area of asphalt to mitigate heat island effects;
    - **Landscaping**: Improve the landscaping treatment around the site and with enhanced plantings and trees;
    - **Pedestrian connectivity**: Consider safe and convenient access to buildings from parking locations using sidewalks, clear painted lines and interspersed with landscaping;
- A scoped Design Brief is a required submittal for all Site Plan/Re-zoning applications and can be combined with the Planning Rationale. Please see the Design Brief Terms of Reference provided.

Note. The Design Brief submittal should have a section which addresses these pre-consultation comments;

This is an exciting project in an area full of potential. We look forward to helping you achieve its goals with the highest level of design resolution. We are happy to assist and answer any questions regarding the above. Good luck.

4. Parks – Phil Castro

Comments expected July 4th. It is expected that Parks will be requiring 2% parkland dedication for this area.

5. Trees - Mark Richardson

<u>TCR requirements:</u>

1. a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
    a. an approved TCR is a requirement of Site Plan approval.
    b. The TCR may be combined with the EIS provided all information is supplied
2. Any removal of privately-owned trees 10cm or larger in diameter, or 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.
3. The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
    a. If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
    b. Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit
4. the TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition
5. Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)
6. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
7. 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
    a. the location of tree protection fencing must be shown on the plan
8. the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
9. For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

LP tree planting requirements:

For additional information on the following please contact tracy.smith@Ottawa.ca

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.
- Maintain 2.5m from curb
- 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.

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 include watering and warranty as described in the specification (can be provided by Forestry Services).
- Plant native trees whenever possible
- 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)

Hard surface planting

- Curb style planter is 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 document on the LP that adequate soil volumes can be met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

Sensitive Marine Clay

- Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

Tree Canopy Cover

- The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40% urban forest canopy cover target.
- At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate.
- Indicate on the plan the projected future canopy cover at 40 years for the site.

6. Environment – Mark Elliot

Endangered Species: Nothing of concern. There are some birds (Peregrine Falcon, Chimney Swift, Barn Swallow, Black Crowned Night Heron) that have been spotted in the woods across Bank Street, and a Snapping Turtle upstream in Sawmill Creek. However, none of the proposed changes would negatively impact these species. Indeed, the applicant's proposal to plant more trees in the area is likely to improve habitat, rather than degrade it.

Watercourse: Any development within the 30m setback (4.9.3 in the New OP, 4.7.3 in the Old OP) will require an EIS to determine ecological function and that no negative impact will come from it. The CA covered issues with flood plains in detail so I won't comment on them except to say that I agree with what was said.

Unevaluated Wetlands: The applicant noted during the preconsultation that the unevaluated wetlands in the Northeastern corner are likely a mapping artifact and do not exist on the ground. However, this would need to be confirmed by ground truthing because it would otherwise be considered a surface water feature (per definition in New OP p.266) and be protected under 4.9.3 in the New OP.

7. Transportation – Mike Giampa

- Follow Transportation Impact Assessment Guidelines:
    - A TIA is required.
    - Start this process asap. The application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
- As the proposed site is for the general public use, AODA legislation applies.
    - Clearly define accessible parking stalls and ensure they meet AODA standards (include an access aisle next to the parking stall and a pedestrian curb ramp at the end of the access aisle, as required).
    - Please consider using the City's Accessibility Design Standards, which provide a summary of AODA requirements. https://ottawa.ca/en/city-hall/creating-equal-inclusive-and-diverse-city/accessibility-services/accessibility-design-standards-features#accessibility-design-standards
- On site plan:
    - Parking stalls at the end of dead-end parking aisles require adequate turning around space
    -
    - Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
    - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible

    - Show lane/aisle widths.
    - Incorporate pedestrian circulation into the site layout by providing sidewalks/ walkways.
    - Ensure the access is 3m away from the property line.
- Noise Impact Studies required for the following:
    - Rail (if the proposed development is considered noise sensitive)

8. General Information

a. Ensure that all plans and studies are prepared as per City guidelines – as available online…
   https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans


geoOttawa
FR
Address, Street, or Place
40m
-8421884.118 5678895.679 Meters


geoOttawa
FR
Address, Street, or Place
1500mmØ CONC
152mmØ - PVC
102mmØ - UNK
1050mmØ CONR
750mmØ CONR
ch. Johnston Rd.
250mmØ CONC
305mmØ - CI
450mmØ CONR
525mmØ CONC
IN103854
IN90727
IN91568
MHSA00596
IN91570
IN91569
MHSA33854
MHST33691
IN89667
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MHST33717
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MHSA00597
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MHST33716
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1337
1339
1341
78.42
78.14
75.64
75.75
10m
-8421589.333 5678772.599 Meters

Appendix B

Servicing Plan
(DWG. 23034-S1 & -S2)

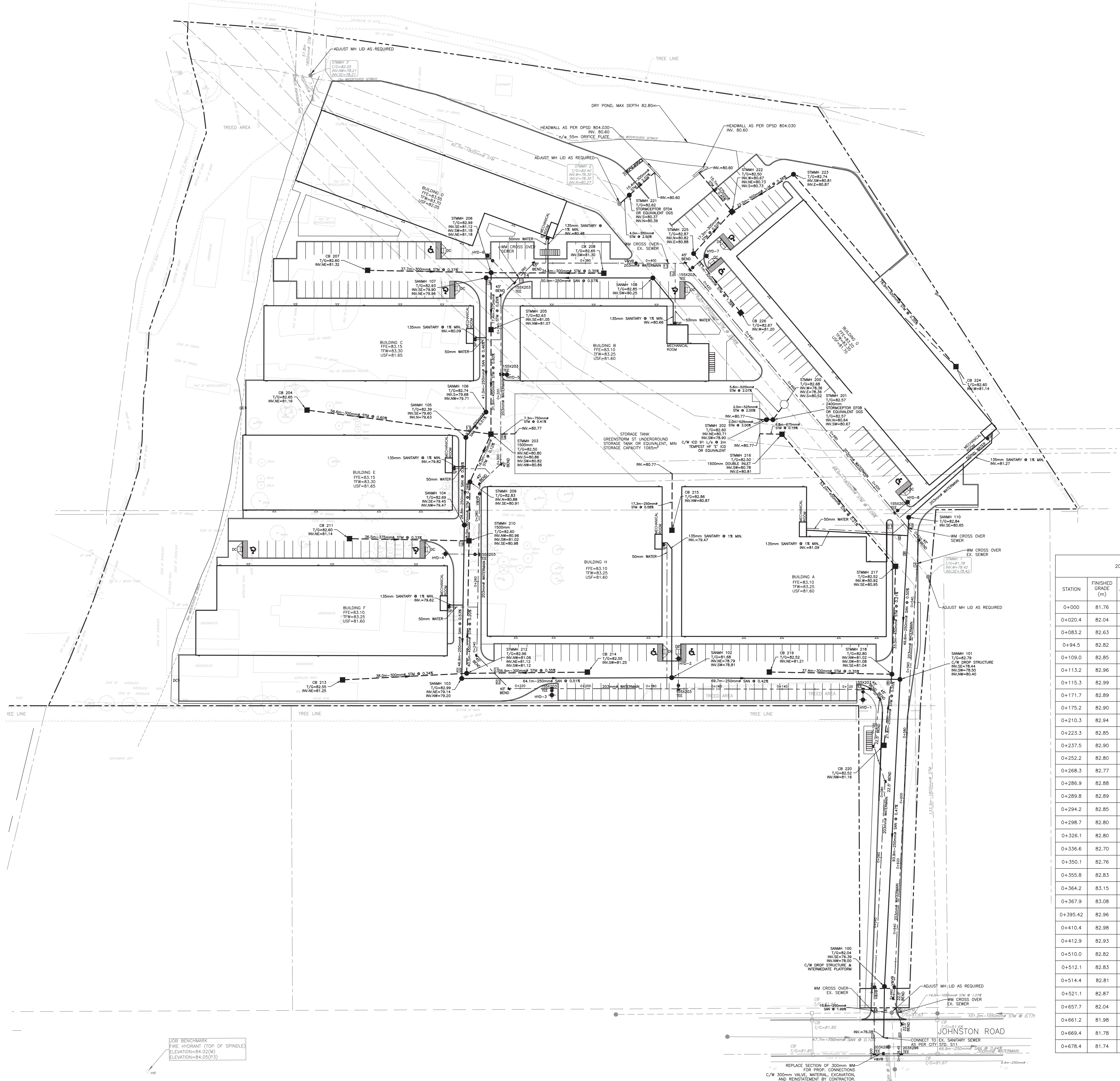
Grading Plan
(DWG. 23034-GR1)

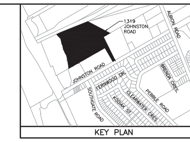
Notes & Details
(DWG. 23034-N1)

Erosion and Sediment Control Plan
(DWG. 23034-ESC1)

Existing Conditions and Removals Plan
(DWG. 23034-R1)

Storm Drainage Area Plan
(DWG. 23034-STM1)





LEGEND

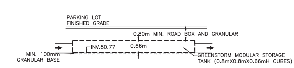
- PROPERTY BOUNDARY
- EXISTING HYDRANT
- EXISTING CATCH BASIN
- EXISTING WATERMAIN
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- EXISTING TREE
- HYDRANT
- WATERMAIN
- V&VB VALVE & VALVE BOX
- SP CURB STOP & SERVICE POST
- CATCH BASIN
- SANITARY SEWER & MANHOLE
- STORM SEWER & MANHOLE
- ENTRANCE
- ROOF DRAIN
- CROSSING NUMBER

CROSSING TABLE

CROSSING No.	SERVICE	INVERT/OBVERT	SEPARATION (m)
1	WATER	79.51	3.06
	EX SAN	76.45	
2	WATER	79.48	3.03
	EX SAN	76.45	
3	STORM	79.70	0.25
	WATER	79.95	
4	EX STORM	79.23	2.74
	SANITARY	76.49	
5	WATER	80.02	0.25
	EX STORM	79.77	
6	STORM	81.05	2.29
	SANITARY	78.76	
7	WATER	80.67	0.25
	EX STORM	80.42	
8	SANITARY	80.60	0.18
	EX STORM	80.42	
9	SANITARY	80.82	0.40
	STORM	80.42	
10	SANITARY	80.62	0.25
	WATER	80.87	
11	WATER	80.67	0.25
	STORM	80.42	
12	WATER	80.57	0.25
	STORM	80.32	
13	WATER	80.57	0.25
	EX STORM	80.32	
14	STORM	81.21	0.62
	WATER	80.59	
15	WATER	80.56	0.25
	SANITARY	80.31	
16	STORM	81.11	0.89
	SANITARY	80.22	
17	STORM	80.85	0.96
	SANITARY	79.89	
18	STORM	80.79	0.66
	WATER	80.13	
19	STORM	81.02	1.35
	SANITARY	79.67	
20	STORM	81.12	1.67
	SANITARY	79.45	
21	STORM	81.15	0.70
	WATER	80.45	
22	WATER	80.44	1.11
	SANITARY	79.33	

203mmø WATERMAIN GRADE TABLE

STATION	FINISHED GRADE (m)	TOP OF WATER (m)	COVER DEPTH (m)	COMMENTS
0+000	81.76	79.37	2.40	203X296mm TEE TO EXISTING
0+020.4	82.04	79.64	2.40	VALVE & VALVE BOX
0+083.2	82.63	80.23	2.40	22.5° HORIZONTAL BEND
0+94.5	82.82	80.42	2.40	22.5° HORIZONTAL BEND
0+109.0	82.85	80.45	2.40	45° HORIZONTAL BEND
0+113.2	82.96	80.56	2.40	45° HORIZONTAL BEND
0+115.3	82.99	80.59	2.40	155X203mm HYDRANT TEE
0+171.7	82.89	80.49	2.40	155X203mm HYDRANT TEE
0+175.2	82.90	80.50	2.40	52X203mm SERVICE TEE
0+210.3	82.94	80.54	2.40	155X203mm HYDRANT TEE
0+223.3	82.85	80.45	2.40	45° HORIZONTAL BEND
0+237.5	82.90	80.50	2.40	45° HORIZONTAL BEND
0+252.2	82.80	80.40	2.40	52X203mm SERVICE TEE
0+268.3	82.77	80.37	2.40	155X203mm HYDRANT TEE
0+286.9	82.88	80.48	2.40	VALVE & VALVE BOX
0+289.8	82.89	80.49	2.40	45° HORIZONTAL BEND
0+294.2	82.85	80.45	2.40	52X203mm SERVICE TEE
0+298.7	82.80	80.40	2.40	45° HORIZONTAL BEND
0+326.1	82.80	80.40	2.40	155X203mm HYDRANT TEE
0+336.6	82.70	80.30	2.40	52X203mm SERVICE TEE
0+350.1	82.76	80.36	2.40	45° HORIZONTAL BEND
0+355.8	82.83	80.43	2.40	155X203mm HYDRANT TEE
0+364.2	83.15	80.75	2.40	45° HORIZONTAL BEND
0+367.9	83.08	80.68	2.40	52X203mm SERVICE TEE
0+395.42	82.96	80.56	2.40	VALVE & VALVE BOX
0+410.4	82.98	80.58	2.40	45° HORIZONTAL BEND
0+412.9	82.93	80.53	2.40	155X203mm HYDRANT TEE
0+510.0	82.82	80.42	2.40	155X203mm HYDRANT TEE
0+512.1	82.83	80.43	2.40	52X203mm SERVICE TEE
0+514.4	82.81	80.41	2.40	52X203mm SERVICE TEE
0+521.1	82.87	80.47	2.40	45° HORIZONTAL BEND
0+657.7	82.04	79.64	2.40	VALVE & VALVE BOX
0+661.2	81.98	79.58	2.40	45° HORIZONTAL BEND
0+669.4	81.78	79.38	2.40	45° HORIZONTAL BEND
0+678.4	81.74	79.34	2.40	203X296mm TEE TO EXISTING



UNDERGROUND STORAGE TANK TYPICAL SECTION
N.T.S.

NOT FOR CONSTRUCTION

NOTES

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

PROPERTY BOUNDARIES AND TOPOGRAPHIC SURVEY ARE FROM "TOPOGRAPHIC SKETCH OF PART OF LOS 2 & 3 CONCESSION 3 (RIDEAU FRONT)" STANTEC GEOMATICS LTD., ONTARIO LAND SURVEYORS. DATED MAY 17, 2023

NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SPA	14/08/23	CC

SCALE — HORIZONTAL 1:400

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

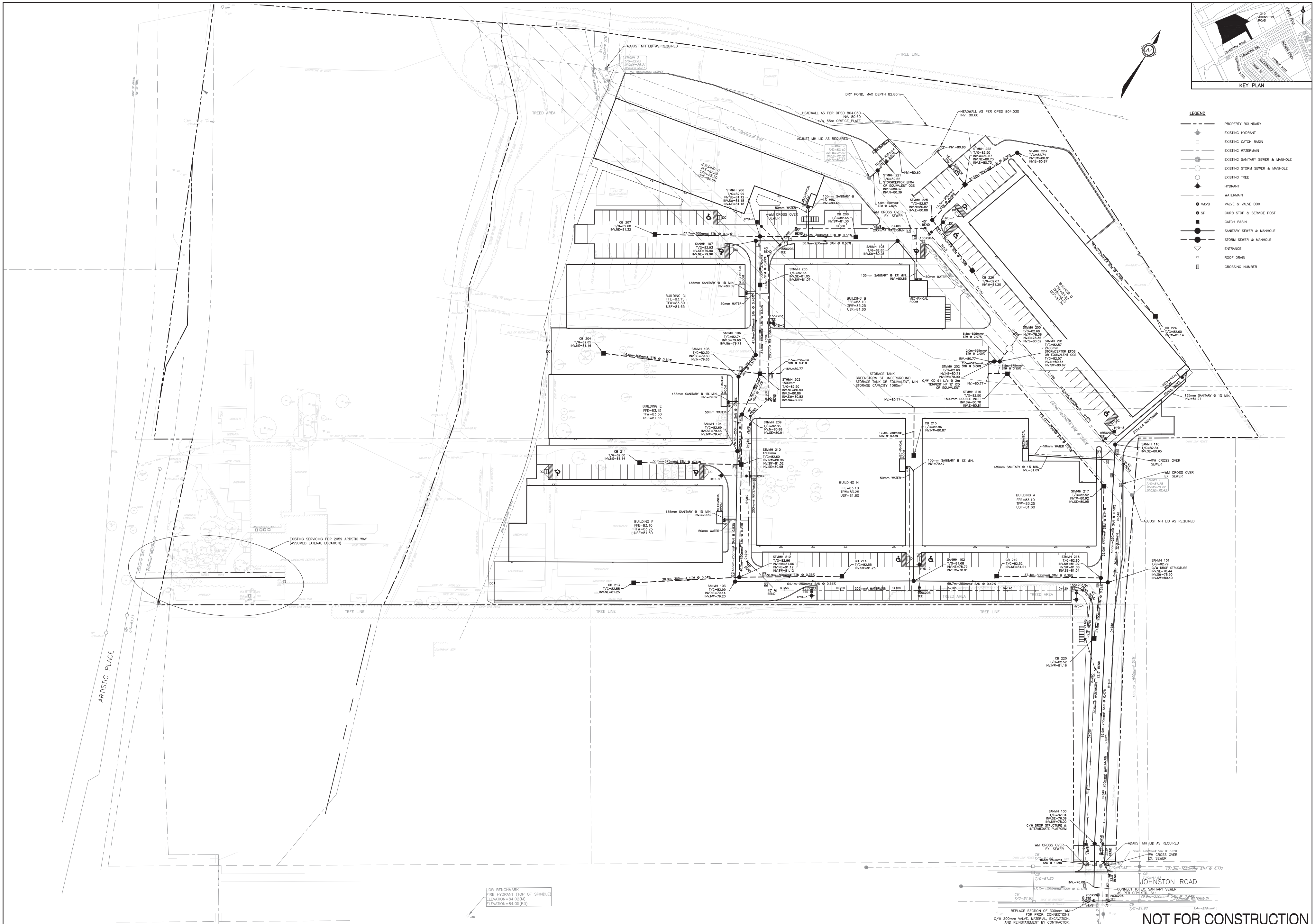
DESIGN SM · CHECKED CC · DRAWN LR · CHECKED SM · APPROVED CC

2079 ARTISTIC PLACE INC

1319 JOHNSTON ROAD
CITY OF OTTAWA

SERVICING PLAN

PROJECT No. 23034
SURVEY STANTEC
DATED AUGUST 2023
DWG. No. 23034-S1



NOT FOR CONSTRUCTION

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NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SPA	14/08/23	CC

SCALE: 0 4m 8m 16m HORIZONTAL 1:400

LICENSED PROFESSIONAL ENGINEER AUG. 14/23 S.A.G.MCCAUGHEY 100217133 PROVINCE OF ONTARIO

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

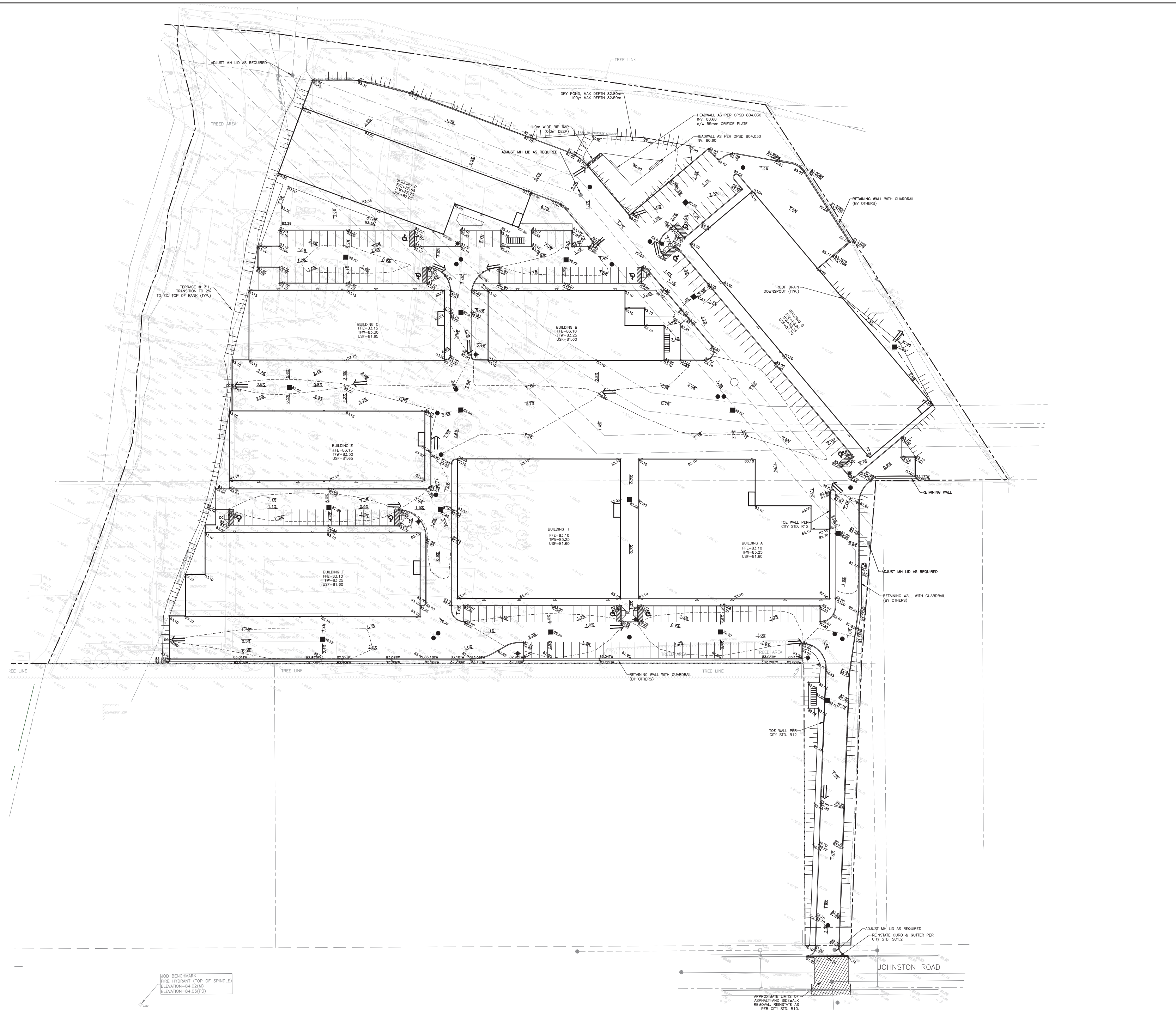
DESIGN	SM
CHECKED	CC
DRAWN	LR
CHECKED	SM
APPROVED	CC

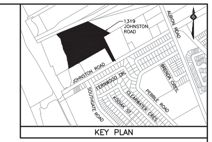
2079 ARTISTIC PLACE INC

1319 JOHNSTON ROAD
CITY OF OTTAWA

SERVICING PLAN

PROJECT No.	23034
SURVEY	STANTEC
DATED	AUGUST 2023
DWG. No:	23034-S2





KEY PLAN

LEGEND

- PROPERTY BOUNDARY
- 100-YEAR PONDING LIMIT
- EXISTING ELEVATION
- X 105.00 PROPOSED GRADE
- 2.0% DRAINAGE SLOPE & DIRECTION
- MAJOR OVERLAND FLOW ROUTE
- TERRACING (3H:1V MAX.)
- SWALE
- DC DEPRESSED CURB
- EXISTING HYDRANT
- EXISTING CATCH BASIN
- EXISTING TREE
- HYDRANT
- CATCH BASIN
- STORM/SANITARY MANHOLE
- ENTRANCE
- ROOF DRAIN DOWNSPOUT

SURFACE STORAGE VOLUME SUMMARY

STRUCTURE	100-YEAR		
	PROVIDED STORAGE VOLUME (m^3)	PONDING ELEVATION (m)	PONDING DEPTH (m)
STMMH216	113	82.80	0.30
STMMH203	92.3	82.80	0.30
CB204	6.3	82.80	0.25
STMMH205	9.1	82.80	0.27
CB207	14.9	82.80	0.20
CB208	9.3	82.80	0.25
STMH210	20.3	82.80	0.20
CB211	25.9	82.80	0.20
CB213	40.6	82.80	0.25
CB214	41.2	82.80	0.25
CB215	N/A	82.80	0.00
STMMH217	23.4	82.80	0.30
CB219	58.7	82.80	0.28
CB220	47.6	82.80	0.30
POND	536	82.50	1.90

50mm SUPERPAVE 12.5mm LEVEL D
70mm SUPERPAVE 19.0mm LEVEL D
150mm GRANULAR "A"
450mm GRANULAR "B" TYPE II
HEAVY DUTY

NOTE: REFER TO GEOTECHNICAL INVESTIGATION PREPARED BY GEMTEC.

PAVEMENT STRUCTURE DETAIL
N.T.S.

NOTES

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NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SPA	14/08/23	CC

SCALE
HORIZONTAL 1:400

LICENSED PROFESSIONAL ENGINEER
S.A.G. MCCAUGHEY
100217133
PROVINCE OF ONTARIO

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

DESIGN SM
CHECKED CC
DRAWN LR
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APPROVED CC

2079 ARTISTIC PLACE INC

1319 JOHNSTON ROAD
CITY OF OTTAWA

GRADING PLAN

PROJECT No. 23034
SURVEY STANTEC
DATED AUGUST 2023
DWG. No. 23034-GR1

GENERAL NOTES:

1. ALL WORKS AND MATERIALS SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA AND ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), AS AMENDED BY THE CITY OF OTTAWA.
2. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS AND ELEVATIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
4. DESIGN ELEVATIONS GIVEN ARE TO BE ADHERED TO WITH NO CHANGES WITHOUT PRIOR WRITTEN APPROVAL BY ROBINSON LAND DEVELOPMENT.
5. ANY AREAS BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE.
6. RELOCATION OF EXISTING SERVICES AND/OR UTILITIES SHALL BE AS SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER AT THE EXPENSE OF THE CONTRACTOR.
7. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
8. ALL CONSTRUCTION SIGNAGE MUST CONFORM TO THE M.T.O. MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST AMENDMENT).
9. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
10. THE SUPPORT OF ALL UTILITIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
11. THE CONTRACTOR WILL BE RESPONSIBLE FOR ADDITIONAL BEDDING OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH, AS SPECIFIED BY OPSD, IS EXCEEDED.
12. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH THE CITY OF OTTAWA PRIOR TO AND TREE CUTTING.
13. REFER TO GEOTECHNICAL INVESTIGATION PREPARED BY GEMTEC, DATED JULY 2023.
14. THE CONTRACTOR IS RESPONSIBLE FOR AND SHALL PROVIDE FOR DEWATERING, SUPPORT AND PROTECTION OF EXCAVATIONS AND TRENCHING AS WELL AS RELEASE OF ANY PUMPED GROUNDWATER IN A CONTROLLED AND APPROVED MANNER.
15. DO NOT CONSTRUCT USING DRAWINGS THAT ARE NOT MARKED "ISSUED FOR CONSTRUCTION".
16. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.

STORM SEWERS:

1. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2 (LATEST AMENDMENT). ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1 (LATEST AMENDMENT). PIPE SHALL BE JOINTED WITH STD. RUBBER GASKETS AS PER CSA A257.3 (LATEST AMENDMENT).
2. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
3. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
4. STORM MANHOLE FRAME AND COVERS SHALL BE AS PER CITY OF OTTAWA STD. S24.1. CB FRAME AND COVER PER OPSD 400.030
5. STORM SEWER MANHOLES SERVING SEWERS LESS THAN 900mm SHALL BE CONSTRUCTED WITH A 300mm SUMP. FOR STORM SEWERS 900mm AND OVER USE BENCHING IN ACCORDANCE WITH OPSD 701.021.
6. THE STORM SEWER CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE ADDITIONAL BEDDING, A DIFFERENT TYPE OF BEDDING OR A HIGHER PIPE STRENGTH AT HIS OWN EXPENSE AND SHALL ALSO BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.
7. ALL STORM MANHOLES SHALL BE 1200mm DIAMETER AS PER OPSD 701.010 UNLESS OTHERWISE NOTED.
8. ALL CATCH BASINS SHALL BE 600mm X 600mm AS PER OPSD 705.010 UNLESS OTHERWISE NOTED.
10. SEWERS WITH LESS THAN 2m COVER SHALL BE INSULATED PER CITY OF OTTAWA STD. S35.

SANITARY SEWERS:

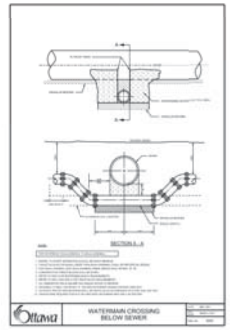
1. ALL SANITARY SEWERS SHALL BE PVC SDR 35, IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
2. SANITARY SEWER TRENCH AND BEDDING SHALL BE AS PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B' BEDDING UNLESS OTHERWISE NOTED.
3. ALL SANITARY SERVICES ARE TO BE EQUIPPED WITH APPROVED BACKWATER VALVES.
4. SANITARY MANHOLE FRAME AND COVERS SHALL BE WATERTIGHT AS PER CITY OF OTTAWA STD. S24.
5. SANITARY SEWER MANHOLES SHALL BE BENCHED AS PER OPSD 701.021.
6. SANITARY PRE-CAST MANHOLE SHALL BE CONSTRUCTED WITH A HIGHER PERCENTAGE OF SILICA FUME IN THE CONCRETE TO MAKE IT MORE DENSE AND LESS SUSCEPTIBLE TO CORROSION OR PINHOLE LEAKS.
7. FOR SANITARY MANHOLES, DEPENDING ON THE ELEVATION OF THE GROUNDWATER TABLE, AND BASED ON THE RECOMMENDATION OF THE PROJECT GEOTECHNICAL CONSULTANT, CRETEX SEALS, OR A SIMILAR PRODUCT, SHALL BE INSTALLED IN THE PRE-CAST MANHOLE SECTION TO JUST BELOW THE MANHOLE FRAME TO PREVENT INFILTRATION.
17. CLAY SEALS SHALL BE INSTALLED WITHIN SEWER TRENCHES IN ACCORDANCE WITH CITY STANDARD S8.
18. CONTRACTOR SHALL PERFORM LEAKAGE TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR SANITARY SEWERS IN ACCORDANCE WITH OPSS 410 AND OPSS 407. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL STORM AND SANITARY SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW.
19. IN ACCORDANCE WITH CITY OF OTTAWA STANDARD S11, SANITARY SERVICE CONNECTION REQUIRES APPROVED CONTROLLED SETTLEMENT JOINT.
20. SEWERS AND LATERALS WITH LESS THAN 2m COVER SHALL BE INSULATED PER CITY OF OTTAWA STD. S35.

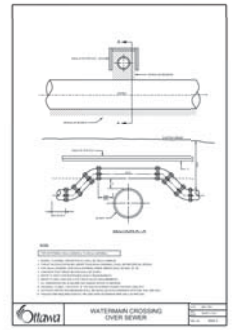
WATER SUPPLY:

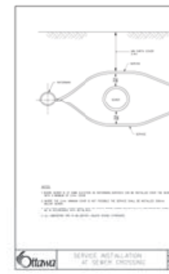
1. ALL PVC WATERMAINS SHALL BE EQUAL TO AWWA C-900 CLASS 150, SDR 18, OR APPROVED EQUAL.
2. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17, UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
3. ALL PVC WATERMAINS SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W36.
4. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS AS PER CITY OF OTTAWA STD. W40 AND W42.
5. CONTRACTOR TO SUPPLY HYDRANT EXTENSION TO ADJUST THE LENGTH OF HYDRANT BARREL IF REQUIRED.
6. FIRE HYDRANTS SHALL BE INSTALLED AS PER CITY OF OTTAWA STD. W19, AND LOCATED AS PER CITY STD. W18.
7. VALVE IN BOXES SHALL BE INSTALLED AS PER CITY OF OTTAWA STD. W24.
8. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS AS PER CITY OF OTTAWA STD. W25.5 AND W25.6.
9. THRUST BLOCKING OF WATERMAIN TO BE INSTALLED AS PER CITY OF OTTAWA STD. W25.3 AND W25.4.
10. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS AND BLOW-OFFS AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
11. INSULATION FOR WATERMAIN CROSSING OVER AND BELOW SEWER SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. W25.2 AND W25, RESPECTIVELY, WHERE WATERMAIN COVER IS LESS THAN 2.4m.
12. AS PER CITY GUIDELINE, THE MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER / UTILITY IS 0.25m FOR CROSSING OVER THE SEWER, AS PER CITY STD. W25.2. FOR CROSSING UNDER SEWER, ADEQUATE STRUCTURAL SUPPORT FOR THE SEWERS IS REQUIRED TO PREVENT EXCESSIVE DEFLECTION OF JOINTS AND SETTLING. THE LENGTH OF WATER PIPE SHALL BE CENTERED AT THE POINT OF CROSSING SO THAT THE JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER AS PER CITY STD. W25.
13. CONNECTION TO EXISTING WATERMAIN TO BE PERFORMED BY CITY FORCES. CONTRACTOR TO PROVIDE LABOUR, EQUIPMENT AND MATERIAL REQUIRED FOR EXCAVATION, BEDDING AND REINSTATEMENT.
14. SWABBING, DISINFECTION, AND HYDROSTATIC TESTING TO BE CONDUCTED AS PER CITY OF OTTAWA STANDARDS IN THE PRESENCE OF A CITY INSPECTOR AND/OR CONSULTANT.

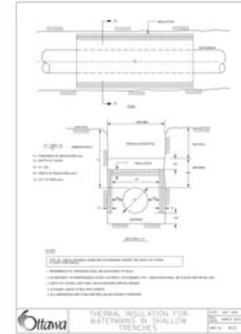
ROADWORK SPECIFICATIONS:

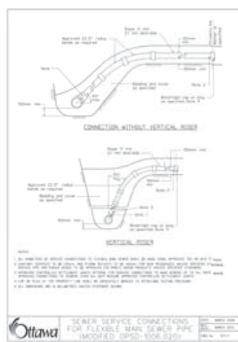
1. CONCRETE CURB SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC1.1 (BARRIER CURB). PROVISION SHALL BE MADE FOR CURB DEPRESSIONS AT SIDEWALKS AND DRIVEWAYS.
2. ALL BARRIER CURB TO BE 150mm ABOVE FINISHED ASPHALT GRADE UNLESS OTHERWISE NOTED.
3. MONOLITHIC CURB AND SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC2.
4. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. R10 AND OPSD 509.010, OPSS 310.
5. GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA.
6. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS & NECESSARY REPAIRS HAVE BEEN CARRIED OUT TO THE SATISFACTION OF THE ENGINEER.
7. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 300mm LIFTS.
8. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW-CUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW ASPHALT.
9. PAVEMENT DESIGN AS PER GEOTECHNICAL RECOMMENDATIONS.

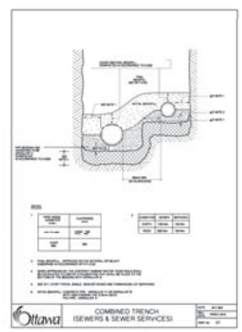


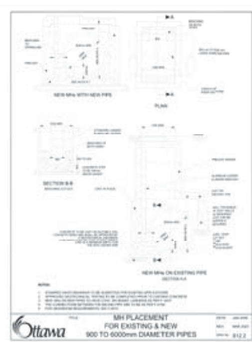


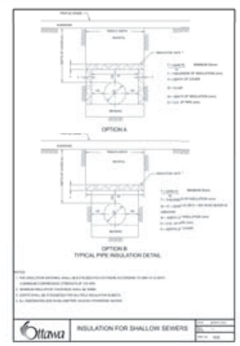


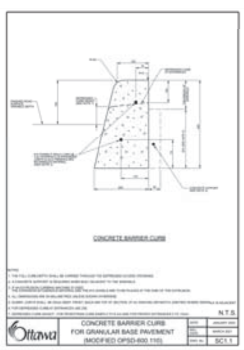


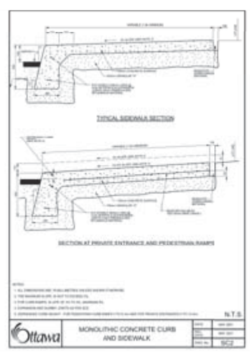


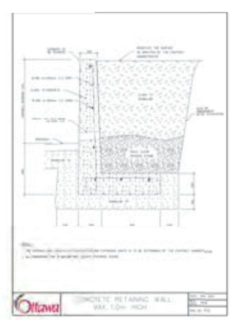


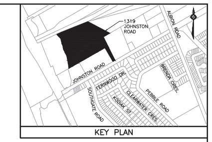












KEY PLAN

NOTES

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

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NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SPA	14/08/23	CC

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LICENSED PROFESSIONAL ENGINEER AUG. 14/23 S.A.G.MCCAUGHEY 100217133 PROVINCE OF ONTARIO

Robinson Land Development
350 Palladium Drive
Ottawa, ON K2V 1A8
(613) 592-6060 rcii.com

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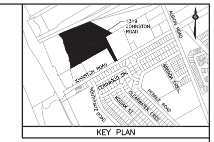
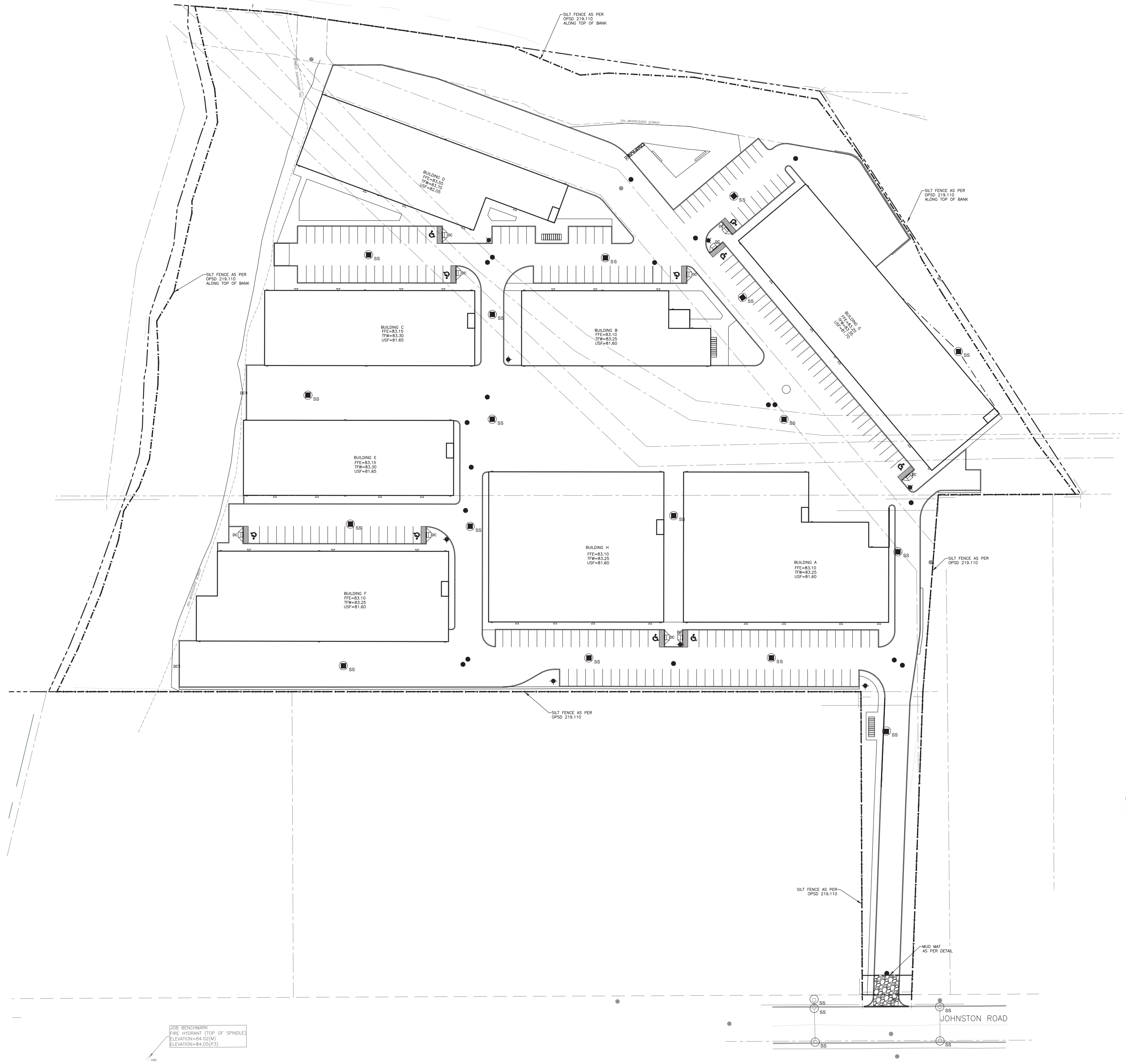
2079 ARTISTIC PLACE INC

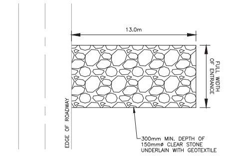
1319 JOHNSTON ROAD
CITY OF OTTAWA

NOTES & DETAILS

PROJECT No.	23034
SURVEY	STANTEC
DATED	AUGUST 2023
DWG. No:	23034-N1

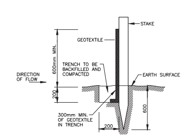




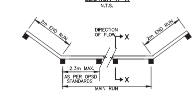


NOTES:
1. MUD MAT TO BE UNDERLAIN WITH A GEOTEXTILE FABRIC.
2. SEDIMENT SHALL BE CLEANED FROM ROADWAYS AS REQUIRED.
3. STORM INLETS IN CLOSE VICINITY TO MUD MAT SHALL BE PROTECTED WITH INLET CONTROL MEASURES.

MUD MAT DETAIL
N.T.S.



SECTION X–X
N.T.S.



SILT FENCE BARRIER DETAIL
N.T.S.

NOTES:
1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE ULTIMATE RECEIVING WATERCOURSE DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
2. LIMIT THE EXTENT OF EXPOSED SOILS AT ANY GIVEN TIME.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL VEGETATION HAS BEEN RE-ESTABLISHED IN ALL DISTURBED AREAS. RE-VEGETATE DISTURBED AREAS AS SOON AS POSSIBLE.
4. STOCKPILE SOIL AWAY (15 METRES OR GREATER) FROM WATERCOURSES, DRAINAGE FEATURES AND TOP OF STEEP SLOPES.
5. SILT SACKS ARE TO BE PLACED UNDERNEATH THE FRAME AND COVER OF ALL PROPOSED AND EXISTING CATCH BASIN AND OPEN COVER STORM MANHOLES UNTIL CONSTRUCTION IS COMPLETED.
6. A SILT FENCE BARRIER SHALL BE INSTALLED AS PER OPSD 219.110 WHERE INDICATED AND MAINTAINED AS REQUIRED.
7. INSTALL MUD MATS AT ALL CONSTRUCTION ENTRANCES.
8. DURING ACTIVE CONSTRUCTION PERIODS, VISUAL INSPECTIONS SHALL BE UNDERTAKEN ON A WEEKLY BASIS AND AFTER MAJOR STORM EVENTS (>25mm RAIN IN 24 HOUR PERIOD) ON SEDIMENT CONTROL BARRIERS AND ANY DAMAGE REPAIRED IMMEDIATELY.
9. EROSION AND SEDIMENT CONTROL BARRIERS SHALL ALSO BE ASSESSED (AND REPAIRED AS REQUIRED) FOLLOWING SIGNIFICANT SNOWMELT EVENTS.
10. VISUAL INSPECTIONS SHALL ALSO BE UNDERTAKEN IN ANTICIPATION OF LARGE STORM EVENTS (OR A SERIES OF RAINFALL AND/OR SNOWMELT DAYS) THAT COULD POTENTIALLY YIELD SIGNIFICANT RUNOFF VOLUMES.
11. CARE SHALL BE TAKEN TO PREVENT DAMAGE TO EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION OPERATIONS.
12. IN SOME CASES, BARRIERS MAY BE REMOVED TEMPORARILY TO ACCOMMODATE THE CONSTRUCTION OPERATIONS. THE AFFECTED BARRIERS SHALL BE REINSTATED IMMEDIATELY AFTER CONSTRUCTION OPERATIONS ARE COMPLETED.
13. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE ADJUSTED AS REQUIRED AS THE SITE BECOMES DEVELOPED.
14. SEDIMENT CONTROL DEVICES SHALL BE CLEANED OF ACCUMULATED SEDIMENTATION AS REQUIRED AND REPLACED AS NECESSARY.
15. DURING THE COURSE OF CONSTRUCTION, IF THE ENGINEER BELIEVES THAT ADDITIONAL PREVENTION METHODS ARE REQUIRED TO CONTROL EROSION AND SEDIMENTATION, THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES, AS REQUIRED, TO THE SATISFACTION OF THE ENGINEER.
16. CONSTRUCTION AND MAINTENANCE REQUIREMENTS FOR EROSION AND SEDIMENT CONTROLS ARE TO COMPLY WITH OPSS 805.

NOT FOR CONSTRUCTION

NOTES

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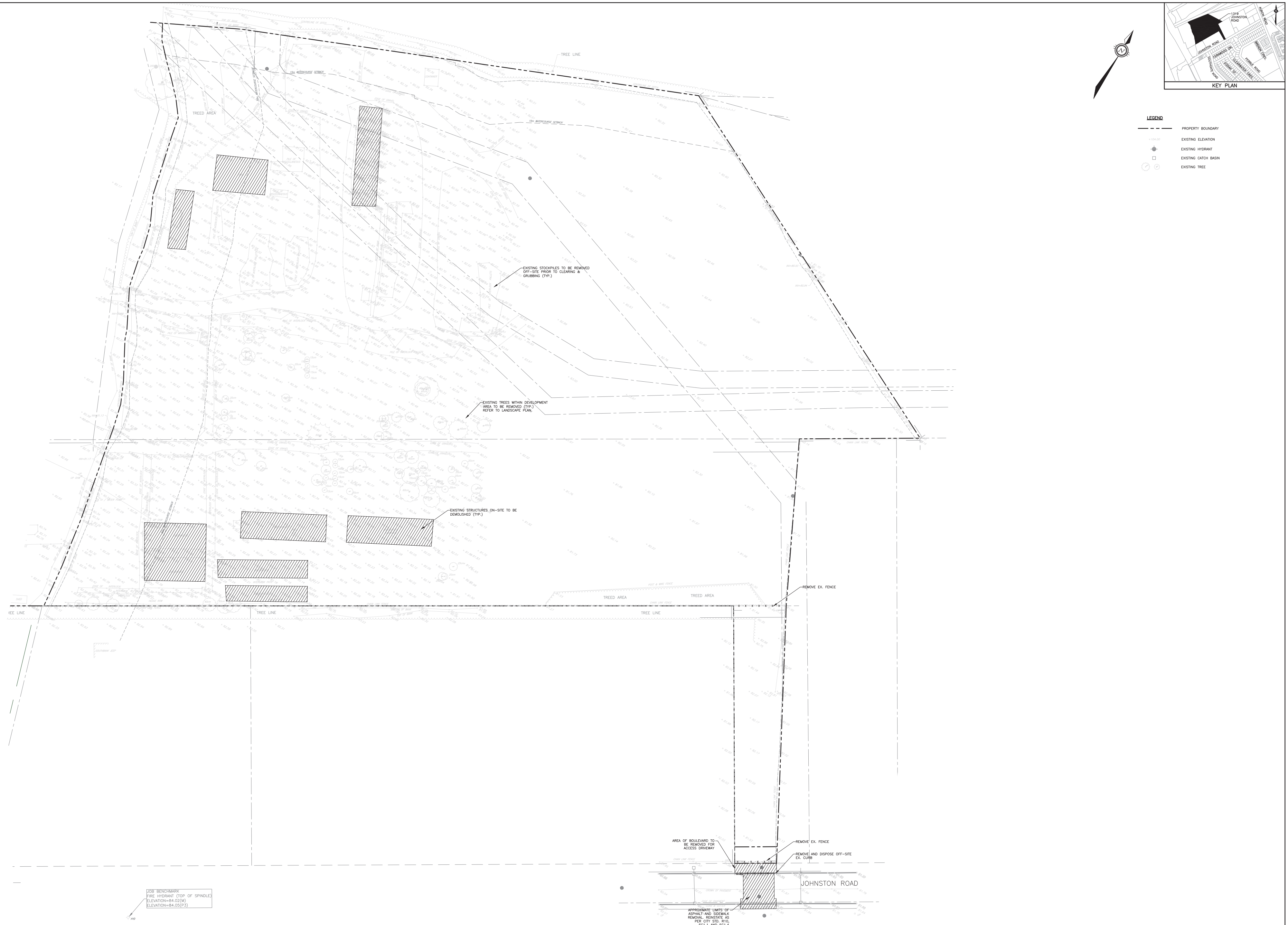
2079 ARTISTIC PLACE INC

1319 JOHNSTON ROAD
CITY OF OTTAWA

EROSION AND SEDIMENT CONTROL PLAN

PROJECT No.	23034
SURVEY	STANTEC
DATED	AUGUST 2023
DWG. No.	23034-ESC1



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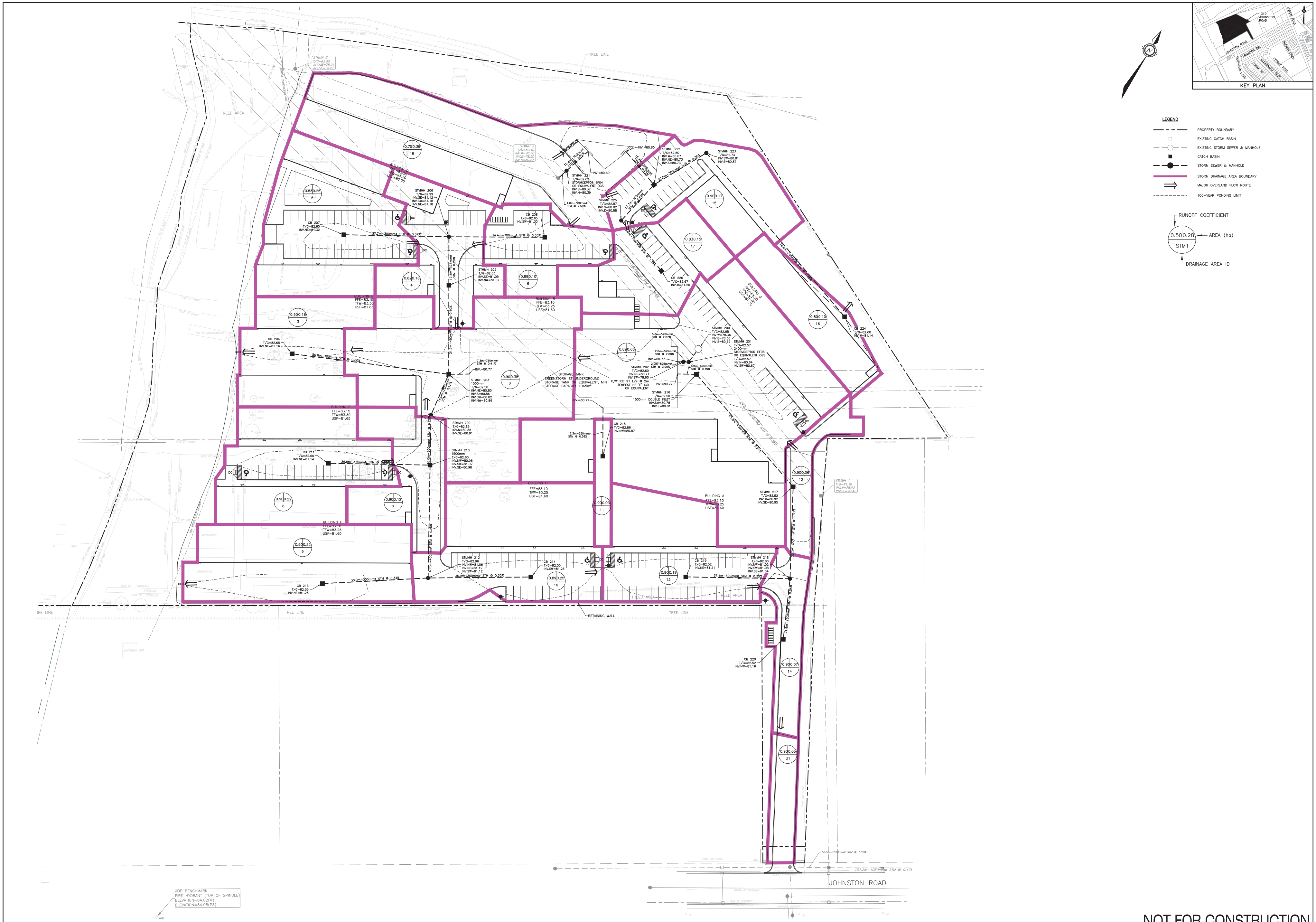
2079 ARTISTIC PLACE INC

1319 JOHNSTON ROAD
CITY OF OTTAWA

EXISTING CONDITIONS AND REMOVALS PLAN

PROJECT No.	23034
SURVEY	STANTEC
DATED	AUGUST 2023
DWG. No.	23034-R1



NOT FOR CONSTRUCTION

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2079 ARTISTIC PLACE INC

1319 JOHNSTON ROAD
CITY OF OTTAWA

STORM AREA DRAINAGE PLAN

PROJECT No.	23034
SURVEY	STANTEC
DATED	AUGUST 2023
DWG. No.	23034-STM1

Appendix C

Water Demand Calculations

Fire Demand Calculations

Boundary Conditions

Water Model Outputs

WATERMAIN DESIGN SHEET

1319 Johnston Road Site Plan

Project No. 23034

Robinson Consultants

Junction Node Number	RESIDENTIAL POPULATION				NON-RES			AVG. DAILY					MAX. DAILY					PEAK HOURLY				
	ACTUAL COUNT				IND. (ha)	COMM. (ha)	INST. (ha)	DEMAND (L/s)					DEMAND (L/s)					DEMAND (L/s)				
	Low Density	Medium Density	High Density	Total Population				RES.	IND.	COMM.	INST.	TOTAL	RES.	IND.	COMM.	INST.	TOTAL	RES.	IND.	COMM.	INST.	TOTAL
Bldg A					0.62				0.25			0.25		0.38			0.63		0.68			1.38
Bldg H					0.50				0.20			0.20		0.30			0.51		0.55			1.11
Bldg F					0.40				0.16			0.16		0.24			0.41		0.44			0.89
Bldg E					0.44				0.18			0.18		0.27			0.45		0.48			0.98
Bldg C					0.32				0.13			0.13		0.19			0.32		0.35			0.71
Bldg B					0.27				0.11			0.11		0.16			0.27		0.30			0.60
Bldg G					0.65				0.26			0.26		0.39			0.66		0.71			1.45
Bldg D					0.40				0.16			0.16		0.24			0.41		0.44			0.89
Total					**3.60**							**1.46**					**3.65**					**8.02**

Residential Densities

Low Density (SFH's) =	3.4	cap/unit
Medium Density (Townhouses) =	2.7	cap/unit
High Density (Apartments) =	1.8	cap/unit

Avg. Daily Demand:			Max. Daily Demand:		Max. Hourly Demand:	
Residential =	280	L/cap/day	2.5	x Avg. Day	2.2	x Max. Day
Industrial (Light) =	35000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day
Commercial =	28000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day
Institutional =	28000	L/ha/day	1.5	x Avg. Day	1.8	x Max. Day

2023-07-20

Table 6

Distance to the Exposure (m)	Length-Height Factor of Exposing Building Face	Construction Type of Exposed Building Face				
		Type V	Type III-IV[2]	Type III-IV[3]	Type I-II[2]	Type I-II[3]
0 - 3	0-20	20%	15%	5%	10%	0%
	21-40	21%	16%	6%	11%	1%
	41-60	22%	17%	7%	12%	2%
	61-80	23%	18%	8%	13%	3%
	81-100	24%	19%	9%	14%	4%
	Over 100	25%	20%	10%	15%	5%
3.1 to 10	0-20	15%	10%	3%	6%	0%
	21-40	16%	11%	4%	7%	0%
	41-60	17%	12%	5%	8%	1%
	61-80	18%	13%	6%	9%	2%
	81-100	19%	14%	7%	10%	3%
	Over 100	20%	15%	8%	11%	4%
10.1 to 20	0-20	10%	5%	0%	3%	0%
	21-40	11%	6%	1%	4%	0%
	41-60	12%	7%	2%	5%	0%
	61-80	13%	8%	3%	6%	1%
	81-100	14%	9%	4%	7%	2%
	Over 100	15%	10%	5%	8%	3%
20.1 to 30	0-20	0%	0%	0%	0%	0%
	21-40	2%	1%	0%	0%	0%
	41-60	4%	2%	0%	1%	0%
	61-80	6%	3%	1%	2%	0%
	81-100	8%	4%	2%	3%	0%
	Over 100	10%	5%	3%	4%	0%
Over 30	All	0%	0%	0%	0%	0%

[2] *with unprotected openings*
[3] *without unprotected openings*

1.5 for **Type V** Wood Frame Construction
0.8 for **Type IV-A** Mass Timber Construction
0.9 for **Type IV-B** Mass Timber Construction
1.0 for **Type IV-C** Mass Timber Construction
1.5 for **Type IV-D** Mass Timber Construction
1.0 for **Type III** Ordinary Construction
0.8 for **Type II** Noncombustible Construction
0.6 for **Type I** Fire Resistive Construction

Type V

Seperation Distance	Length-Height Factor					
	0	20.00001	40.00001	60.00001	80.00001	100
0	20%	21%	22%	23%	24%	25%
3	15%	16%	17%	18%	19%	20%
10	10%	11%	12%	13%	14%	15%
20	0%	2%	4%	6%	8%	10%
30.00001	0%	0%	0%	0%	0%	0%

Type III-IV2

Seperation Distance	Length-Height Factor					
	0	20.00001	40.00001	60.00001	80.00001	100
0	15%	16%	17%	18%	19%	20%
3	10%	11%	12%	13%	14%	15%
10	5%	6%	7%	8%	9%	10%
20	0%	1%	2%	3%	4%	5%
30.00001	0%	0%	0%	0%	0%	0%

Type III-IV3

Seperation Distance	Length-Height Factor					
	0	20.00001	40.00001	60.00001	80.00001	100
0	5%	6%	7%	8%	9%	10%
3	3%	4%	5%	6%	7%	8%
10	0%	1%	2%	3%	4%	5%
20	0%	0%	0%	1%	2%	3%
30.00001	0%	0%	0%	0%	0%	0%

Type I-II2

Seperation Distance	Length-Height Factor					
	0	20.00001	40.00001	60.00001	80.00001	100
0	10%	11%	12%	13%	14%	15%
3	6%	7%	8%	9%	10%	11%
10	3%	4%	5%	6%	7%	8%
20	0%	0%	1%	2%	3%	4%
30.00001	0%	0%	0%	0%	0%	0%

Type I-II3

Seperation Distance	Length-Height Factor					
	0	20.00001	40.00001	60.00001	80.00001	100
0	0%	1%	2%	3%	4%	5%
3	0%	0%	1%	2%	3%	4%
10	0%	0%	0%	1%	2%	3%
20	0%	0%	0%	0%	0%	0%
30.00001	0%	0%	0%	0%	0%	0%

Project Name:	1319 Johnston Rd
Project Location:	Ottawa ON
Project No:	23034
Date:	21-Jul-23
Building Type:	Light Industrial
Building Being Considered:	Bldg A

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**			
		Wood Frame (Type V)	1.5	Non-Combustible Construction (Type II)	0.8	
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				4948.9	m^2
	Total Effective Floor Area				**4,948.9**	**m^2**
C	**Fire Flow**				**12,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**			
		Non-combustible	-0.25	Free burning	0.15	
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1800**	**L/min**
	Fire Flow				**13,800**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	None	0.00	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	No	0.00	
		Full Supervision of the Sprinker System	-0.10	No	0.00	
	Sprinkler Reduction				**0**	**L/min**
	Exposures					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				46	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				92	m.storeys
	Construction Type of Exposed Wall	**Options**		Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame				
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance				6.0	m
	West Side Exposure Charge				**0.03**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				4.7	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				9.4	m.storeys
	Construction Type of Exposed Wall	**Options**		Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame				
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	32.3	m
	North Side Exposure Charge			**0.00**	
F	**East Side**				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			10	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			20	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			27.7	m
	East Side Exposure Charge			**0.00**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			62.5	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			125	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	145	m
	South Side Exposure Charge			**0.00**	
	Total Exposure Charage			**0.03**	**< 0.75**
	Increase for Exposures			**414**	**L/min**
G	**Total Required Fire Flow**			**14,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B equivalent to 2-storey given ~8m building height

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Project Name:	1319 Johnston Rd
Project Location:	Ottawa ON
Project No:	23034
Date:	21-Jul-23
Building Type:	Light Industrial
Building Being Considered:	Bldg H

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**			
		Wood Frame (Type V)	1.5	Non-Combustible Construction (Type II)	0.8	
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				4879.2	m^2
	Total Effective Floor Area				**4,879.2**	**m^2**
C	**Fire Flow**				**12,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**			
		Non-combustible	-0.25	Free burning	0.15	
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1800**	**L/min**
	Fire Flow				**13,800**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	None	0.00	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	No	0.00	
		Full Supervision of the Sprinker System	-0.10	No	0.00	
	Sprinkler Reduction				**0**	**L/min**
	Exposures					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				28.7	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				57.4	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance				11.8	m
	West Side Exposure Charge				**0.00**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				47	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				94	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	32.3	m
	North Side Exposure Charge			**0.00**	
F	**East Side**				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			46	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			92	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			6	m
	East Side Exposure Charge			**0.03**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			53.3	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			106.6	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	145	m
	South Side Exposure Charge			**0.00**	
	Total Exposure Charage			**0.03**	**< 0.75**
	Increase for Exposures			**414**	**L/min**
G	**Total Required Fire Flow**			**14,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B equivalent to 2-storey given ~8m building height

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Project Name:	1319 Johnston Rd
Project Location:	Ottawa ON
Project No:	23034
Date:	21-Jul-23
Building Type:	Light Industrial
Building Being Considered:	Bldg F

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**			
		Wood Frame (Type V)	1.5	Non-Combustible Construction (Type II)	0.8	
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				4046.3	m^2
	Total Effective Floor Area				**4,046.3**	**m^2**
C	**Fire Flow**				**11,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**			
		Non-combustible	-0.25	Free burning	0.15	
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1650**	**L/min**
	Fire Flow				**12,650**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	None	0.00	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	No	0.00	
		Full Supervision of the Sprinker System	-0.10	No	0.00	
	Sprinkler Reduction				**0**	**L/min**
	Exposures					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				27.4	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				54.8	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance			**>30m; No Exposure**	70.0	m
	West Side Exposure Charge				**0.00**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				64	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				128	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			17.0	m
	North Side Exposure Charge			**0.03**	
F	**East Side**				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			21.5	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			43	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			12.2	m
	East Side Exposure Charge			**0.00**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			76.8	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			153.6	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	145	m
	South Side Exposure Charge			**0.00**	
	Total Exposure Charage			**0.03**	**< 0.75**
	Increase for Exposures			**379.5**	**L/min**
G	**Total Required Fire Flow**			**13,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B equivalent to 2-storey given ~8m building height

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Project Name:	1319 Johnston Rd
Project Location:	Ottawa ON
Project No:	23034
Date:	21-Jul-23
Building Type:	Light Industrial
Building Being Considered:	Bldg E

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**			
		Wood Frame (Type V)	1.5	Non-Combustible Construction (Type II)	0.8	
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				2927.3	m^2
	Total Effective Floor Area				**2,927.3**	**m^2**
C	**Fire Flow**				**10,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**			
		Non-combustible	-0.25	Free burning	0.15	
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1500**	**L/min**
	Fire Flow				**11,500**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	None	0.00	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	No	0.00	
		Full Supervision of the Sprinker System	-0.10	No	0.00	
	Sprinkler Reduction				**0**	**L/min**
	Exposures					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				23	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				46	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance			**>30m; No Exposure**	100.0	m
	West Side Exposure Charge				**0.00**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				57.6	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				115.2	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			16.7	m
	North Side Exposure Charge			**0.03**	
F	**East Side**				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			7.2	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			14.4	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			10.7	m
	East Side Exposure Charge			**0.00**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			64	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			128	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			17	m
	South Side Exposure Charge			**0.03**	
	Total Exposure Charage			**0.06**	**< 0.75**
	Increase for Exposures			**690**	**L/min**
G	**Total Required Fire Flow**			**12,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B equivalent to 2-storey given ~8m building height

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Project Name:	1319 Johnston Rd
Project Location:	Ottawa ON
Project No:	23034
Date:	21-Jul-23
Building Type:	Light Industrial
Building Being Considered:	Bldg C

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**			
		Wood Frame (Type V)	1.5	Non-Combustible Construction (Type II)	0.8	
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				2927.3	m^2
	Total Effective Floor Area				**2,927.3**	**m^2**
C	**Fire Flow**				**10,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**			
		Non-combustible	-0.25	Free burning	0.15	
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1500**	**L/min**
	Fire Flow				**11,500**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	None	0.00	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	No	0.00	
		Full Supervision of the Sprinker System	-0.10	No	0.00	
	Sprinkler Reduction				**0**	**L/min**
	Exposures					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				22.9	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				45.8	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance			**>30m; No Exposure**	100.0	m
	West Side Exposure Charge				**0.00**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				32	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				64	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			21.4	m
	North Side Exposure Charge			**0.00**	
F	**East Side**				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			22.9	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			45.8	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			10.7	m
	East Side Exposure Charge			**0.00**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			57.6	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			115.2	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			16.7	m
	South Side Exposure Charge			**0.03**	
	Total Exposure Charage			**0.03**	**< 0.75**
	Increase for Exposures			**345**	**L/min**
G	**Total Required Fire Flow**			**12,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B equivalent to 2-storey given ~8m building height

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Project Name:	1319 Johnston Rd
Project Location:	Ottawa ON
Project No:	23034
Date:	21-Jul-23
Building Type:	Light Industrial
Building Being Considered:	Bldg B

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**			
		Wood Frame (Type V)	1.5	Non-Combustible Construction (Type II)	0.8	
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				2414.9	m^2
	Total Effective Floor Area				**2,414.9**	**m^2**
C	**Fire Flow**				**9,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**			
		Non-combustible	-0.25	Free burning	0.15	
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1350**	**L/min**
	Fire Flow				**10,350**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	None	0.00	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	No	0.00	
		Full Supervision of the Sprinker System	-0.10	No	0.00	
	Sprinkler Reduction				**0**	**L/min**
	Exposures					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				22.9	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				45.8	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance				6.7	m
	West Side Exposure Charge				**0.01**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				18.2	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				36.4	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			23.7	m
	North Side Exposure Charge			**0.00**	
F	**East Side**				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			17.4	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			34.8	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			29.4	m
	East Side Exposure Charge			**0.00**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			51.7	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			103.4	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	32.3	m
	South Side Exposure Charge			**0.00**	
	Total Exposure Charage			**0.01**	**< 0.75**
	Increase for Exposures			**103.5**	**L/min**
G	**Total Required Fire Flow**			**10,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B equivalent to 2-storey given ~8m building height

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Project Name:	1319 Johnston Rd
Project Location:	Ottawa ON
Project No:	23034
Date:	21-Jul-23
Building Type:	Light Industrial
Building Being Considered:	Bldg D

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**			
		Wood Frame (Type V)	1.5	Non-Combustible Construction (Type II)	0.8	
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				3177.1	m^2
	Total Effective Floor Area				**3,177.1**	**m^2**
C	**Fire Flow**				**10,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**			
		Non-combustible	-0.25	Free burning	0.15	
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1500**	**L/min**
	Fire Flow				**11,500**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	None	0.00	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	No	0.00	
		Full Supervision of the Sprinker System	-0.10	No	0.00	
	Sprinkler Reduction				**0**	**L/min**
	Exposures					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				23	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				46	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance			**>30m; No Exposure**	100.0	m
	West Side Exposure Charge				**0.00**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				80	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				160	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	100.0	m
	North Side Exposure Charge			**0.00**	
F	**East Side**				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			12	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			24	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	55	m
	East Side Exposure Charge			**0.00**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			50.2	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			100.4	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			22.2	m
	South Side Exposure Charge			**0.00**	
	Total Exposure Charage			**0**	**< 0.75**
	Increase for Exposures			**0**	**L/min**
G	**Total Required Fire Flow**			**12,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B equivalent to 2-storey given ~8m building height

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Project Name:	1319 Johnston Rd
Project Location:	Ottawa ON
Project No:	23034
Date:	21-Jul-23
Building Type:	Light Industrial
Building Being Considered:	Bldg G

Robinson Land Development

Calculations for Total Required Fire Flow

Step	Parameter				Value	
A	**Type of Construction**	**Options**	**C**			
		Wood Frame (Type V)	1.5	Non-Combustible Construction (Type II)	0.8	
		Ordinary Construction (Type III)	1.0			
		Non-Combustible Construction (Type II)	0.8			
		Fire Resistive Construction (Type I)	0.6			
B	Ground Floor Area				4907.1	m^2
	Total Effective Floor Area				**4,907.1**	**m^2**
C	**Fire Flow**				**12,000**	**L/min**
D	**Occupancy Class**	**Options**	**Charge**			
		Non-combustible	-0.25	Free burning	0.15	
		Limited Combustible	-0.15			
		Combustible	0.00			
		Free burning	0.15			
		Rapid Burning	0.25			
	Occupancy Adjustment				**1800**	**L/min**
	Fire Flow				**13,800**	**L/min**
E	**Sprinkler Protection**	**Options**	**Charge**			
		Automatic Sprinkler Protection	-0.30	None	0.00	
		None	0.00			
		Water Supply is Standard for System and Hose Lines	-0.10	No	0.00	
		Full Supervision of the Sprinker System	-0.10	No	0.00	
	Sprinkler Reduction				**0**	**L/min**
	Exposures					
	West Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				15.9	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				31.8	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				
		Noncombustible or Fire Resistive without Unprotected Openings				
	Separation Distance				29.4	m
	West Side Exposure Charge				**0.00**	
	North Side					
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Building Fully Protected with Automatic Sprinker Systems				No	
	Exposed Wall Length				118	m
	Exposed Wall No. of Storeys				2	
	Length-Height Factor of Exposed Wall				236	m.storeys
	Construction Type of Exposed Wall	**Options**				
		Wood Frame		Noncombustible or Fire Resistive without Unprotected Openings		
		Ordinary with Unprotected Openings				
		Ordinary without Unprotected Openings				
		Noncombustible or Fire Resistive with Unprotected Openings				

		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	100.0	m
	North Side Exposure Charge			**0.00**	
F	**East Side**				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			26.8	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			53.6	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance		**>30m; No Exposure**	39	m
	East Side Exposure Charge			**0.00**	
	South Side				
	Subject Building and Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Building Fully Protected with Automatic Sprinker Systems			No	
	Exposed Wall Length			19.9	m
	Exposed Wall No. of Storeys			2	
	Length-Height Factor of Exposed Wall			39.8	m.storeys
	Construction Type of Exposed Wall	**Options**	Noncombustible or Fire Resistive without Unprotected Openings		
		Wood Frame			
		Ordinary with Unprotected Openings			
		Ordinary without Unprotected Openings			
		Noncombustible or Fire Resistive with Unprotected Openings			
		Noncombustible or Fire Resistive without Unprotected Openings			
	Separation Distance			27.7	m
	South Side Exposure Charge			**0.00**	
	Total Exposure Charage			**0**	**< 0.75**
	Increase for Exposures			**0**	**L/min**
G	**Total Required Fire Flow**			**14,000**	**L/min**

Notes:

1. Fire flow calculations have been prepared in accordance with Fire Underwriters Survey (v. 2020)

2. Floor areas used in Step B equivalent to 2-storey given ~8m building height

3. Where buildings are at a diagonal to each other, the shortest separtion distance is increased by 3 metres and used as the exposure distance (Ref. FUS v.2020 pg.30).

Stephen McCaughey

From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Sent: July 31, 2023 8:25 PM
To: Stephen McCaughey
Subject: RE: 1319 Johnston Rd - SPA criteria
Attachments: 1319 Johnston Road July 2023.pdf

"CAUTION: External Sender"
Hi Stephen,

Please find below the boundary conditions for the proposed development at 1319 Johnston Road:

The following are boundary conditions, HGL, for hydraulic analysis at 1319 Johnston Road (zone 2W2C) assumed to be connected to the 305 mm on Johnston Road (see attached PDF for location).

Minimum HGL = 123.9 m

Maximum HGL = 131.3 m

Max Day + FireFlow (133.3 L/s): 126.2 m

Max Day + FireFlow (233.3 L/s): 123.7 m

These are for current conditions and are based on computer model simulation.

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.

The results were based on the following demand scenarios:

Water avg day: 1.46 L/s
Water peak hour: 8.02 L/s
Water max day + fire 1: 3.65 L/s + 8,000 L/min (Bldg F) = 136.98 L/s
Water max day + fire 2: 3.65 + 14,000 L/min = 237 L/s

Feel free to reach out at any time.

Thank you,

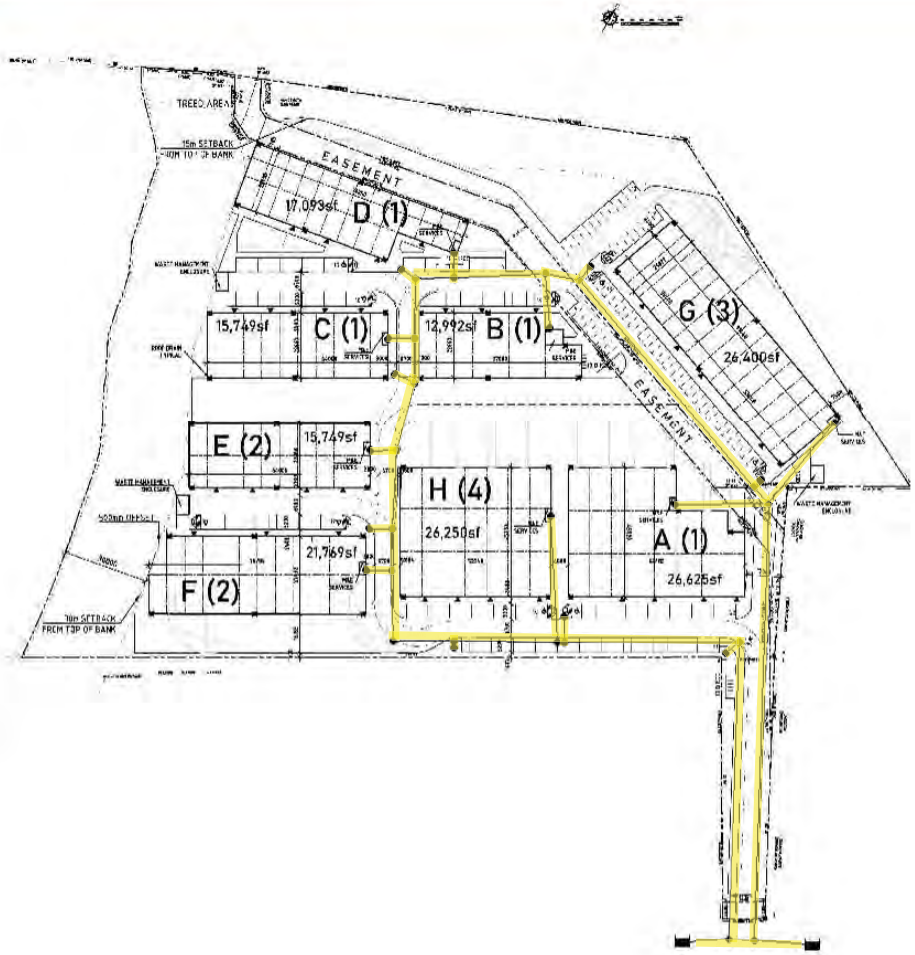
From: Stephen McCaughey <smccaughey@rcii.com>
Sent: July 28, 2023 7:42 AM
To: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Subject: RE: 1319 Johnston Rd - SPA criteria

Boundary Conditions for 1319 Johnston Road

EPANET 2.2 - 1319 Johnston.net

File Edit View Project Report Window Help

Network Map



Data Map

Junctions

WestConnect
EastConnect
HYD-1
HYD-2
HYD-3
HYD-4
HYD-5

Auto-Length Off | LPS | 100% | X,Y: -1917.503, 6309.922

```
*********************************************************************
*                            E P A N E T                            *
*                     Hydraulic and Water Quality                   *
*                     Analysis for Pipe Networks                    *
*                          Version 2.2                              *
*********************************************************************
```

Input File: 1319 Johnston.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	West	WestConnect	5	300
2	WestConnect	EastConnect	6	300
3	EastConnect	East	5	300
4	BldgAGConnect	EastConnect	162	200
5	HYD8Connect	BldgAGConnect	7	200
6	HYD8Connect	HYD-8	5	150
7	BldgG	BldgAGConnect	40	50
8	BldgAGConnect	BldgA	29	50
10	HYD7Connect	HYD8Connect	92	200
11	HYD7Connect	BldgBConnect	14	200
12	BldgBConnect	BldgB	19	50
13	BldgBConnect	BldgDConnect	35	200
14	BldgDConnect	BldgD	8	50
15	BldgDConnect	HYD6Connect	11	200
16	HYD6Connect	HYD-6	11	150
17	HYD6Connect	BldgCConnect	22	200
18	BldgCConnect	BldgC	8	50
19	BldgCConnect	HYD5Connect	12	200
20	HYD5Connect	HYD-5	6	150
21	HYD5Connect	BldgEConnect	29	200
22	BldgEConnect	BldgE	12	50
23	BldgEConnect	HYD4Connect	25	200
24	HYD4Connect	HYD-4	9	150
25	HYD4Connect	BldgFConnect	16	200
26	BldgFConnect	BldgF	9	50
27	BldgFConnect	20	25	200
28	20	HYD3Connect	23	200
29	HYD3Connect	HYD-3	2	150
30	HYD3Connect	BldgHConnect	35	200
31	BldgHConnect	BldgH	45	50
32	HYD-2	HYD2Connect	9	150
33	BldgHConnect	HYD2Connect	4	200
34	HYD2Connect	HYD1Connect	60	200

35	HYD1Connect	HYD-1	4	150
36	HYD1Connect	WestConnect	108	200
37	HYD7Connect	HYD-7	7	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
WestConnect	0.00	131.30	51.95	0.00	
EastConnect	0.00	131.30	51.95	0.00	
HYD-1	0.00	131.30	48.80	0.00	
HYD-2	0.00	131.30	48.30	0.00	
HYD-3	0.00	131.30	48.30	0.00	
HYD-4	0.00	131.30	48.40	0.00	
HYD-5	0.00	131.30	48.20	0.00	
HYD-6	0.00	131.30	48.00	0.00	
HYD-8	0.00	131.30	48.30	0.00	
BldgA	0.25	131.27	48.17	0.00	
BldgG	0.26	131.26	48.06	0.00	
BldgAGConnect	0.00	131.30	51.20	0.00	
HYD8Connect	0.00	131.30	51.20	0.00	
HYD1Connect	0.00	131.30	51.20	0.00	
HYD2Connect	0.00	131.30	51.20	0.00	
HYD3Connect	0.00	131.30	51.20	0.00	
20	0.00	131.30	51.20	0.00	
BldgFConnect	0.00	131.30	51.20	0.00	
BldgF	0.16	131.29	48.19	0.00	
HYD4Connect	0.00	131.30	51.20	0.00	
BldgEConnect	0.00	131.30	51.20	0.00	
BldgE	0.18	131.29	48.19	0.00	
HYD5Connect	0.00	131.30	51.20	0.00	
BldgCConnect	0.00	131.30	51.20	0.00	
BldgC	0.16	131.30	48.00	0.00	
HYD6Connect	0.00	131.30	51.20	0.00	
BldgDConnect	0.00	131.30	51.20	0.00	
BldgD	0.16	131.30	47.75	0.00	
BldgBConnect	0.00	131.30	51.20	0.00	
BldgB	0.11	131.29	48.19	0.00	
HYD7Connect	0.00	131.30	51.20	0.00	
BldgH	0.20	131.27	48.17	0.00	
BldgHConnect	0.00	131.30	51.20	0.00	
HYD-7	0.00	131.30	48.30	0.00	
West	-0.74	131.30	0.00	0.00	Reservoir
East	-0.74	131.30	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	0.74	0.01	0.00	Open
2	0.05	0.00	0.00	Open
3	-0.74	0.01	0.00	Open
4	-0.79	0.03	0.01	Open
5	-0.28	0.01	0.00	Open
6	0.00	0.00	0.00	Open
7	-0.26	0.13	1.05	Open
8	0.25	0.13	0.98	Open
10	-0.28	0.01	0.00	Open
11	0.28	0.01	0.00	Open
12	0.11	0.06	0.21	Open
13	0.17	0.01	0.00	Open
14	0.16	0.08	0.43	Open
15	0.01	0.00	0.00	Open
16	0.00	0.00	0.00	Open
17	0.01	0.00	0.00	Open
18	0.16	0.08	0.43	Open
19	-0.15	0.00	0.00	Open
20	0.00	0.00	0.00	Open
21	-0.15	0.00	0.00	Open
22	0.18	0.09	0.53	Open
23	-0.33	0.01	0.00	Open
24	0.00	0.00	0.00	Open
25	-0.33	0.01	0.00	Open
26	0.16	0.08	0.43	Open
27	-0.49	0.02	0.00	Open
28	-0.49	0.02	0.00	Open
29	0.00	0.00	0.00	Open
30	-0.49	0.02	0.00	Open
31	0.20	0.10	0.65	Open
32	0.00	0.00	0.00	Open
33	-0.69	0.02	0.01	Open
34	-0.69	0.02	0.01	Open
35	0.00	0.00	0.00	Open
36	-0.69	0.02	0.01	Open
37	0.00	0.00	0.00	Open

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*********************************************************************
*                            E P A N E T                            *
*                     Hydraulic and Water Quality                   *
*                     Analysis for Pipe Networks                    *
*                           Version 2.2                             *
*********************************************************************

Input File: 1319 Johnston.net
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Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	West	WestConnect	5	300
2	WestConnect	EastConnect	6	300
3	EastConnect	East	5	300
4	BldgAGConnect	EastConnect	162	200
5	HYD8Connect	BldgAGConnect	7	200
6	HYD8Connect	HYD-8	5	150
7	BldgG	BldgAGConnect	40	50
8	BldgAGConnect	BldgA	29	50
10	HYD7Connect	HYD8Connect	92	200
11	HYD7Connect	BldgBConnect	14	200
12	BldgBConnect	BldgB	19	50
13	BldgBConnect	BldgDConnect	35	200
14	BldgDConnect	BldgD	8	50
15	BldgDConnect	HYD6Connect	11	200
16	HYD6Connect	HYD-6	11	150
17	HYD6Connect	BldgCConnect	22	200
18	BldgCConnect	BldgC	8	50
19	BldgCConnect	HYD5Connect	12	200
20	HYD5Connect	HYD-5	6	150
21	HYD5Connect	BldgEConnect	29	200
22	BldgEConnect	BldgE	12	50
23	BldgEConnect	HYD4Connect	25	200
24	HYD4Connect	HYD-4	9	150
25	HYD4Connect	BldgFConnect	16	200
26	BldgFConnect	BldgF	9	50
27	BldgFConnect	20	25	200
28	20	HYD3Connect	23	200
29	HYD3Connect	HYD-3	2	150
30	HYD3Connect	BldgHConnect	35	200
31	BldgHConnect	BldgH	45	50
32	HYD-2	HYD2Connect	9	150
33	BldgHConnect	HYD2Connect	4	200
34	HYD2Connect	HYD1Connect	60	200

35	HYD1Connect	HYD-1	4	150
36	HYD1Connect	WestConnect	108	200
37	HYD7Connect	HYD-7	7	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
WestConnect	0.00	123.90	44.55	0.00	
EastConnect	0.00	123.90	44.55	0.00	
HYD-1	0.00	123.88	41.38	0.00	
HYD-2	0.00	123.88	40.88	0.00	
HYD-3	0.00	123.87	40.87	0.00	
HYD-4	0.00	123.87	40.97	0.00	
HYD-5	0.00	123.87	40.77	0.00	
HYD-6	0.00	123.87	40.57	0.00	
HYD-8	0.00	123.87	40.87	0.00	
BldgA	1.38	123.20	40.10	0.00	
BldgG	1.45	122.86	39.66	0.00	
BldgAGConnect	0.00	123.87	43.77	0.00	
HYD8Connect	0.00	123.87	43.77	0.00	
HYD1Connect	0.00	123.88	43.78	0.00	
HYD2Connect	0.00	123.88	43.78	0.00	
HYD3Connect	0.00	123.87	43.77	0.00	
20	0.00	123.87	43.77	0.00	
BldgFConnect	0.00	123.87	43.77	0.00	
BldgF	0.89	123.78	40.68	0.00	
HYD4Connect	0.00	123.87	43.77	0.00	
BldgEConnect	0.00	123.87	43.77	0.00	
BldgE	0.98	123.72	40.62	0.00	
HYD5Connect	0.00	123.87	43.77	0.00	
BldgCConnect	0.00	123.87	43.77	0.00	
BldgC	0.71	123.81	40.51	0.00	
HYD6Connect	0.00	123.87	43.77	0.00	
BldgDConnect	0.00	123.87	43.77	0.00	
BldgD	0.89	123.79	40.24	0.00	
BldgBConnect	0.00	123.87	43.77	0.00	
BldgB	0.60	123.77	40.67	0.00	
HYD7Connect	0.00	123.87	43.77	0.00	
BldgH	1.11	123.18	40.08	0.00	
BldgHConnect	0.00	123.88	43.78	0.00	
HYD-7	0.00	123.87	40.87	0.00	
West	-4.00	123.90	0.00	0.00	Reservoir
East	-4.01	123.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1	4.00	0.06	0.02	Open
2	0.25	0.00	0.00	Open
3	-4.01	0.06	0.02	Open
4	-4.27	0.14	0.18	Open
5	-1.44	0.05	0.03	Open
6	0.00	0.00	0.00	Open
7	-1.45	0.74	25.36	Open
8	1.38	0.70	23.14	Open
10	-1.44	0.05	0.02	Open
11	1.44	0.05	0.02	Open
12	0.60	0.31	4.95	Open
13	0.84	0.03	0.01	Open
14	0.89	0.45	10.27	Open
15	-0.05	0.00	0.00	Open
16	0.00	0.00	0.00	Open
17	-0.05	0.00	0.00	Open
18	0.71	0.36	6.76	Open
19	-0.76	0.02	0.01	Open
20	0.00	0.00	0.00	Open
21	-0.76	0.02	0.01	Open
22	0.98	0.50	12.28	Open
23	-1.74	0.06	0.03	Open
24	0.00	0.00	0.00	Open
25	-1.74	0.06	0.03	Open
26	0.89	0.45	10.27	Open
27	-2.63	0.08	0.08	Open
28	-2.63	0.08	0.07	Open
29	0.00	0.00	0.00	Open
30	-2.63	0.08	0.08	Open
31	1.11	0.57	15.46	Open
32	0.00	0.00	0.00	Open
33	-3.74	0.12	0.14	Open
34	-3.74	0.12	0.14	Open
35	0.00	0.00	0.00	Open
36	-3.74	0.12	0.14	Open
37	0.00	0.00	0.00	Open

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**********************************************************************
*                    E P A N E T                     *
*              Hydraulic and Water Quality           *
*              Analysis for Pipe Networks            *
*                   Version 2.2                      *
**********************************************************************
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Input File: 1319 Johnston.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	West	WestConnect	5	300
2	WestConnect	EastConnect	6	300
3	EastConnect	East	5	300
4	BldgAGConnect	EastConnect	162	200
5	HYD8Connect	BldgAGConnect	7	200
6	HYD8Connect	HYD-8	5	150
7	BldgG	BldgAGConnect	40	50
8	BldgAGConnect	BldgA	29	50
10	HYD7Connect	HYD8Connect	92	200
11	HYD7Connect	BldgBConnect	14	200
12	BldgBConnect	BldgB	19	50
13	BldgBConnect	BldgDConnect	35	200
14	BldgDConnect	BldgD	8	50
15	BldgDConnect	HYD6Connect	11	200
16	HYD6Connect	HYD-6	11	150
17	HYD6Connect	BldgCConnect	22	200
18	BldgCConnect	BldgC	8	50
19	BldgCConnect	HYD5Connect	12	200
20	HYD5Connect	HYD-5	6	150
21	HYD5Connect	BldgEConnect	29	200
22	BldgEConnect	BldgE	12	50
23	BldgEConnect	HYD4Connect	25	200
24	HYD4Connect	HYD-4	9	150
25	HYD4Connect	BldgFConnect	16	200
26	BldgFConnect	BldgF	9	50
27	BldgFConnect	20	25	200
28	20	HYD3Connect	23	200
29	HYD3Connect	HYD-3	2	150
30	HYD3Connect	BldgHConnect	35	200
31	BldgHConnect	BldgH	45	50
32	HYD-2	HYD2Connect	9	150
33	BldgHConnect	HYD2Connect	4	200
34	HYD2Connect	HYD1Connect	60	200
35	HYD1Connect	HYD-1	4	150
36	HYD1Connect	WestConnect	108	200
37	HYD7Connect	HYD-7	7	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
WestConnect	0.00	123.85	44.50	0.00	
EastConnect	0.00	123.85	44.50	0.00	
HYD-1	77.80	111.46	28.96	0.00	
HYD-2	77.80	109.22	26.22	0.00	
HYD-3	0.00	111.11	28.11	0.00	
HYD-4	0.00	111.37	28.47	0.00	
HYD-5	0.00	111.60	28.50	0.00	
HYD-6	0.00	111.75	28.45	0.00	
HYD-8	77.80	111.50	28.50	0.00	
BldgA	0.63	112.76	29.66	0.00	
BldgG	0.66	112.68	29.48	0.00	
BldgAGConnect	0.00	112.92	32.82	0.00	
HYD8Connect	0.00	112.46	32.36	0.00	
HYD1Connect	0.00	112.23	32.13	0.00	
HYD2Connect	0.00	110.95	30.85	0.00	
HYD3Connect	0.00	111.11	31.01	0.00	
20	0.00	111.20	31.10	0.00	
BldgFConnect	0.00	111.30	31.20	0.00	
BldgF	0.41	111.28	28.18	0.00	
HYD4Connect	0.00	111.37	31.27	0.00	
BldgEConnect	0.00	111.48	31.38	0.00	
BldgE	0.45	111.44	28.34	0.00	
HYD5Connect	0.00	111.60	31.50	0.00	
BldgCConnect	0.00	111.65	31.55	0.00	
BldgC	0.32	111.64	28.34	0.00	
HYD6Connect	0.00	111.75	31.65	0.00	
BldgDConnect	0.00	111.80	31.70	0.00	
BldgD	0.41	111.78	28.23	0.00	
BldgBConnect	0.00	111.96	31.86	0.00	
BldgB	0.27	111.94	28.84	0.00	
HYD7Connect	0.00	112.03	31.93	0.00	
BldgH	0.51	110.80	27.70	0.00	
BldgHConnect	0.00	110.97	30.87	0.00	
HYD-7	0.00	112.03	29.03	0.00	
West	-119.28	123.90	0.00	0.00	Reservoir
East	-117.78	123.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status

1	119.28	1.69	10.33	Open
2	-14.11	0.20	0.20	Open
3	-117.78	1.67	10.09	Open
4	-103.67	3.30	67.46	Open
5	-102.38	3.26	65.91	Open
6	77.80	4.40	192.04	Open
7	-0.66	0.34	5.90	Open
8	0.63	0.32	5.42	Open
10	-24.58	0.78	4.69	Open
11	24.58	0.78	4.69	Open
12	0.27	0.14	1.13	Open
13	24.31	0.77	4.60	Open
14	0.41	0.21	2.44	Open
15	23.90	0.76	4.45	Open
16	0.00	0.00	0.00	Open
17	23.90	0.76	4.46	Open
18	0.32	0.16	1.54	Open
19	23.58	0.75	4.34	Open
20	0.00	0.00	0.00	Open
21	23.58	0.75	4.35	Open
22	0.45	0.23	2.90	Open
23	23.13	0.74	4.19	Open
24	0.00	0.00	0.00	Open
25	23.13	0.74	4.19	Open
26	0.41	0.21	2.44	Open
27	22.72	0.72	4.06	Open
28	22.72	0.72	4.06	Open
29	0.00	0.00	0.00	Open
30	22.72	0.72	4.06	Open
31	0.51	0.26	3.66	Open
32	-77.80	4.40	192.04	Open
33	22.21	0.71	3.89	Open
34	-55.59	1.77	21.27	Open
35	77.80	4.40	192.03	Open
36	-133.39	4.25	107.59	Open
37	0.00	0.00	0.00	Open

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**********************************************************************
*                    E P A N E T                     *
*              Hydraulic and Water Quality           *
*              Analysis for Pipe Networks            *
*                   Version 2.2                      *
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Input File: 1319 Johnston.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	West	WestConnect	5	300
2	WestConnect	EastConnect	6	300
3	EastConnect	East	5	300
4	BldgAGConnect	EastConnect	162	200
5	HYD8Connect	BldgAGConnect	7	200
6	HYD8Connect	HYD-8	5	150
7	BldgG	BldgAGConnect	40	50
8	BldgAGConnect	BldgA	29	50
10	HYD7Connect	HYD8Connect	92	200
11	HYD7Connect	BldgBConnect	14	200
12	BldgBConnect	BldgB	19	50
13	BldgBConnect	BldgDConnect	35	200
14	BldgDConnect	BldgD	8	50
15	BldgDConnect	HYD6Connect	11	200
16	HYD6Connect	HYD-6	11	150
17	HYD6Connect	BldgCConnect	22	200
18	BldgCConnect	BldgC	8	50
19	BldgCConnect	HYD5Connect	12	200
20	HYD5Connect	HYD-5	6	150
21	HYD5Connect	BldgEConnect	29	200
22	BldgEConnect	BldgE	12	50
23	BldgEConnect	HYD4Connect	25	200
24	HYD4Connect	HYD-4	9	150
25	HYD4Connect	BldgFConnect	16	200
26	BldgFConnect	BldgF	9	50
27	BldgFConnect	20	25	200
28	20	HYD3Connect	23	200
29	HYD3Connect	HYD-3	2	150
30	HYD3Connect	BldgHConnect	35	200
31	BldgHConnect	BldgH	45	50
32	HYD-2	HYD2Connect	9	150
33	BldgHConnect	HYD2Connect	4	200
34	HYD2Connect	HYD1Connect	60	200
35	HYD1Connect	HYD-1	4	150
36	HYD1Connect	WestConnect	108	200
37	HYD7Connect	HYD-7	7	150

Page 2
Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
WestConnect	0.00	123.85	44.50	0.00	
EastConnect	0.00	123.85	44.50	0.00	
HYD-1	0.00	110.40	27.90	0.00	
HYD-2	77.80	101.20	18.20	0.00	
HYD-3	77.80	101.41	18.41	0.00	
HYD-4	77.80	100.14	17.24	0.00	
HYD-5	0.00	104.69	21.59	0.00	
HYD-6	0.00	106.48	23.18	0.00	
HYD-8	0.00	114.59	31.59	0.00	
BldgA	0.63	114.80	31.70	0.00	
BldgG	0.66	114.72	31.52	0.00	
BldgAGConnect	0.00	114.96	34.86	0.00	
HYD8Connect	0.00	114.59	34.49	0.00	
HYD1Connect	0.00	110.40	30.30	0.00	
HYD2Connect	0.00	102.93	22.83	0.00	
HYD3Connect	0.00	101.79	21.69	0.00	
20	0.00	101.82	21.72	0.00	
BldgFConnect	0.00	101.85	21.75	0.00	
BldgF	0.41	101.83	18.73	0.00	
HYD4Connect	0.00	101.87	21.77	0.00	
BldgEConnect	0.00	103.17	23.07	0.00	
BldgE	0.45	103.13	20.03	0.00	
HYD5Connect	0.00	104.69	24.59	0.00	
BldgCConnect	0.00	105.32	25.22	0.00	
BldgC	0.32	105.30	22.00	0.00	
HYD6Connect	0.00	106.48	26.38	0.00	
BldgDConnect	0.00	107.06	26.96	0.00	
BldgD	0.41	107.04	23.49	0.00	
BldgBConnect	0.00	108.92	28.82	0.00	
BldgB	0.27	108.90	25.80	0.00	
HYD7Connect	0.00	109.67	29.57	0.00	
BldgH	0.51	102.65	19.55	0.00	
BldgHConnect	0.00	102.81	22.71	0.00	
HYD-7	0.00	109.67	26.67	0.00	
West	-120.50	123.90	0.00	0.00	Reservoir
East	-116.56	123.90	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status

1	120.50	1.70	10.53	Open
2	-23.82	0.34	0.52	Open
3	-116.56	1.65	9.90	Open
4	-92.74	2.95	54.88	Open
5	-91.45	2.91	53.48	Open
6	0.00	0.00	0.00	Open
7	-0.66	0.34	5.90	Open
8	0.63	0.32	5.42	Open
10	-91.45	2.91	53.48	Open
11	91.45	2.91	53.48	Open
12	0.27	0.14	1.13	Open
13	91.18	2.90	53.18	Open
14	0.41	0.21	2.44	Open
15	90.77	2.89	52.74	Open
16	0.00	0.00	0.00	Open
17	90.77	2.89	52.74	Open
18	0.32	0.16	1.55	Open
19	90.45	2.88	52.40	Open
20	0.00	0.00	0.00	Open
21	90.45	2.88	52.40	Open
22	0.45	0.23	2.90	Open
23	90.00	2.86	51.92	Open
24	77.80	4.40	192.04	Open
25	12.20	0.39	1.28	Open
26	0.41	0.21	2.44	Open
27	11.79	0.38	1.20	Open
28	11.79	0.38	1.20	Open
29	77.80	4.40	192.04	Open
30	-66.01	2.10	29.24	Open
31	0.51	0.26	3.66	Open
32	-77.80	4.40	192.04	Open
33	-66.52	2.12	29.66	Open
34	-144.32	4.59	124.49	Open
35	0.00	0.00	0.00	Open
36	-144.32	4.59	124.49	Open
37	0.00	0.00	0.00	Open

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**********************************************************************
*                    E P A N E T                     *
*              Hydraulic and Water Quality           *
*              Analysis for Pipe Networks            *
*                   Version 2.2                      *
**********************************************************************
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Input File: 1319 Johnston.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	West	WestConnect	5	300
2	WestConnect	EastConnect	6	300
3	EastConnect	East	5	300
4	BldgAGConnect	EastConnect	162	200
5	HYD8Connect	BldgAGConnect	7	200
6	HYD8Connect	HYD-8	5	150
7	BldgG	BldgAGConnect	40	50
8	BldgAGConnect	BldgA	29	50
10	HYD7Connect	HYD8Connect	92	200
11	HYD7Connect	BldgBConnect	14	200
12	BldgBConnect	BldgB	19	50
13	BldgBConnect	BldgDConnect	35	200
14	BldgDConnect	BldgD	8	50
15	BldgDConnect	HYD6Connect	11	200
16	HYD6Connect	HYD-6	11	150
17	HYD6Connect	BldgCConnect	22	200
18	BldgCConnect	BldgC	8	50
19	BldgCConnect	HYD5Connect	12	200
20	HYD5Connect	HYD-5	6	150
21	HYD5Connect	BldgEConnect	29	200
22	BldgEConnect	BldgE	12	50
23	BldgEConnect	HYD4Connect	25	200
24	HYD4Connect	HYD-4	9	150
25	HYD4Connect	BldgFConnect	16	200
26	BldgFConnect	BldgF	9	50
27	BldgFConnect	20	25	200
28	20	HYD3Connect	23	200
29	HYD3Connect	HYD-3	2	150
30	HYD3Connect	BldgHConnect	35	200
31	BldgHConnect	BldgH	45	50
32	HYD-2	HYD2Connect	9	150
33	BldgHConnect	HYD2Connect	4	200
34	HYD2Connect	HYD1Connect	60	200
35	HYD1Connect	HYD-1	4	150
36	HYD1Connect	WestConnect	108	200
37	HYD7Connect	HYD-7	7	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
WestConnect	0.00	123.86	44.51	0.00	
EastConnect	0.00	123.86	44.51	0.00	
HYD-1	0.00	115.05	32.55	0.00	
HYD-2	0.00	110.16	27.16	0.00	
HYD-3	66.70	106.71	23.71	0.00	
HYD-4	66.70	104.68	21.78	0.00	
HYD-5	66.70	105.29	22.19	0.00	
HYD-6	0.00	107.80	24.50	0.00	
HYD-8	0.00	115.29	32.29	0.00	
BldgA	0.63	115.48	32.38	0.00	
BldgG	0.66	115.40	32.20	0.00	
BldgAGConnect	0.00	115.64	35.54	0.00	
HYD8Connect	0.00	115.29	35.19	0.00	
HYD1Connect	0.00	115.05	34.95	0.00	
HYD2Connect	0.00	110.16	30.06	0.00	
HYD3Connect	0.00	107.00	26.90	0.00	
20	0.00	106.63	26.53	0.00	
BldgFConnect	0.00	106.24	26.14	0.00	
BldgF	0.41	106.21	23.11	0.00	
HYD4Connect	0.00	105.98	25.88	0.00	
BldgEConnect	0.00	106.06	25.96	0.00	
BldgE	0.45	106.02	22.92	0.00	
HYD5Connect	0.00	106.15	26.05	0.00	
BldgCConnect	0.00	106.73	26.63	0.00	
BldgC	0.32	106.72	23.42	0.00	
HYD6Connect	0.00	107.80	27.70	0.00	
BldgDConnect	0.00	108.34	28.24	0.00	
BldgD	0.41	108.32	24.77	0.00	
BldgBConnect	0.00	110.06	29.96	0.00	
BldgB	0.27	110.04	26.94	0.00	
HYD7Connect	0.00	110.75	30.65	0.00	
BldgH	0.51	109.67	26.57	0.00	
BldgHConnect	0.00	109.83	29.73	0.00	
HYD-7	0.00	110.75	27.75	0.00	
West	-102.54	123.90	0.00	0.00	Reservoir
East	-101.22	123.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status

1	102.54	1.45	7.81	Open
2	-12.32	0.17	0.16	Open
3	-101.22	1.43	7.62	Open
4	-88.90	2.83	50.75	Open
5	-87.61	2.79	49.40	Open
6	0.00	0.00	0.00	Open
7	-0.66	0.34	5.90	Open
8	0.63	0.32	5.42	Open
10	-87.61	2.79	49.40	Open
11	87.61	2.79	49.40	Open
12	0.27	0.14	1.13	Open
13	87.34	2.78	49.12	Open
14	0.41	0.21	2.45	Open
15	86.93	2.77	48.69	Open
16	0.00	0.00	0.00	Open
17	86.93	2.77	48.69	Open
18	0.32	0.16	1.55	Open
19	86.61	2.76	48.36	Open
20	66.70	3.77	144.40	Open
21	19.91	0.63	3.18	Open
22	0.45	0.23	2.91	Open
23	19.46	0.62	3.05	Open
24	66.70	3.77	144.40	Open
25	-47.24	1.50	15.73	Open
26	0.41	0.21	2.45	Open
27	-47.65	1.52	15.99	Open
28	-47.65	1.52	15.99	Open
29	66.70	3.77	144.40	Open
30	-114.35	3.64	80.89	Open
31	0.51	0.26	3.66	Open
32	0.00	0.00	0.00	Open
33	-114.86	3.66	81.56	Open
34	-114.86	3.66	81.56	Open
35	0.00	0.00	0.00	Open
36	-114.86	3.66	81.56	Open
37	0.00	0.00	0.00	Open

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**********************************************************************
*                    E P A N E T                     *
*              Hydraulic and Water Quality           *
*              Analysis for Pipe Networks            *
*                   Version 2.2                      *
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Input File: 1319 Johnston.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	West	WestConnect	5	300
2	WestConnect	EastConnect	6	300
3	EastConnect	East	5	300
4	BldgAGConnect	EastConnect	162	200
5	HYD8Connect	BldgAGConnect	7	200
6	HYD8Connect	HYD-8	5	150
7	BldgG	BldgAGConnect	40	50
8	BldgAGConnect	BldgA	29	50
10	HYD7Connect	HYD8Connect	92	200
11	HYD7Connect	BldgBConnect	14	200
12	BldgBConnect	BldgB	19	50
13	BldgBConnect	BldgDConnect	35	200
14	BldgDConnect	BldgD	8	50
15	BldgDConnect	HYD6Connect	11	200
16	HYD6Connect	HYD-6	11	150
17	HYD6Connect	BldgCConnect	22	200
18	BldgCConnect	BldgC	8	50
19	BldgCConnect	HYD5Connect	12	200
20	HYD5Connect	HYD-5	6	150
21	HYD5Connect	BldgEConnect	29	200
22	BldgEConnect	BldgE	12	50
23	BldgEConnect	HYD4Connect	25	200
24	HYD4Connect	HYD-4	9	150
25	HYD4Connect	BldgFConnect	16	200
26	BldgFConnect	BldgF	9	50
27	BldgFConnect	20	25	200
28	20	HYD3Connect	23	200
29	HYD3Connect	HYD-3	2	150
30	HYD3Connect	BldgHConnect	35	200
31	BldgHConnect	BldgH	45	50
32	HYD-2	HYD2Connect	9	150
33	BldgHConnect	HYD2Connect	4	200
34	HYD2Connect	HYD1Connect	60	200
35	HYD1Connect	HYD-1	4	150
36	HYD1Connect	WestConnect	108	200
37	HYD7Connect	HYD-7	7	150

Page 2
Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
WestConnect	0.00	123.86	44.51	0.00	
EastConnect	0.00	123.86	44.51	0.00	
HYD-1	0.00	116.30	33.80	0.00	
HYD-2	0.00	112.10	29.10	0.00	
HYD-3	0.00	109.39	26.39	0.00	
HYD-4	66.70	103.66	20.76	0.00	
HYD-5	66.70	103.52	20.42	0.00	
HYD-6	66.70	103.02	19.72	0.00	
HYD-8	0.00	113.60	30.60	0.00	
BldgA	0.63	113.86	30.76	0.00	
BldgG	0.66	113.78	30.58	0.00	
BldgAGConnect	0.00	114.02	33.92	0.00	
HYD8Connect	0.00	113.60	33.50	0.00	
HYD1Connect	0.00	116.30	36.20	0.00	
HYD2Connect	0.00	112.10	32.00	0.00	
HYD3Connect	0.00	109.39	29.29	0.00	
20	0.00	107.79	27.69	0.00	
BldgFConnect	0.00	106.06	25.96	0.00	
BldgF	0.41	106.04	22.94	0.00	
HYD4Connect	0.00	104.96	24.86	0.00	
BldgEConnect	0.00	104.69	24.59	0.00	
BldgE	0.45	104.66	21.56	0.00	
HYD5Connect	0.00	104.39	24.29	0.00	
BldgCConnect	0.00	104.47	24.37	0.00	
BldgC	0.32	104.45	21.15	0.00	
HYD6Connect	0.00	104.61	24.51	0.00	
BldgDConnect	0.00	105.25	25.15	0.00	
BldgD	0.41	105.23	21.68	0.00	
BldgBConnect	0.00	107.32	27.22	0.00	
BldgB	0.27	107.30	24.20	0.00	
HYD7Connect	0.00	108.15	28.05	0.00	
BldgH	0.51	111.65	28.55	0.00	
BldgHConnect	0.00	111.82	31.72	0.00	
HYD-7	0.00	108.15	25.15	0.00	
West	-101.96	123.90	0.00	0.00	Reservoir
East	-101.80	123.90	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status

1	101.96	1.44	7.72	Open
2	-3.82	0.05	0.02	Open
3	-101.80	1.44	7.70	Open
4	-97.98	3.12	60.77	Open
5	-96.69	3.08	59.29	Open
6	0.00	0.00	0.00	Open
7	-0.66	0.34	5.90	Open
8	0.63	0.32	5.42	Open
10	-96.69	3.08	59.29	Open
11	96.69	3.08	59.29	Open
12	0.27	0.14	1.13	Open
13	96.42	3.07	58.99	Open
14	0.41	0.21	2.45	Open
15	96.01	3.06	58.52	Open
16	66.70	3.77	144.40	Open
17	29.31	0.93	6.50	Open
18	0.32	0.16	1.54	Open
19	28.99	0.92	6.37	Open
20	66.70	3.77	144.40	Open
21	-37.71	1.20	10.37	Open
22	0.45	0.23	2.90	Open
23	-38.16	1.21	10.60	Open
24	66.70	3.77	144.40	Open
25	-104.86	3.34	68.90	Open
26	0.41	0.21	2.44	Open
27	-105.27	3.35	69.40	Open
28	-105.27	3.35	69.40	Open
29	0.00	0.00	0.00	Open
30	-105.27	3.35	69.40	Open
31	0.51	0.26	3.66	Open
32	0.00	0.00	0.00	Open
33	-105.78	3.37	70.02	Open
34	-105.78	3.37	70.02	Open
35	0.00	0.00	0.00	Open
36	-105.78	3.37	70.02	Open
37	0.00	0.00	0.00	Open

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*                    E P A N E T                     *
*              Hydraulic and Water Quality           *
*              Analysis for Pipe Networks            *
*                   Version 2.2                      *
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Input File: 1319 Johnston.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	West	WestConnect	5	300
2	WestConnect	EastConnect	6	300
3	EastConnect	East	5	300
4	BldgAGConnect	EastConnect	162	200
5	HYD8Connect	BldgAGConnect	7	200
6	HYD8Connect	HYD-8	5	150
7	BldgG	BldgAGConnect	40	50
8	BldgAGConnect	BldgA	29	50
10	HYD7Connect	HYD8Connect	92	200
11	HYD7Connect	BldgBConnect	14	200
12	BldgBConnect	BldgB	19	50
13	BldgBConnect	BldgDConnect	35	200
14	BldgDConnect	BldgD	8	50
15	BldgDConnect	HYD6Connect	11	200
16	HYD6Connect	HYD-6	11	150
17	HYD6Connect	BldgCConnect	22	200
18	BldgCConnect	BldgC	8	50
19	BldgCConnect	HYD5Connect	12	200
20	HYD5Connect	HYD-5	6	150
21	HYD5Connect	BldgEConnect	29	200
22	BldgEConnect	BldgE	12	50
23	BldgEConnect	HYD4Connect	25	200
24	HYD4Connect	HYD-4	9	150
25	HYD4Connect	BldgFConnect	16	200
26	BldgFConnect	BldgF	9	50
27	BldgFConnect	20	25	200
28	20	HYD3Connect	23	200
29	HYD3Connect	HYD-3	2	150
30	HYD3Connect	BldgHConnect	35	200
31	BldgHConnect	BldgH	45	50
32	HYD-2	HYD2Connect	9	150
33	BldgHConnect	HYD2Connect	4	200
34	HYD2Connect	HYD1Connect	60	200
35	HYD1Connect	HYD-1	4	150
36	HYD1Connect	WestConnect	108	200
37	HYD7Connect	HYD-7	7	150

Page 2
Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
WestConnect	0.00	123.86	44.51	0.00	
EastConnect	0.00	123.86	44.51	0.00	
HYD-1	0.00	117.48	34.98	0.00	
HYD-2	0.00	113.94	30.94	0.00	
HYD-3	0.00	111.66	28.66	0.00	
HYD-4	0.00	107.92	25.02	0.00	
HYD-5	66.70	103.94	20.84	0.00	
HYD-6	66.70	103.01	19.71	0.00	
HYD-8	0.00	111.73	28.73	0.00	
BldgA	0.63	112.06	28.96	0.00	
BldgG	0.66	111.98	28.78	0.00	
BldgAGConnect	0.00	112.22	32.12	0.00	
HYD8Connect	0.00	111.73	31.63	0.00	
HYD1Connect	0.00	117.48	37.38	0.00	
HYD2Connect	0.00	113.94	33.84	0.00	
HYD3Connect	0.00	111.66	31.56	0.00	
20	0.00	110.31	30.21	0.00	
BldgFConnect	0.00	108.85	28.75	0.00	
BldgF	0.41	108.83	25.73	0.00	
HYD4Connect	0.00	107.92	27.82	0.00	
BldgEConnect	0.00	106.47	26.37	0.00	
BldgE	0.45	106.44	23.34	0.00	
HYD5Connect	0.00	104.80	24.70	0.00	
BldgCConnect	0.00	104.73	24.63	0.00	
BldgC	0.32	104.72	21.42	0.00	
HYD6Connect	0.00	104.60	24.50	0.00	
BldgDConnect	0.00	104.72	24.62	0.00	
BldgD	0.41	104.70	21.15	0.00	
BldgBConnect	0.00	105.10	25.00	0.00	
BldgB	0.27	105.08	21.98	0.00	
HYD7Connect	0.00	105.26	25.16	0.00	
BldgH	0.51	113.54	30.44	0.00	
BldgHConnect	0.00	113.70	33.60	0.00	
HYD-7	66.70	104.25	21.25	0.00	
West	-101.74	123.90	0.00	0.00	Reservoir
East	-102.02	123.90	0.00	0.00	Reservoir

Page 3
Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status

1	101.74	1.44	7.70	Open
2	5.26	0.07	0.03	Open
3	-102.02	1.44	7.73	Open
4	-107.28	3.41	71.87	Open
5	-105.99	3.37	70.28	Open
6	0.00	0.00	0.00	Open
7	-0.66	0.34	5.90	Open
8	0.63	0.32	5.42	Open
10	-105.99	3.37	70.28	Open
11	39.29	1.25	11.18	Open
12	0.27	0.14	1.13	Open
13	39.02	1.24	11.04	Open
14	0.41	0.21	2.44	Open
15	38.61	1.23	10.83	Open
16	66.70	3.77	144.40	Open
17	-28.09	0.89	6.01	Open
18	0.32	0.16	1.55	Open
19	-28.41	0.90	6.14	Open
20	66.70	3.77	144.40	Open
21	-95.11	3.03	57.51	Open
22	0.45	0.23	2.90	Open
23	-95.56	3.04	58.02	Open
24	0.00	0.00	0.00	Open
25	-95.56	3.04	58.02	Open
26	0.41	0.21	2.44	Open
27	-95.97	3.05	58.48	Open
28	-95.97	3.05	58.48	Open
29	0.00	0.00	0.00	Open
30	-95.97	3.05	58.48	Open
31	0.51	0.26	3.66	Open
32	0.00	0.00	0.00	Open
33	-96.48	3.07	59.05	Open
34	-96.48	3.07	59.05	Open
35	0.00	0.00	0.00	Open
36	-96.48	3.07	59.05	Open
37	66.70	3.77	144.40	Open

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*              Hydraulic and Water Quality           *
*              Analysis for Pipe Networks            *
*                   Version 2.2                      *
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Input File: 1319 Johnston.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	West	WestConnect	5	300
2	WestConnect	EastConnect	6	300
3	EastConnect	East	5	300
4	BldgAGConnect	EastConnect	162	200
5	HYD8Connect	BldgAGConnect	7	200
6	HYD8Connect	HYD-8	5	150
7	BldgG	BldgAGConnect	40	50
8	BldgAGConnect	BldgA	29	50
10	HYD7Connect	HYD8Connect	92	200
11	HYD7Connect	BldgBConnect	14	200
12	BldgBConnect	BldgB	19	50
13	BldgBConnect	BldgDConnect	35	200
14	BldgDConnect	BldgD	8	50
15	BldgDConnect	HYD6Connect	11	200
16	HYD6Connect	HYD-6	11	150
17	HYD6Connect	BldgCConnect	22	200
18	BldgCConnect	BldgC	8	50
19	BldgCConnect	HYD5Connect	12	200
20	HYD5Connect	HYD-5	6	150
21	HYD5Connect	BldgEConnect	29	200
22	BldgEConnect	BldgE	12	50
23	BldgEConnect	HYD4Connect	25	200
24	HYD4Connect	HYD-4	9	150
25	HYD4Connect	BldgFConnect	16	200
26	BldgFConnect	BldgF	9	50
27	BldgFConnect	20	25	200
28	20	HYD3Connect	23	200
29	HYD3Connect	HYD-3	2	150
30	HYD3Connect	BldgHConnect	35	200
31	BldgHConnect	BldgH	45	50
32	HYD-2	HYD2Connect	9	150
33	BldgHConnect	HYD2Connect	4	200
34	HYD2Connect	HYD1Connect	60	200
35	HYD1Connect	HYD-1	4	150
36	HYD1Connect	WestConnect	108	200
37	HYD7Connect	HYD-7	7	150

Node Results:

Node ID	Demand LPS	Head m	Pressure m	Quality	
WestConnect	0.00	123.85	44.50	0.00	
EastConnect	0.00	123.85	44.50	0.00	
HYD-1	77.80	113.06	30.56	0.00	
HYD-2	0.00	112.95	29.95	0.00	
HYD-3	0.00	112.39	29.39	0.00	
HYD-4	0.00	111.48	28.58	0.00	
HYD-5	0.00	110.73	27.63	0.00	
HYD-6	0.00	110.27	26.97	0.00	
HYD-8	77.80	109.33	26.33	0.00	
BldgA	0.63	110.68	27.58	0.00	
BldgG	0.66	110.60	27.40	0.00	
BldgAGConnect	0.00	110.84	30.74	0.00	
HYD8Connect	0.00	110.29	30.19	0.00	
HYD1Connect	0.00	113.83	33.73	0.00	
HYD2Connect	0.00	112.95	32.85	0.00	
HYD3Connect	0.00	112.39	32.29	0.00	
20	0.00	112.06	31.96	0.00	
BldgFConnect	0.00	111.71	31.61	0.00	
BldgF	0.41	111.68	28.58	0.00	
HYD4Connect	0.00	111.48	31.38	0.00	
BldgEConnect	0.00	111.13	31.03	0.00	
BldgE	0.45	111.10	28.00	0.00	
HYD5Connect	0.00	110.73	30.63	0.00	
BldgCConnect	0.00	110.57	30.47	0.00	
BldgC	0.32	110.55	27.25	0.00	
HYD6Connect	0.00	110.27	30.17	0.00	
BldgDConnect	0.00	110.12	30.02	0.00	
BldgD	0.41	110.10	26.55	0.00	
BldgBConnect	0.00	109.65	29.55	0.00	
BldgB	0.27	109.63	26.53	0.00	
HYD7Connect	0.00	109.46	29.36	0.00	
BldgH	0.51	112.73	29.63	0.00	
BldgHConnect	0.00	112.89	32.79	0.00	
HYD-7	77.80	108.12	25.12	0.00	
West	-118.62	123.90	0.00	0.00	Reservoir
East	-118.44	123.90	0.00	0.00	Reservoir

Link Results:

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status

1	118.62	1.68	10.22	Open
2	-4.53	0.06	0.02	Open
3	-118.44	1.68	10.20	Open
4	-113.91	3.63	80.32	Open
5	-112.62	3.58	78.64	Open
6	77.80	4.40	192.04	Open
7	-0.66	0.34	5.90	Open
8	0.63	0.32	5.42	Open
10	-34.82	1.11	8.94	Open
11	-42.98	1.37	13.21	Open
12	0.27	0.14	1.13	Open
13	-43.25	1.38	13.36	Open
14	0.41	0.21	2.44	Open
15	-43.66	1.39	13.60	Open
16	0.00	0.00	0.00	Open
17	-43.66	1.39	13.60	Open
18	0.32	0.16	1.54	Open
19	-43.98	1.40	13.78	Open
20	0.00	0.00	0.00	Open
21	-43.98	1.40	13.78	Open
22	0.45	0.23	2.90	Open
23	-44.43	1.41	14.05	Open
24	0.00	0.00	0.00	Open
25	-44.43	1.41	14.05	Open
26	0.41	0.21	2.44	Open
27	-44.84	1.43	14.29	Open
28	-44.84	1.43	14.29	Open
29	0.00	0.00	0.00	Open
30	-44.84	1.43	14.29	Open
31	0.51	0.26	3.66	Open
32	0.00	0.00	0.00	Open
33	-45.35	1.44	14.59	Open
34	-45.35	1.44	14.59	Open
35	77.80	4.40	192.04	Open
36	-123.15	3.92	92.80	Open
37	77.80	4.40	192.04	Open

Appendix D

Sanitary Sewer Design Sheet

Confirmation of Ex. Sewer Capacity

SANITARY SEWER DESIGN SHEET
for
1319 JOHNSTON RD., CITY OF OTTAWA

Robinson
Land Development

LOCATION				RESIDENTIAL FLOW			COMM./INST. FLOW		INDUSTRIAL FLOW					CUM. PEAK DESIGN FLOW (L/s)	PIPE								
STREET	FROM MH	TO MH	DRAINAGE AREA	PEAK FACTOR	PEAK POP. FLOW (L/s)	EXTRAN. FLOW (L/s)	PEAK FACTOR	PEAK FLOW (L/s)	DRAINAGE AREA (ha)	AVG FLOW (L/s)	PEAK FLOW (L/s)	EXTRAN. FLOW (L/s)	INDIV. PEAK FLOW (L/s)		LENGTH (m)	DIAMETER (mm)	UPSTREAM MH INV. (m)	DNSTREAM MH INV. (m)	SLOPE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	EXCESS CAPACITY (L/s)	PERCENT FULL
	SANMH108	SANMH107	BLDG B+D						0.82	0.33	2.33	0.27	2.66	**2.66**	50.9	250.00	80.25	79.96	0.6%	44.93	0.92	42.27	6%
	SANMH107	SANMH106	BLDG C						0.33	0.13	0.94	0.11	1.07	**3.73**	41.0	250.00	79.90	79.71	0.5%	40.52	0.83	36.80	9%
	SANMH106	SANMH105							0.00	0.00	0.00	0.00	0.00	**3.73**	9.9	250.00	79.68	79.63	0.5%	42.30	0.86	38.58	9%
	SANMH105	SANMH104	BLDG E						0.26	0.11	0.74	0.09	0.84	**4.57**	26.8	250.00	79.60	79.47	0.5%	41.46	0.84	36.89	11%
	SANMH104	SANMH103	BLDG F						0.53	0.21	1.50	0.17	1.72	**6.29**	46.9	250.00	79.45	79.20	0.5%	43.46	0.89	37.17	14%
	SANMH103	SANMH102							0.00	0.00	0.00	0.00	0.00	**6.29**	64.1	250.00	79.14	78.81	0.5%	42.71	0.87	36.42	15%
	SANMH102	SANMH101	BLDG H						0.45	0.18	1.28	0.15	1.46	**7.75**	69.7	250.00	78.79	78.50	0.4%	38.40	0.78	30.65	20%
	SANMH110	SANMH101	BLDG G+A						1.12	0.45	3.18	0.37	3.63	**3.63**	49.6	250.00	80.65	80.40	0.5%	42.26	0.86	38.63	9%
	SANMH101	SANMH100							0.00	0.00	0.00	0.00	0.00	**11.38**	93.9	250.00	78.44	78.00	0.5%	40.75	0.83	29.37	28%
Johnston Road	SANMH100	EX. SAN							0.00	0.00	0.00	0.00	0.00	**11.38**	15.6	250.00	76.39	76.08	2.0%	83.91	1.71	72.54	14%
									3.51	1.09	7.63	0.89	8.72	**11.38**									

DESIGN PARAMETERS

Average Daily Flow =	280	L/cap/day
Comm./Inst. Flow =	28000	L/ha/day
Industrial Flow =	35000	L/ha/day
Maximum Residential Peak Factor =	4.0	
Harmon - Correction Factor (K) =	0.8	
Institutional/Commercial Peak Factor =	1.5	
Industrial Peak Factor =	7	per OSDG App. 4-B
Extraneous Flow =	0.33	L/s/ha
Minimum Velocity =	0.6	m/s
Maximum Velocity =	3.0	m/s

2023-08-14

Stephen McCaughey

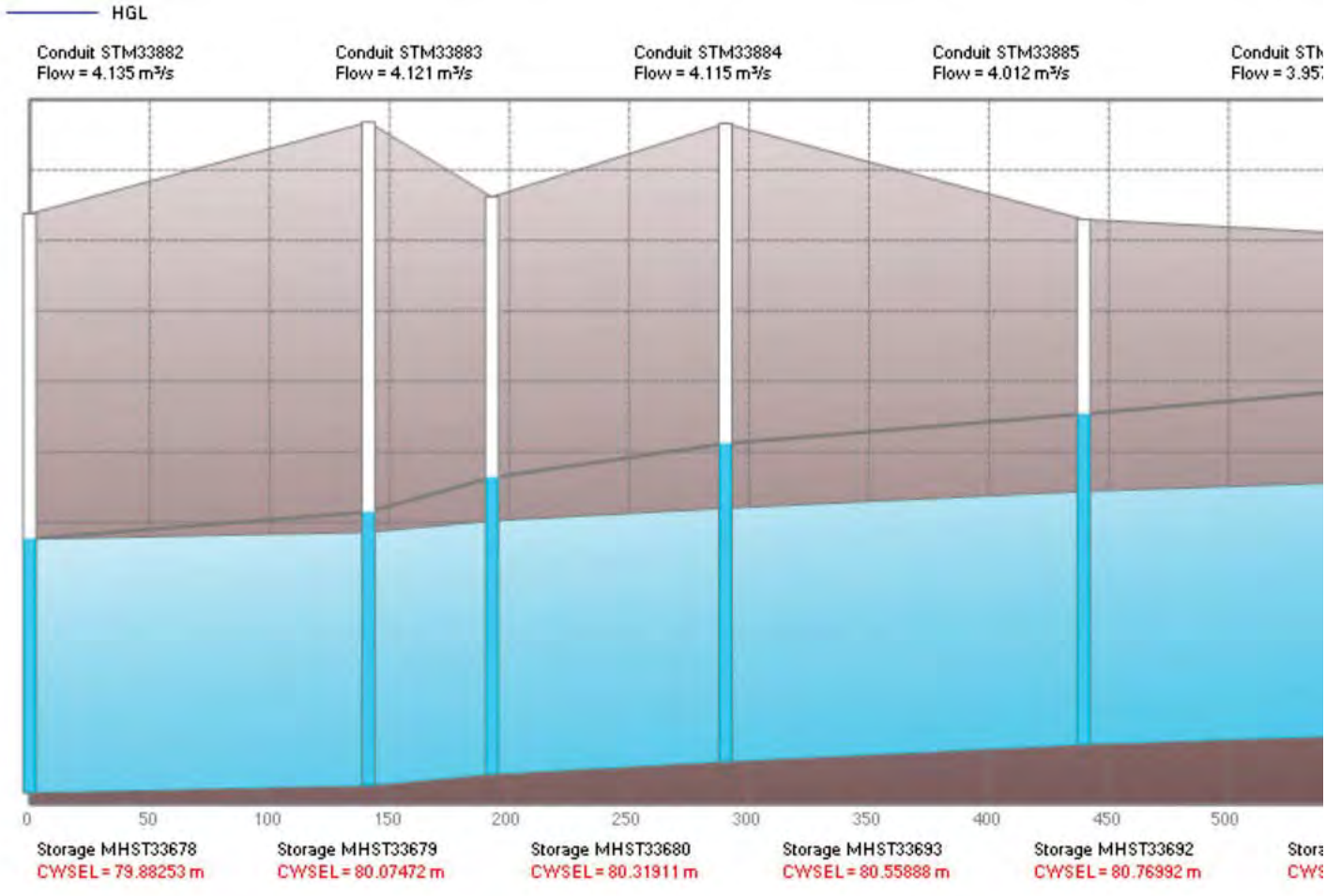
From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Sent: July 13, 2023 3:18 PM
To: Stephen McCaughey
Subject: RE: 1319 Johnston Rd - SPA criteria

Follow Up Flag: Follow up
Flag Status: Flagged

"CAUTION: External Sender"
Hi Stephen,

I have received responses from various internal groups at the City regarding the two (2) questions you had:

1) Sanitary Sewer Capacity: There are no capacity concerns based on your proposed sanitary contributions.
2) Please see the inline image below of the City's hydraulic model of the Hydraulic Grade Line (HGL) during the 1:100 year event for the storm trunk sewer running through 2059 Artistic Place



Note that the following storm structure IDs are running through the site:

- MHST33680 to MHST33693 (1800 mm dia. Conc)
- MHST33693 to MHST33692 (1800 mm dia. Conc)

Appendix E

Confirmation of SWM Criteria

1800mm Storm HGL

Pre-Development Calculations

Storm Sewer Design Sheet

Storage Volume Calculations

ICD Calculations

Underground Storage Tank Information

ICD Information

OGS Cutsheets

Stephen McCaughey

From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Sent: July 5, 2023 12:22 PM
To: Stephen McCaughey
Subject: RE: 1319 Johnston Rd - SPA criteria

"CAUTION: External Sender"
Hi Stephen,

I've provided my responses in red to your questions in the body of the email below. Feel free to reach out if you need further clarification.

Thank you,

Tyler Cassidy, P.Eng
Infrastructure Project Manager,
Planning, Real Estate and Economic Development Department / Direction générale de la planification, des biens immobiliers et du développement économique - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 12977, Tyler.Cassidy@ottawa.ca

From: Stephen McCaughey <smccaughey@rcii.com>
Sent: July 04, 2023 11:44 AM
To: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Subject: 1319 Johnston Rd - SPA criteria

Hi Tyler,

I understand you're the engineering reviewer for the proposed 1319 Johnston Rd. I will be following up with sanitary and water demand estimates but I wanted to confirm about SWM criteria, particularly in reference to the 2003 Sawmill Creek Subwatershed Study:

- Is the pre-development runoff coefficient to be estimated from current land-use or as defined by the Study?
  Please base the pre-development runoff coefficient on the existing land-use, up to a maximum of C=0.5.
- If I am understanding correctly, the peak flow rate is to be limited to pre-development rate for each storm condition from 2-yr to 100-yr (2-yr post- to pre-development, 50-yr post- to pre-development, 100-yr post- to pre-development) as opposed to bringing the 100-yr post-development down to the 2-yr pre-development. Is this correct?
  The 2-year, 5-year & 100-year post-development peak flows are to be controlled to the 2-year pre-development peak flow. Any flows exceeding the 2-year pre-development peak flow (for all storms up to and including the 100-year storm) are to be stored on site.
- Are there any infiltration targets or requirements? We are awaiting geotechnical information currently but there is some potential about elevated groundwater levels making infiltration challenging.

There are infiltration targets based on the Sawmill Creek Subwatershed Study (see section 9.3: Creek Baseflow Protection). In general, we would like to see the capturing and infiltration of runoff from ~40% of hard surfaces. If groundwater conditions make certain infiltration measures unfeasible (exfiltration pipe systems), then total impervious area on site may need to be limited.

- Quality control is to be “enhanced” level (80% TSS removal)
  That is correct.

Thank you,

Stephen McCaughey, P.Eng. | Project Engineer – Land Development
210-350 Palladium Drive, Ottawa ON, K2V 1A8
O: 613-592-6060 x160 | smccaughey@rcii.com | www.rcii.com

Stephen McCaughey

From: Cassidy, Tyler <tyler.cassidy@ottawa.ca>
Sent: July 13, 2023 3:18 PM
To: Stephen McCaughey
Subject: RE: 1319 Johnston Rd - SPA criteria

Follow Up Flag: Follow up
Flag Status: Flagged

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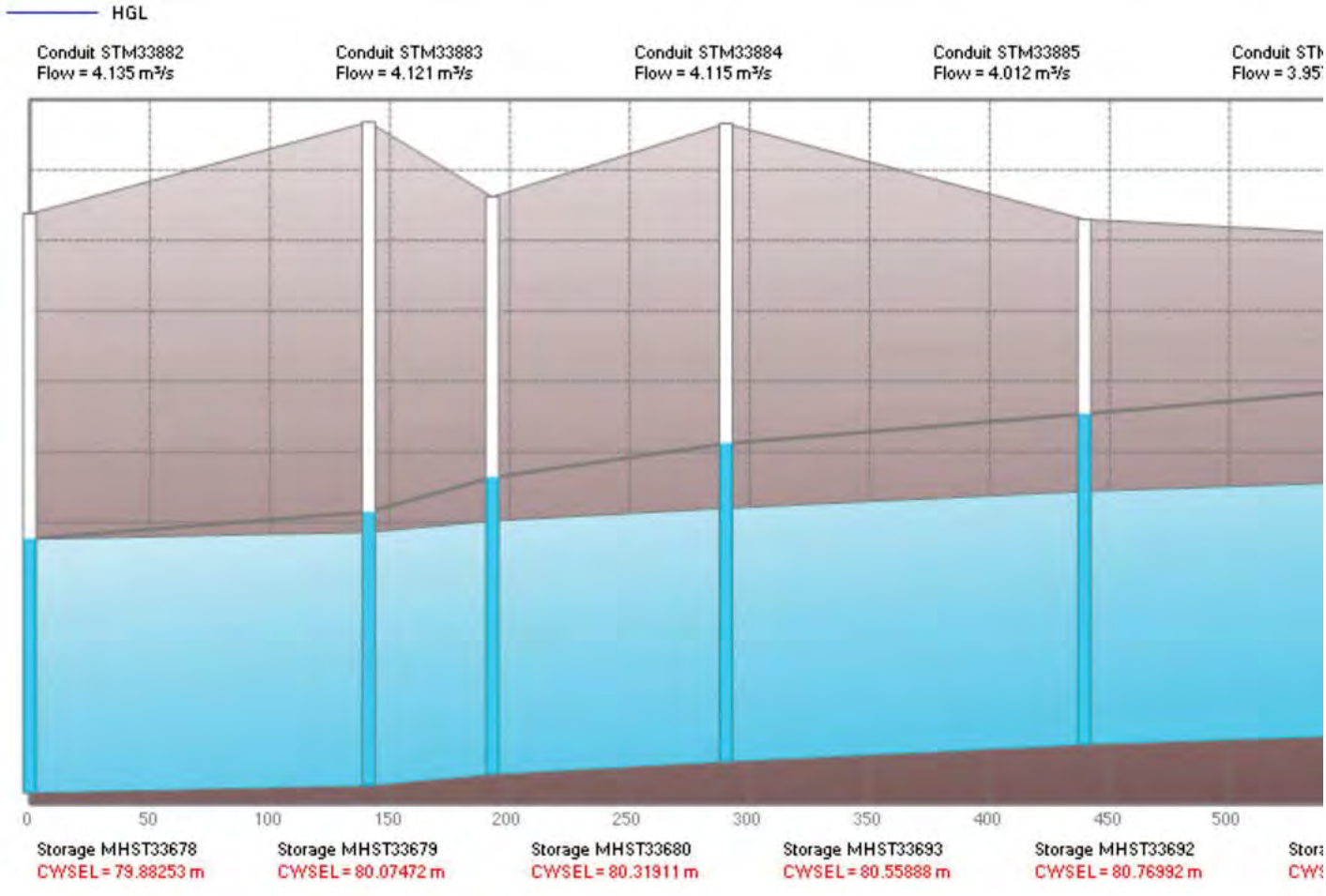
1) Sanitary Sewer Capacity: There are no capacity concerns based on your proposed sanitary contributions.
2) Please see the inline image below of the City's hydraulic model of the Hydraulic Grade Line (HGL) during the 1:100 year event for the storm trunk sewer running through 2059 Artistic Place



Note that the following storm structure IDs are running through the site:

- MHST33680 to MHST33693 (1800 mm dia. Conc)
- MHST33693 to MHST33692 (1800 mm dia. Conc)

Robinson Consultants

	Impervious	Pervious	Gravel
C	0.9	0.2	0.7

Overall Runoff Coefficient Calculations

Development Condition	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)
PRE		3.69		3.69	0.20	0.25
POST	3.54	0.15	0.00	3.69	0.87	1.00

Sub-Drainage Area Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)
1	0.65	0.005		0.66	0.89	1.00
2	0.38			0.38	0.90	1.00
3	0.16			0.16	0.90	1.00
4	0.14	0.017		0.16	0.82	1.00
5	0.22	0.02		0.25	0.83	1.00
6	0.10	0.00		0.10	0.89	1.00
7	0.12			0.12	0.90	1.00
8	0.22			0.22	0.90	1.00
9	0.22			0.22	0.90	1.00
10	0.25	0.002		0.25	0.89	1.00
11	0.03			0.03	0.90	1.00
12	0.06			0.06	0.90	1.00
13	0.19			0.19	0.90	1.00
14	0.07			0.07	0.90	1.00
15	0.17			0.17	0.90	1.00
16	0.09	0.01		0.10	0.80	1.00
17	0.13	0.015		0.15	0.83	1.00
18	0.28	0.074		0.36	0.75	0.94

Uncontrolled Flow Area Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)
U1	0.05	0.00	0.00	0.05	0.90	1.00

Notes:

1. Runoff Coefficients: Cimp=0.90, Cper=0.20, Cgravel=0.80
2. C (100 YR) = C + 25% (to a mximum of 1.0)

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Pre-Development Flow Calculations

Given:

Area (ha) = 3.69

C = 0.20

C (100 YR) = 0.25

Return Period	Time of Concentration (min)	Rainfall Intensity, i (mm/hr)	Flow, Q (L/s)
2 Year	15.0	61.8	126.8
5 Year	15.0	83.6	171.5
100 Year	15.0	142.9	366.6

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method (Q = 2.78CiA).
3. C (100 YR) = C + 25% (to a maximum of 1.0)
4. Time of concentration assumed as 15 minutes for greenfield

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Uncontrolled Flow Calculations

U1 (Entranceway)

Given:

Area (ha) = 0.05

C = 0.90

C (100 YR) = 1.00

Return Period	Time of Concentration (min)	Intensity[*1], i (mm/hr)	Flow[*2], Q (L/s)
2 Year	10	76.8	10.4
5 Year	10	104.2	14.1
100 Year	10	178.6	26.8

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method (Q = 2.78CiA).

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Flow and Storage Volume Calculations

Given:

Area (ha) = 3.69

C = 0.87

C (100 YR)[*3] = 1.00

Return Period	Time of Concentration (min)	Intensity[*1], i (mm/hr)	Flow[*2], Q (L/s)	Allowable Release Rate[*4] (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	20	52.0	465.1	116.4	348.7	418.5
	25	45.2	403.8	116.4	287.4	431.1
	30	40.0	358.0	116.4	241.6	434.8
	35	**36.1**	**322.3**	**116.4**	**206.0**	**432.5**
	40	32.9	293.8	116.4	177.4	425.7
	45	30.2	270.3	116.4	153.9	415.6
5 Year	35	48.5	433.7	112.7	321.0	674.1
	40	44.2	395.0	112.7	282.3	677.5
	45	40.6	363.2	112.7	250.5	676.4
	50	**37.7**	**336.6**	**112.7**	**223.9**	**671.7**
	55	35.1	314.0	112.7	201.3	664.3
	60	32.9	294.5	112.7	181.8	654.5
100 Year	75	47.3	484.9	100.0	384.9	1732.2
	80	45.0	461.7	100.0	361.7	1736.1
	85	43.0	440.7	100.0	340.8	1738.1
	90	**41.1**	**421.8**	**100.0**	**321.9**	**1738.2**
	95	39.4	404.6	100.0	304.7	1736.7
	100	37.9	388.9	100.0	289.0	1733.8

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method (Q = 2.78CiA).
3. C (100 YR) = C + 25% (Max. 1.0)
4. Allowable Release Rate = 2-Year Pre-Development Flow less Uncontrolled Flow

	Impervious	Pervious	Gravel
C	0.9	0.2	0.8

Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)	Percent Impervious (%)
1	0.65	0.005		0.66	0.89	1.00	99.2
2	0.38			0.38	0.90	1.00	100.0
3	0.16			0.16	0.90	1.00	100.0
4	0.14	0.017		0.16	0.82	1.00	89.2
5	0.22	0.02		0.25	0.83	1.00	90.2
6	0.10	0.00		0.10	0.89	1.00	99.0
7	0.12			0.12	0.90	1.00	100.0
8	0.22			0.22	0.90	1.00	100.0
9	0.22			0.22	0.90	1.00	100.0
10	0.25	0.002		0.25	0.89	1.00	99.2
11	0.03			0.03	0.90	1.00	100.0
12	0.06			0.06	0.90	1.00	100.0
13	0.19			0.19	0.90	1.00	100.0
14	0.07			0.07	0.90	1.00	100.0
15	0.17			0.17	0.90	1.00	100.0
16	0.09	0.01		0.10	0.80	1.00	86.4
17	0.13	0.015		0.15	0.83	1.00	89.8
18	0.28	0.074		0.36	0.75	0.94	79.2
TOTAL DEVELOPMENT	**3.49**	**0.15**	**0.00**	**3.64**	**0.87**	**1.00**	**95.8**

1319 Johnston Road, Ottawa
23034

STORM SEWER DESIGN SHEET
for
1319 JOHNSTON ROAD, OTTAWA

Robinson Consultants

LOCATION			2 YEAR				FLOW				PROPOSED SEWER								
DRAINAGE AREA	FROM MH	TO MH	AREA (ha)	C	INDIV. 2.78AC	ACCUM. 2.78AC	TIME OF CONC. (min)	2 YEAR RAINFALL INTENSITY (mm/hr)	2 YEAR PEAK FLOW (L/s)	DESIGN PEAK FLOW (L/s)	PIPE DIA. (mm)	UPSTREAM INV.	DNSTREAM INV.	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL
BUILDING G																			
17	226	225	0.15	0.83	0.34	0.34	10.00	76.81	26.01	26.01	300	81.20	80.88	0.42	76.8	62.48	0.88	1.45	42%
	225	222	0.00	0.00	0.00	0.34	11.45	71.66	24.26	24.26	300	80.82	80.73	0.41	22.0	61.93	0.88	0.42	39%
16	224	223	0.10	0.80	0.23	0.23	10.00	76.81	17.70	17.70	300	81.14	80.87	0.35	76.8	57.39	0.81	1.58	31%
	223	222	0.00	0.00	0.00	0.23	11.58	71.24	16.42	16.42	300	80.81	80.73	0.36	22.0	58.38	0.83	0.44	28%
15	222	POND	0.17	0.90	0.43	1.00	12.02	69.83	69.79	69.79	375	80.67	80.60	0.45	15.7	117.19	1.06	0.25	60%
18	POND	221	0.36	0.75	0.75	1.75	12.27	69.07	120.61	120.61	300	80.60	80.39	1.98	10.6	136.25	1.93	0.09	89%
	221	EX. STMMH	0.00	0.00	0.00	1.75	12.36	68.80	120.13	120.13	300	80.37	80.27	2.50	4.0	153.05	2.17	0.03	78%
MAIN DRAINAGE AREA																			
14	220	218	0.07	0.90	0.18	0.18	10.00	76.81	13.45	13.45	250	81.16	81.04	0.55	21.7	44.27	0.90	0.40	30%
13	219	218	0.19	0.90	0.47	0.47	10.00	76.81	36.32	36.32	300	81.21	81.08	0.35	37.4	57.07	0.81	0.77	64%
	218	217	0.00	0.00	0.00	0.65	10.67	74.32	48.16	48.16	450	81.02	80.95	0.22	31.2	135.18	0.85	0.61	36%
12	217	216	0.06	0.90	0.15	0.79	11.28	72.20	57.27	57.27	450	80.92	80.81	0.20	55.1	127.52	0.80	1.15	45%
1	216	TANK	0.66	0.89	1.63	2.42	12.43	68.59	166.30	166.30	675	80.78	80.77	0.15	6.7	325.08	0.91	0.12	51%
11	215	TANK	0.03	0.90	0.07	0.07	10.00	76.81	5.19	5.19	250	80.87	80.77	0.58	17.3	45.26	0.92	0.31	11%
10	214	212	0.25	0.89	0.62	0.62	10.00	76.81	47.93	47.93	300	81.25	81.12	0.35	36.9	57.45	0.81	0.76	83%
9	213	212	0.22	0.90	0.55	0.55	10.00	76.81	42.47	42.47	300	81.25	81.12	0.34	38.0	56.62	0.80	0.79	75%
	212	210	0.00	0.00	0.00	1.18	10.77	73.96	87.06	87.06	450	81.06	80.98	0.20	40.5	126.84	0.80	0.85	69%
8	211	210	0.22	0.90	0.55	0.55	10.00	76.81	41.89	41.89	375	81.14	81.02	0.33	36.5	100.63	0.91	0.67	42%
7	210	209	0.12	0.90	0.31	2.03	11.12	72.77	147.92	147.92	600	80.96	80.91	0.28	18.0	323.94	1.15	0.26	46%
	209	203	0.00	0.00	0.00	2.03	11.38	71.89	146.13	146.13	750	80.88	80.86	0.12	16.0	394.00	0.89	0.30	37%
6	208	206	0.10	0.89	0.25	0.25	10.00	76.81	19.26	19.26	300	81.30	81.18	0.35	34.4	57.17	0.81	0.71	34%
5	207	206	0.25	0.83	0.57	0.57	10.00	76.81	43.69	43.69	300	81.32	81.18	0.37	37.7	58.99	0.83	0.75	74%
	206	205	0.00	0.00	0.00	0.82	10.74	74.08	60.71	60.71	375	81.12	81.07	0.29	17.4	94.08	0.85	0.34	65%
4	205	203	0.16	0.82	0.36	1.18	11.04	73.04	86.13	86.13	450	81.05	80.86	0.60	31.9	220.26	1.38	0.38	39%
3	204	203	0.16	0.90	0.40	0.40	10.00	76.81	30.94	30.94	300	81.16	80.82	0.60	56.6	75.02	1.06	0.89	41%
2	203	TANK	0.38	0.90	0.95	4.57	11.19	72.51	331.06	331.06	750	80.80	80.77	0.41	7.3	714.40	1.62	0.08	46%
	TANK	202	0.00	0.00	0.00	7.06	11.70	70.84	499.99	499.99	525	80.77	80.73	2.00	2.0	608.81	2.81	0.01	82%
	202	201	0.00	0.00	0.00	7.06	11.71	70.80	499.72	499.72	525	80.71	80.67	2.00	2.0	608.81	2.81	0.01	82%
	201	200	0.00	0.00	0.00	7.06	11.72	70.77	499.46	499.46	525	80.64	80.52	2.07	5.8	619.22	2.86	0.03	81%
			3.64																

Design Parameters

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Peak flows calculated using the Rational Method.
3. Manning's roughness coefficient = 0.013
4. Full flow velocity: MIN 0.8 m/s; MAX 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)

2023-07-27

1319 Johnston Road, Ottawa
23034

STORM SEWER DESIGN SHEET
for
1319 JOHNSTON ROAD, OTTAWA

Robinson Consultants

LOCATION			5 YEAR				FLOW				PROPOSED SEWER								
DRAINAGE AREA	FROM MH	TO MH	AREA (ha)	C	INDIV. 2.78AC	ACCUM. 2.78AC	TIME OF CONC. (min)	5 YEAR RAINFALL INTENSITY (mm/hr)	5 YEAR PEAK FLOW (L/s)	DESIGN PEAK FLOW (L/s)	PIPE DIA. (mm)	UPSTREAM INV.	DNSTREAM INV.	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL
BUILDING G																			
17	226	225	0.15	0.83	0.34	0.34	10.00	104.19	35.28	35.28	300	81.20	80.88	0.42	76.8	62.48	0.88	1.45	56%
	225	222	0.00	0.00	0.00	0.34	11.45	97.12	32.89	32.89	300	80.82	80.73	0.41	22.0	61.93	0.88	0.42	53%
16	224	223	0.10	0.80	0.23	0.23	10.00	104.19	24.01	24.01	300	81.14	80.87	0.35	76.8	57.39	0.81	1.58	42%
	223	222	0.00	0.00	0.00	0.23	11.58	96.54	22.25	22.25	300	80.81	80.73	0.36	22.0	58.38	0.83	0.44	38%
15	222	POND	0.17	0.90	0.43	1.00	12.02	94.61	94.55	94.55	375	80.67	80.60	0.45	15.7	117.19	1.06	0.25	81%
18	POND	221	0.36	0.75	0.75	1.75	12.27	93.57	163.39	*8.70*	300	80.60	80.39	1.98	10.6	136.25	1.93	0.09	6%
	221	EX. STMMH	0.00	0.00	0.00	1.75	12.36	93.19	162.72	*8.70*	300	80.37	80.27	2.50	4.0	153.05	2.17	0.03	6%
MAIN DRAINAGE AREA																			
14	220	218	0.07	0.90	0.18	0.18	10.00	104.19	18.25	18.25	250	81.16	81.04	0.55	21.7	44.27	0.90	0.40	41%
13	219	218	0.19	0.90	0.47	0.47	10.00	104.19	49.27	49.27	300	81.21	81.08	0.35	37.4	57.07	0.81	0.77	86%
	218	217	0.00	0.00	0.00	0.65	10.67	100.77	65.30	65.30	450	81.02	80.95	0.22	31.2	135.18	0.85	0.61	48%
12	217	216	0.06	0.90	0.15	0.79	11.28	97.87	77.62	77.62	450	80.92	80.81	0.20	55.1	127.52	0.80	1.15	61%
1	216	TANK	0.66	0.89	1.63	2.42	12.43	92.90	225.26	225.26	675	80.78	80.77	0.15	6.7	325.08	0.91	0.12	69%
11	215	TANK	0.03	0.90	0.07	0.07	10.00	104.19	7.04	7.04	250	80.87	80.77	0.58	17.3	45.26	0.92	0.31	16%
10	214	212	0.25	0.89	0.62	0.62	10.00	104.19	65.03	65.03	300	81.25	81.12	0.35	36.9	57.45	0.81	0.76	113%
9	213	212	0.22	0.90	0.55	0.55	10.00	104.19	57.61	57.61	300	81.25	81.12	0.34	38.0	56.62	0.80	0.79	102%
	212	210	0.00	0.00	0.00	1.18	10.77	100.28	118.04	118.04	450	81.06	80.98	0.20	40.5	126.84	0.80	0.85	93%
8	211	210	0.22	0.90	0.55	0.55	10.00	104.19	56.83	56.83	375	81.14	81.02	0.33	36.5	100.63	0.91	0.67	56%
7	210	209	0.12	0.90	0.31	2.03	11.12	98.64	200.52	200.52	600	80.96	80.91	0.28	18.0	323.94	1.15	0.26	62%
	209	203	0.00	0.00	0.00	2.03	11.38	97.44	198.06	198.06	750	80.88	80.86	0.12	16.0	394.00	0.89	0.30	50%
6	208	206	0.10	0.89	0.25	0.25	10.00	104.19	26.13	26.13	300	81.30	81.18	0.35	34.4	57.17	0.81	0.71	46%
5	207	206	0.25	0.83	0.57	0.57	10.00	104.19	59.26	59.26	300	81.32	81.18	0.37	37.7	58.99	0.83	0.75	100%
	206	205	0.00	0.00	0.00	0.82	10.74	100.44	82.32	82.32	375	81.12	81.07	0.29	17.4	94.08	0.85	0.34	87%
4	205	203	0.16	0.82	0.36	1.18	11.04	99.02	116.77	116.77	450	81.05	80.86	0.60	31.9	220.26	1.38	0.38	53%
3	204	203	0.16	0.90	0.40	0.40	10.00	104.19	41.97	41.97	300	81.16	80.82	0.60	56.6	75.02	1.06	0.89	56%
2	203	TANK	0.38	0.90	0.95	4.57	11.19	98.29	448.75	448.75	750	80.80	80.77	0.41	7.3	714.40	1.62	0.08	63%
	TANK	202	0.00	0.00	0.00	7.06	11.70	96.00	677.54	*91.08*	525	80.77	80.73	2.00	2.0	608.81	2.81	0.01	15%
	202	201	0.00	0.00	0.00	7.06	11.71	95.95	677.17	*91.08*	525	80.71	80.67	2.00	2.0	608.81	2.81	0.01	15%
	201	200	0.00	0.00	0.00	7.06	11.72	95.89	676.80	*91.08*	525	80.64	80.52	2.07	5.8	619.22	2.86	0.03	15%
			3.64																

Design Parameters

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Peak flows calculated using the Rational Method.
3. Manning's roughness coefficient = 0.013
4. Full flow velocity: MIN 0.8 m/s; MAX 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)
5. Design Peak Flow modified by ICD:
   POND OUT 8.7 L/s
   STMMH202 91.1 L/s

2023-07-27

1319 Johnston Road, Ottawa
23034

STORM SEWER DESIGN SHEET
for
1319 JOHNSTON ROAD, OTTAWA

Robinson Consultants

LOCATION			100 YEAR				FLOW				PROPOSED SEWER								
DRAINAGE AREA	FROM MH	TO MH	AREA (ha)	C	INDIV. 2.78AC	ACCUM. 2.78AC	TIME OF CONC. (min)	100 YEAR RAINFALL INTENSITY (mm/hr)	100 YEAR PEAK FLOW (L/s)	DESIGN PEAK FLOW (L/s)	PIPE DIA. (mm)	UPSTREAM INV.	DNSTREAM INV.	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	PERCENT FULL
BUILDING G																			
17	226	225	0.15	1.00	0.41	0.41	10.00	178.56	72.97	72.97	300	81.20	80.88	0.42	76.8	62.48	0.88	1.45	117%
	225	222	0.00	0.00	0.00	0.41	11.45	166.32	67.97	67.97	300	80.82	80.73	0.41	22.0	61.93	0.88	0.42	110%
16	224	223	0.10	1.00	0.29	0.29	10.00	178.56	51.13	51.13	300	81.14	80.87	0.35	76.8	57.39	0.81	1.58	89%
	223	222	0.00	0.00	0.00	0.29	11.58	165.33	47.34	47.34	300	80.81	80.73	0.36	22.0	58.38	0.83	0.44	81%
15	222	POND	0.17	1.00	0.48	1.17	12.02	161.98	190.03	190.03	375	80.67	80.60	0.45	15.7	117.19	1.06	0.25	162%
18	POND	221	0.36	0.94	0.93	2.11	12.27	160.19	337.45	*8.7*	300	80.60	80.39	1.98	10.6	136.25	1.93	0.09	6%
	221	EX. STMMH	0.00	0.00	0.00	2.11	12.36	159.53	336.07	*8.7*	300	80.37	80.27	2.50	4.0	153.05	2.17	0.03	6%
MAIN DRAINAGE AREA																			
14	220	218	0.07	1.00	0.19	0.19	10.00	178.56	34.75	34.75	250	81.16	81.04	0.55	21.7	44.27	0.90	0.40	78%
13	219	218	0.19	1.00	0.53	0.53	10.00	178.56	93.82	93.82	300	81.21	81.08	0.35	37.4	57.07	0.81	0.77	164%
	218	217	0.00	0.00	0.00	0.72	10.67	172.64	124.31	124.31	450	81.02	80.95	0.22	31.2	135.18	0.85	0.61	92%
12	217	216	0.06	1.00	0.16	0.88	11.28	167.62	147.72	147.72	450	80.92	80.81	0.20	55.1	127.52	0.80	1.15	116%
1	216	TANK	0.66	1.00	1.82	2.70	12.43	159.03	430.18	430.18	675	80.78	80.77	0.15	6.7	325.08	0.91	0.12	132%
11	215	TANK	0.03	1.00	0.08	0.08	10.00	178.56	13.40	13.40	250	80.87	80.77	0.58	17.3	45.26	0.92	0.31	30%
10	214	212	0.25	1.00	0.70	0.70	10.00	178.56	124.59	124.59	300	81.25	81.12	0.35	36.9	57.45	0.81	0.76	217%
9	213	212	0.22	1.00	0.61	0.61	10.00	178.56	109.70	109.70	300	81.25	81.12	0.34	38.0	56.62	0.80	0.79	194%
	212	210	0.00	0.00	0.00	1.31	10.77	171.79	225.42	225.42	450	81.06	80.98	0.20	40.5	126.84	0.80	0.85	178%
8	211	210	0.22	1.00	0.61	0.61	10.00	178.56	108.21	108.21	375	81.14	81.02	0.33	36.5	100.63	0.91	0.67	108%
7	210	209	0.12	1.00	0.34	2.26	11.12	168.95	382.32	382.32	600	80.96	80.91	0.28	18.0	323.94	1.15	0.26	118%
	209	203	0.00	0.00	0.00	2.26	11.38	166.86	377.59	377.59	750	80.88	80.86	0.12	16.0	394.00	0.89	0.30	96%
6	208	206	0.10	1.00	0.28	0.28	10.00	178.56	50.14	50.14	300	81.30	81.18	0.35	34.4	57.17	0.81	0.71	88%
5	207	206	0.25	1.00	0.68	0.68	10.00	178.56	122.11	122.11	300	81.32	81.18	0.37	37.7	58.99	0.83	0.75	207%
	206	205	0.00	0.00	0.00	0.96	10.74	172.06	165.98	165.98	375	81.12	81.07	0.29	17.4	94.08	0.85	0.34	176%
4	205	203	0.16	1.00	0.44	1.40	11.03	169.68	237.74	237.74	450	81.05	80.86	0.60	31.9	220.26	1.38	0.38	108%
3	204	203	0.16	1.00	0.45	0.45	10.00	178.56	79.92	79.92	300	81.16	80.82	0.60	56.6	75.02	1.06	0.89	107%
2	203	TANK	0.38	1.00	1.06	5.17	11.19	168.33	869.93	869.93	750	80.80	80.77	0.41	7.3	714.40	1.62	0.08	122%
	TANK	202	0.00	0.00	0.00	7.95	11.70	164.40	1306.68	*91.1*	525	80.77	80.73	2.00	2.0	608.81	2.81	0.01	15%
	202	201	0.00	0.00	0.00	7.95	11.71	164.31	1305.96	*91.1*	525	80.71	80.67	2.00	2.0	608.81	2.81	0.01	15%
	201	200	0.00	0.00	0.00	7.95	11.72	164.22	1305.24	*91.1*	525	80.64	80.52	2.07	5.8	619.22	2.86	0.03	15%
			3.64																

Design Parameters

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Peak flows calculated using the Rational Method.
3. Manning's roughness coefficient = 0.013
4. Full flow velocity: MIN 0.8 m/s; MAX 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)
5. Design Peak Flow modified by ICD:
   POND OUT 8.7 L/s
   STMMH202 91.1 L/s

2023-07-27

Robinson Consultants

Surface Storage Volume Calculations

Drainage Area = **1**
2.78* AC = 2.70
Oveflow El. = 82.8
T/G = 82.5
Ponding Area (m2) = 1130
Available Storage (m3) = 113.0

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**12.4**	**159.0**	**430.2**	**325.1**	**105.1**	**78.4**
	13.4	152.3	411.9	325.1	86.9	70.0
	14.4	146.2	395.4	325.1	70.3	60.8
	15.4	140.5	380.2	325.1	55.1	51.0
	16.4	135.4	366.2	325.1	41.1	40.6
	17.4	130.6	353.4	325.1	28.3	29.6

Drainage Area = **2**
2.78* AC = 5.17
Oveflow El. = 82.8
T/G = 82.5
Ponding Area (m2) = 923
Available Storage (m3) = 92.3

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**11.2**	**168.3**	**869.9**	**714.4**	**155.5**	**104.5**
	12.2	160.7	830.6	714.4	116.2	85.0
	13.2	153.8	794.9	714.4	80.5	63.8
	14.2	147.5	762.5	714.4	48.1	41.0
	15.2	141.8	732.9	714.4	18.5	16.9
	16.2	136.6	705.7	714.4	-8.7	-8.4

Drainage Area = **3**
2.78* AC = 0.45
Oveflow El. = 82.8
T/G = 82.65
Ponding Area (m2) = 127
Available Storage (m3) = 6.3

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**79.9**	**75.0**	**4.9**	**2.9**
	11	169.9	76.0	75.0	1.0	0.7
	12	162.1	72.6	75.0	-2.5	-1.8
	13	155.1	69.4	75.0	-5.6	-4.4
	14	148.7	66.6	75.0	-8.5	-7.1
	15	142.9	64.0	75.0	-11.1	-10.0

Drainage Area = **4**
2.78* AC = 1.40
Oveflow El. = 82.8
T/G = 82.63
Ponding Area (m2) = 160
Available Storage (m3) = 9.1

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**11.0**	**169.6**	**237.6**	**220.3**	**17.4**	**11.5**
	12.0	161.9	226.8	220.3	6.5	4.7
	13.0	154.9	217.0	220.3	-3.3	-2.6
	14.0	148.5	208.1	220.3	-12.2	-10.3
	15.0	142.7	199.9	220.3	-20.3	-18.3
	16.0	137.4	192.5	220.3	-27.8	-26.7

Drainage Area = **5**
2.78* AC = 0.68
Oveflow El. = 82.85
T/G = 82.6
Ponding Area (m2) = 358
Available Storage (m3) = 29.8

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**122.1**	**59.0**	**63.1**	**37.9**
	15	142.9	97.7	59.0	38.7	34.9
	20	120.0	82.0	59.0	23.0	27.7
	25	103.8	71.0	59.0	12.0	18.0
	30	91.9	62.8	59.0	3.8	6.9
	35	82.6	56.5	59.0	-2.5	-5.3

Drainage Area = **6**
2.78* AC = 0.28
Oveflow El. = 82.8
T/G = 82.65
Ponding Area (m2) = 209
Available Storage (m3) = 10.4

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	10	178.6	50.1	57.2	-7.0	-4.2
	15	142.9	40.1	57.2	-17.0	-15.3
	20	120.0	33.7	57.2	-23.5	-28.2
	25	103.8	29.2	57.2	-28.0	-42.0
	30	91.9	25.8	57.2	-31.4	-56.5
	35	82.6	23.2	57.2	-34.0	-71.4

Drainage Area = **7**
2.78* AC = 2.26
Oveflow El. = 82.8
T/G = 82.6
Ponding Area (m2) = 304
Available Storage (m3) = 20.3

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**11.1**	**169.0**	**382.3**	**323.9**	**58.4**	**38.9**
	12.1	161.3	364.9	323.9	41.0	29.8
	13.1	154.3	349.2	323.9	25.3	19.9
	14.1	148.0	334.9	323.9	11.0	9.3
	15.1	142.2	321.9	323.9	-2.1	-1.9
	16.1	136.9	309.9	323.9	-14.0	-13.6

Drainage Area = **8**
2.78* AC = 0.61
Oveflow El. = 82.8
T/G = 82.6
Ponding Area (m2) = 389
Available Storage (m3) = 25.9

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**108.2**	**100.6**	**7.6**	**4.5**
	15	142.9	86.6	100.6	-14.0	-12.6
	20	120.0	72.7	100.6	-27.9	-33.5
	25	103.8	62.9	100.6	-37.7	-56.5
	30	91.9	55.7	100.6	-45.0	-80.9
	35	82.6	50.0	100.6	-50.6	-106.2

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Drainage Area = **9**
2.78* AC = 0.61
Oveflow El. = 82.8
T/G = 82.55
Ponding Area (m2) = 486
Available Storage (m3) = 40.5

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**109.7**	**56.6**	**53.1**	**31.9**
	11	169.9	104.4	56.6	47.8	31.5
	12	162.1	99.6	56.6	43.0	31.0
	13	155.1	95.3	56.6	38.7	30.2
	14	148.7	91.4	56.6	34.8	29.2
	15	142.9	87.8	56.6	31.2	28.1

Drainage Area = **10**
2.78* AC = 0.70
Oveflow El. = 82.8
T/G = 82.55
Ponding Area (m2) = 494
Available Storage (m3) = 41.2

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**124.6**	**57.5**	**67.1**	**40.3**
	15	142.9	99.7	57.5	42.3	38.0
	20	120.0	83.7	57.5	26.2	31.5
	25	103.8	72.5	57.5	15.0	22.5
	30	91.9	64.1	57.5	6.6	12.0
	35	82.6	57.6	57.5	0.2	0.4

Drainage Area = **11**
2.78* AC = 0.08
Oveflow El. = 82.95
T/G = 82.86
Ponding Area (m2) = 52
Available Storage (m3) = 1.6

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	10	178.6	13.4	45.3	-31.9	-19.1
	15	142.9	10.7	45.3	-34.5	-31.1
	20	120.0	9.0	45.3	-36.3	-43.5
	25	103.8	7.8	45.3	-37.5	-56.2
	30	91.9	6.9	45.3	-38.4	-69.1
	35	82.6	6.2	45.3	-39.1	-82.0

Drainage Area = **12**
2.78* AC = 0.88
Oveflow El. = 82.8
T/G = 82.5
Ponding Area (m2) = 234
Available Storage (m3) = 23.4

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**157.4**	**127.5**	**29.8**	**17.9**
	15	142.9	125.9	127.5	-1.6	-1.4
	20	120.0	105.7	127.5	-21.8	-26.2
	25	103.8	91.5	127.5	-36.0	-54.0
	30	91.9	81.0	127.5	-46.6	-83.8
	35	82.6	72.8	127.5	-54.7	-115.0

Drainage Area = **13**
2.78* AC = 0.53
Oveflow El. = 82.8
T/G = 82.52
Ponding Area (m2) = 629
Available Storage (m3) = 58.7

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**93.8**	**57.1**	**36.7**	**22.0**
	15	142.9	75.1	57.1	18.0	16.2
	20	120.0	63.0	57.1	6.0	7.1
	25	103.8	54.6	57.1	-2.5	-3.8
	30	91.9	48.3	57.1	-8.8	-15.8
	35	82.6	43.4	57.1	-13.7	-28.7

Drainage Area = **14**
2.78* AC = 0.19
Oveflow El. = 82.8
T/G = 82.5
Ponding Area (m2) = 476
Available Storage (m3) = 47.6

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	10	178.6	34.7	44.3	-9.5	-5.7
	15	142.9	27.8	44.3	-16.5	-14.8
	20	120.0	23.3	44.3	-20.9	-25.1
	25	103.8	20.2	44.3	-24.1	-36.1
	30	91.9	17.9	44.3	-26.4	-47.5
	35	82.6	16.1	44.3	-28.2	-59.2

Drainage Area = **15**
2.78* AC = 1.17
Oveflow El. = 82.8
T/G = 82.5
Ponding Area (m2) = 549
Available Storage (m3) = 54.9

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**209.5**	**117.2**	**92.3**	**55.4**
	15	142.9	167.6	117.2	50.4	45.4
	20	120.0	140.7	117.2	23.5	28.2
	25	103.8	121.8	117.2	4.6	7.0
	30	91.9	107.8	117.2	-9.4	-16.9
	35	82.6	96.9	117.2	-20.3	-42.7

Drainage Area = **16**
2.78* AC = 0.29
Oveflow El. = 82.9
T/G = 82.6
Ponding Area (m2) = 50
Available Storage (m3) = 5.0

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	10	178.6	51.1	57.4	-6.3	-3.8
	15	142.9	40.9	57.4	-16.5	-14.8
	20	120.0	34.3	57.4	-23.0	-27.7
	25	103.8	29.7	57.4	-27.7	-41.5
	30	91.9	26.3	57.4	-31.1	-56.0
	35	82.6	23.6	57.4	-33.7	-70.9

Drainage Area = **17**
2.78* AC = 0.41
Oveflow El. = 82.86
T/G = 82.67
Ponding Area (m2) = 311
Available Storage (m3) = 19.7

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	**10**	**178.6**	**73.0**	**62.5**	**10.5**	**6.3**
	15	142.9	58.4	62.5	-4.1	-3.7
	20	120.0	49.0	62.5	-13.5	-16.2
	25	103.8	42.4	62.5	-20.0	-30.1
	30	91.9	37.5	62.5	-24.9	-44.9
	35	82.6	33.7	62.5	-28.7	-60.3

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Drainage Area =	**18 (Pond)**	Oveflow El. =	82.8	Overflow Area (m2) =	579.0	383.0
2.78* AC =	2.11	T/G =	82.5	Base Area (m2) =	93.0	
		Bot. El. =	80.6			
				Pond Area Rate	220.9	m2/m
		Available Storage (m3) =	777.5			

Drainage Area =	**Tank**	Top El.	81.37
2.78* AC =	7.95	Bot. El. =	80.77
		Storage Area (m2)	1850
		Available Storage (m3) =	1067.9

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity* (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	450	11.5	24.1	4.4	19.8	534.2
	460	11.3	23.7	4.4	19.4	534.3
	470	11.1	23.3	4.4	19.0	534.4
	480	**10.9**	**22.9**	**4.4**	**18.6**	**534.4**
	490	10.7	22.5	4.4	18.2	534.4
	500	10.5	22.2	4.4	17.8	534.3

*For storage calculations with ICD, 50% of max flow rate assumed account for ICD flow curve varying with head

Return Period	Time of Concentration (min)	Intensity, i (mm/hr)	Flow In, Q (L/s)	Pipe Capacity* (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
100 Year	120	32.9	261.4	45.5	215.9	1554.6
	130	30.9	245.6	45.5	200.0	1560.3
	140	29.2	231.7	45.5	186.2	1563.8
	150	**27.6**	**219.5**	**45.5**	**173.9**	**1565.2**
	160	26.2	208.6	45.5	163.0	1564.9
	170	25.0	198.8	45.5	153.2	1563.1

*For storage calculations with ICD, 50% of max flow rate assumed account for ICD flow curve varying with head

Total Storage Available

Drainage Area ID	Available Storage (m3)	
1	113.00	
2	92.30	
3	6.35	
4	9.07	
5	14.90	
6	10.45	
7	20.27	
8	25.93	
9	40.50	
10	41.17	
11	0.00	
12	23.40	
13	58.71	
14	47.60	
Tank	1067.91	
Main Site	**1571.55**	Up to spillover el. 82.80
15	54.90	
16	2.30	
17	7.70	
18	777.50	
Building G	**842.40**	Up to spillover el. 82.80

100-Year Storage Available **2413.95 m3**

100-Year Post-Development Storage Required **2099.63 m3**

2-Year Pre-Development Storage Required **1738.2 m3**

Sawmill Creek Subwatershed Storage Required **1850 m3**

Robinson Consultants

ICD Sizing

Pond Outlet

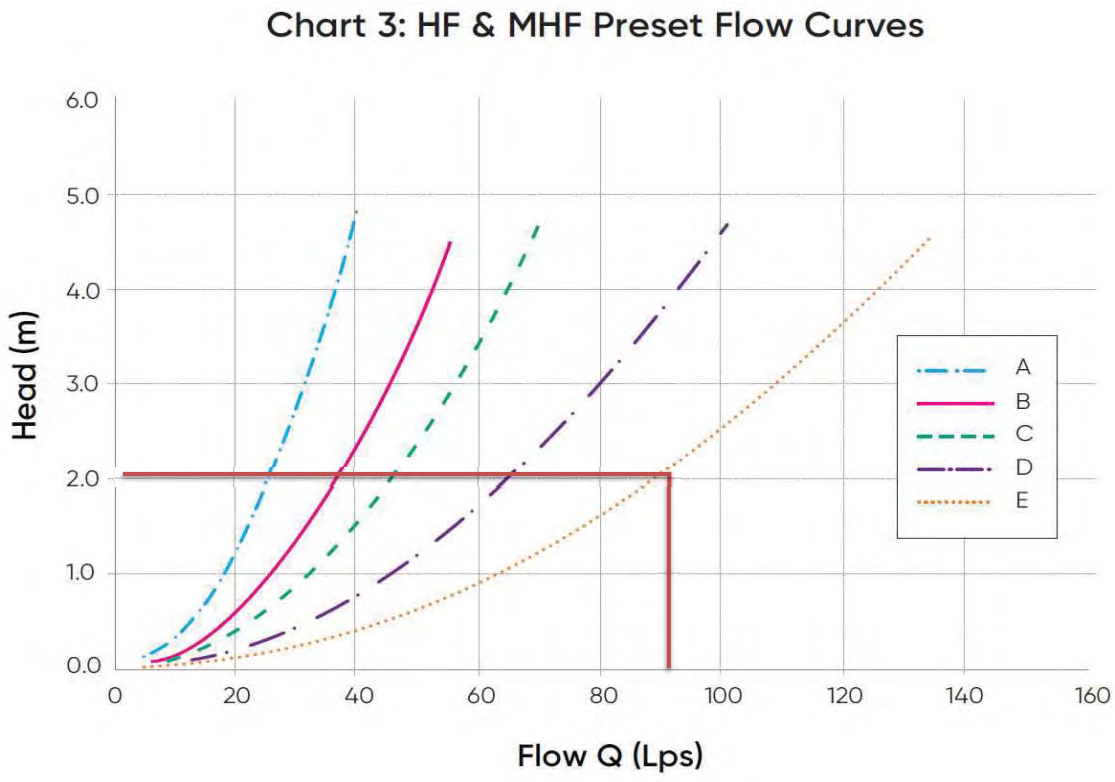
Bot El.	80.6	m
Max El.	82.5	m
Head	1.9	m
Orifice Size	55	mm
Max Flow	8.7	L/s
55mm Orifice Plate		

Tank Outlet

Bot El.	80.77	m
Max El.	82.8	m
Head	2.03	m
Orifice Size	175	mm
Max Flow	91.1	L/s
Tempest HF Model 'E'		

Total Controlled Discharge Rate **99.8 L/s**

Total Controlled Discharge Allowed **100.2 L/s**



STORMCON
STORMWATER MANAGEMENT SOLUTIONS.

GreenStorm ST

Rigofill ST product by FRÄNKISCHE

Underground storage infiltration modules

www.stormcon.ca

Table of contents

*Rigofill ST product by FRÄNKISCHE

Storing stormwater with storage/infiltration systems

Basic element for underground water storage facilities

GreenStorm ST* are plastic tanks to be installed underground (storage/ infiltration modules) in which water is collected and stored. Storage/infiltration systems temporarily collect stormwater and discharge it later. In addition to infiltration using underdrained swale systems, pipe swales, and gravel swales common in the past, increasingly more storage/infiltration systems are being built today.

The storage space of the storage/ infiltration system consists of numerous GreenStorm ST* modules which can be combined three-dimensionally to form large systems.

The advantage of this method is that the void ratio is up to three times larger in these infiltration systems than in gravel swales which saves space and excavation work.

GreenStorm ST* is a modular system which is characterised by high flexibility, rapid installation and a high level of user-friendliness.

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Application – infiltration

Stormwater infiltration – giving back to nature

Large amounts of stormwater can reduce the performance of wastewater treatment systems. Infiltrating unpolluted stormwater nearby has therefore several advantages.

A constant growth in built-up areas and increase in impervious surfaces prevent natural infiltration of stormwater into the soil. Special infiltration systems are used in order to discharge it to the water cycle. In addition to infiltration using pipe swales, increasingly more storage/infiltration systems are being built.

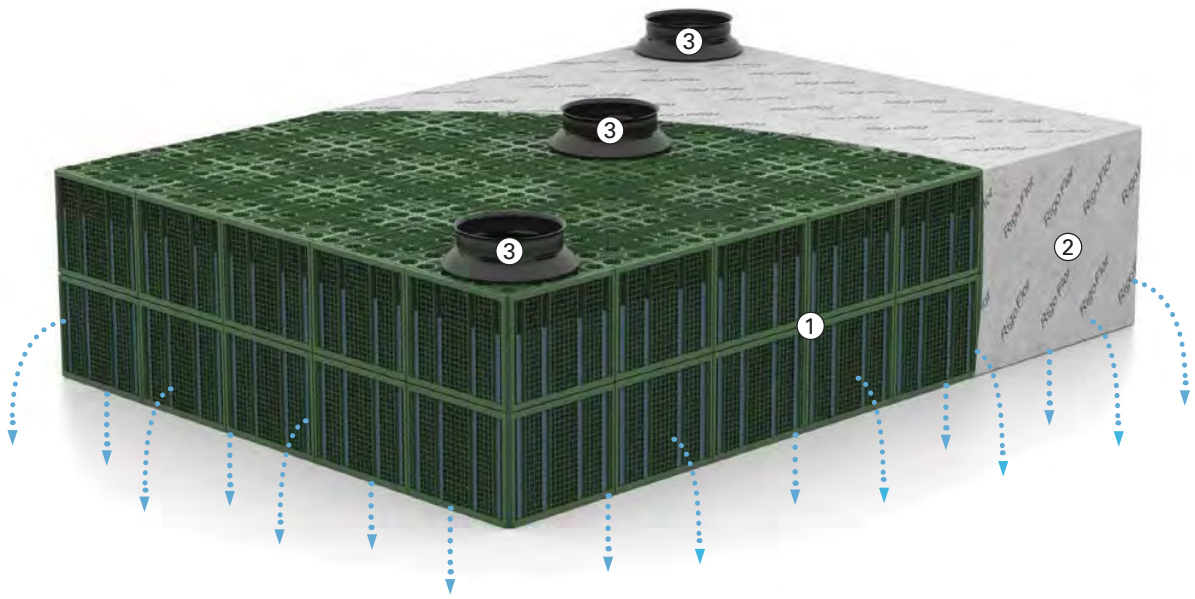
The advantage of this method is that the storage volume of the infiltration system is increased, and space and excavation are saved as compared to gravel swales. Stormwater is thus returned to the natural water cycle and can contribute to producing new groundwater. Infiltration systems are subject to very high requirements. Consequently, they have become an important component of urban drainage.

Storage/infiltration systems considerably increase the underground storage volume. High-performance storage/infiltration systems can be installed even in confined space.

In particular in urban construction no additional space is required and precious building ground is saved.

Légende

1. GreenStorm ST* storage /infiltration module
2. Geotextile
3. QuadroControl ST system shaft



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Application – retention

Retaining stormwater – instead of flooding

If subsoil conditions are unfavourable to infiltration, the goal is to retain the stormwater and ensure a retarded, timelagged discharge. Exposure to impulsive stress can be eliminated or reduced in sewer networks, wastewater treatment systems and waterbodies.

Stormwater retention systems retard the infiltration of stormwater. They are comprised of a watertight retaining element, an inlet and a vortex outlet.

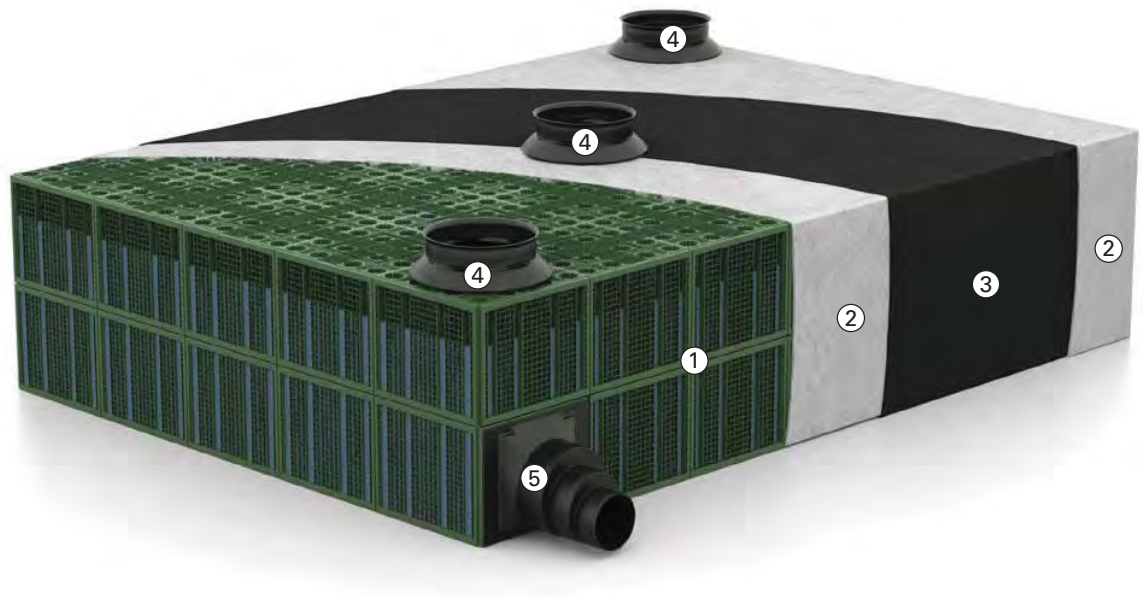
The stormwater distributes evenly in the system where it can be stored and is then discharged in a controlled manner through throttle shafts. If infiltration must be avoided or to prevent unintended discharge of groundwater or strata water (e.g., in case of contaminated soil), it is necessary to waterproof the retention system.

Stormwater runoff from impervious surfaces that cannot infiltrate naturally leads to peak loads in sewer systems.

Stormwater retention facilities collect stormwater in an underground storage tank and discharge it in a retarded manner but continuously. Their very short construction times make storage/ infiltration systems an inexpensive alternative to conventional retention facilities such as retention channels or underground concrete tanks.

Légende

1. GreenStorm ST* storage /infiltration module
2. Geotextile
3. Impermeable membrane
4. QuadroControl ST system shaft
5. Adapter



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Application – harvesting / fire water storage

Harvesting stormwater – saving drinking water

Water – particularly drinking water – is a priceless resource which should be treated responsibly and used sparingly.
It is therefore wise to collect, store and use stormwater if the water must not necessarily be suitable for drinking purposes, instead of allowing the water to infiltrate into the soil unused or diverting it into the sewer system.

There are many examples: irrigation for greens, car wash, use in toilets, etc.

Water is diverted into a waterproof storage/infiltration system and can be supplied for use via a pumping system.

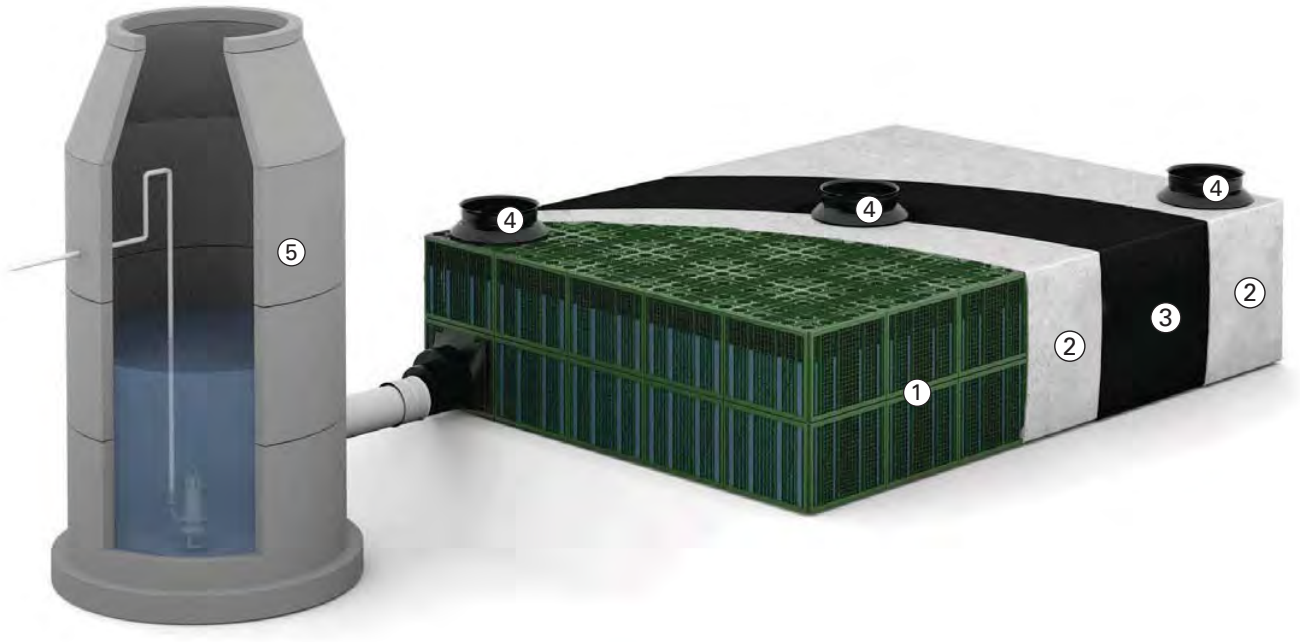
The use of the GreenStorm inspect system allows for finding solutions that fit project-specific requirements – even under the most difficult conditions such as very tight space, narrow conditions, low cover, high groundwater level, etc.

Stormwater harvesting systems provide water for different domestic and industrial water uses. They comprise a watertight retaining element, an inlet with upstream stormwater treatment system, a pump shaft and a system control.

Using GreenStorm ST* for fire water storage also saves water, since system checks can be made in a filled state and water does not have to be pumped out as is the case with conventional concrete tanks.

Légende

1. GreenStorm ST* storage/infiltration module
2. Geotextile
3. Impermeable membrane
4. QuadroControl ST system shaft
5. Tapping shaft (on-site)



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Modular design

Individual system geometries due to modular design

Sizes (length and width) of GreenStorm ST*orage/infiltration systems can be freely designed with hardly any limitations. The 800 mm cellular block type structure can easily be adapted to fit nearly any layout.

With heights of 660 mm (full block) and 350 mm (half block), systems can be built in various sizes to accommodate any single- or multi-layer combination. Therefore, the system can very easily be adapted to on-site requirements. Under high groundwater conditions or low permeability of backfill soil, for example, rather shallow depth systems are to be preferred.

For soils with good permeability, however, high and compact systems are favourable and may be built accordingly. The maximum space available is used.

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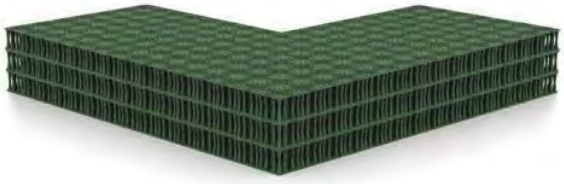
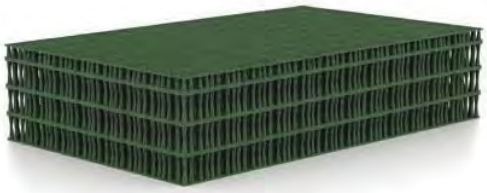
Possible system geometries

GreenStorm ST*
2-layer

GreenStorm ST*
1-layer



GreenStorm ST*
3-layer



GreenStorm ST*
3 1/2-layer

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Storage volume

Extremely high volume

The GreenStorm ST* full block provides a storage volume of 406 litres with a gross volume of 422 litres. With a storage volume of more than 96 %, it stores three times as much water as gravel swales.

The half block has a height of 350 mm and is used if shallow systems are required, e.g., in case of high groundwater levels. With a gross volume of 224 litres, it offers a storage volume of 212 litres.

Column void
The column void of the storage/infiltration module is 100 % available as storage space. Large openings at the column base and at the column connection allow unrestricted filling and emptying of the columns.

Storage/infiltration systems as compared to gravel swales

Pipe and gravel swales only use approx. 30 % of their volume to store water. Therefore, three times the required water storage volume must be provided by excavation. This requires lots of space which is frequently not available in urban areas.

GreenStorm ST* storage/infiltration systems save an enormous amount of space and excavation work. Thus, subsoil storage spaces for stormwater can be built in a very efficient and cost-saving way.

Storage/infiltration systems considerably increase the storage space. High-performance storage/infiltration systems can be installed even in confined space.

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Installation

Easy construction site handling

Requires little space for storage
The storage/infiltration modules are delivered in compact, stacked units with 17 modules per pallet.
The easy stackability of the GreenStorm ST* and ST-B modules allows them to be stored even in confined construction space, even outside the excavation pit.
This facilitates installation, since no additional storage space must be provided in the excavation pit. Installation is neither impeded nor constrained.

Pre-assembly
Depending on the requirements, GreenStorm
ST and GreenStorm ST*-B modules can be pre-assembled in no time at all, both outside and inside the excavation pit with just one easy move. Easy high tensile strength snap connections allow for combining two half elements to create a reliable unit in only a short period of time. This can easily be done by one person alone without requiring any additional tools. The moveable parts of the snap connection are recessed and thus protected from damage.

Easy assembly
There is no need to adhere to any complex installation pattern – the pre-assembled modules or half blocks can just as well be connected to create a single unit.
The low weight allows this to be done by one person only. Connectors establish firm connections between the individual modules. The surface can be accessed immediately without any risk of accidents, since the hole size of the columns is dimensioned respectively (< 100 mm).
Thus, no additional covers of column holes are required.

Montage dans la fouille

Up to

88 %

storage space saved as compared to unstackable storage/infiltration modules

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Inspection

CCTV inspection even when filled

Storage/infiltration systems are durable structures for urban drainage; they must work reliably for decades. Durability and reliability are essential requirements.
The best way to inspect the state of a system using state-of-the-art technology is CCTV inspection. Thus, a storage/infiltration system can be inspected excellently – for final acceptance or later. This provides safety for authorities, engineers, construction companies, customers, and operators.

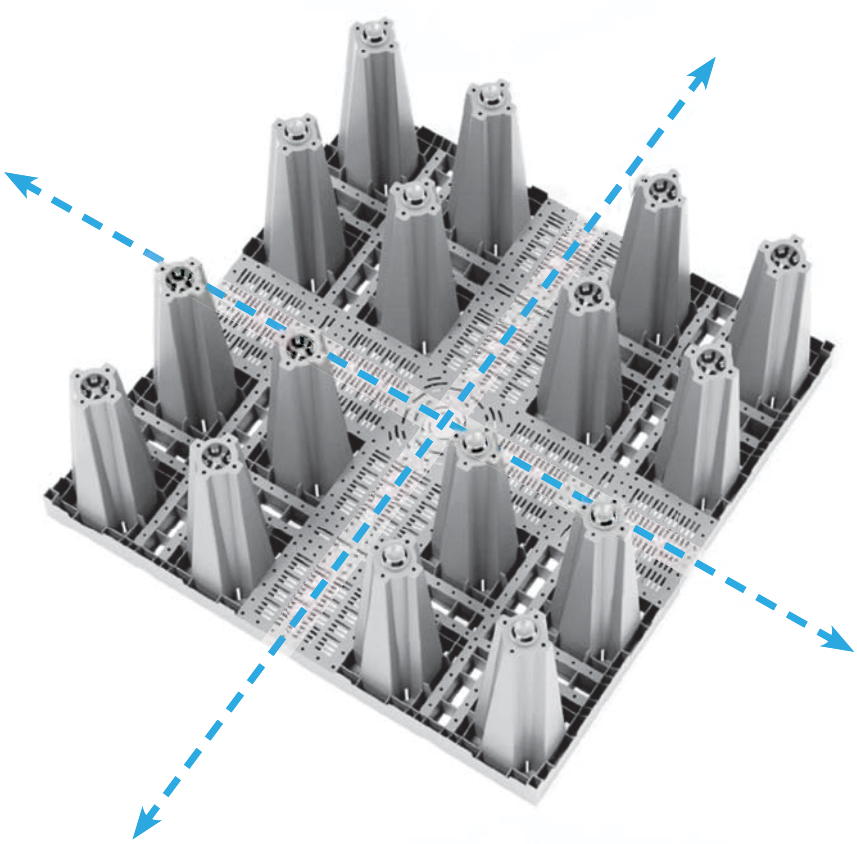
Cross-shaped inspection tunnel

GreenStorm ST* modules have a cross-shaped tunnel which makes the storage/infiltration system camera-accessible and flushable in two axes and thus in four dimensions.
The special and open design of the inspection tunnel allows for an unobstructed view of the entire interior and not only the inspection tunnel.

For example, the statically relevant load-bearing elements, the condition of the geotextile and the entire soil area can be viewed. GreenStorm ST* and GreenStorm ST*-B thus provide excellent options to control the “inner life” of a storage/infiltration system at any time.

The ideal, level and vibration-free running surface and the slim column structure allow for an unobstructed view of the entire module volume. The Quadro Control ST shaft for GreenStorm ST*, which can be integrated, allows for easy access of the automotive dolly for both professional final acceptance inspection and flushing technology.

100 %
inspectable



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Inspection

Recommended camera equipment

A standard sewer camera is sufficient for camera inspection.
A rotatable and height-adjustable camera head allows for an optimal view of the lateral soil area, a controllable carriage ensures a centred positioning, and high-performance optics together with lighting allow for a perfect picture.

Certified CCTV accessibility

GreenStorm ST* has been designed for the use of modern CCTV inspection technology.
The inspectability of the GreenStorm ST* and QuadroControl ST system unit has been tested and confirmed by leading manufacturers of pipe CCTV inspection technology!

Recommended: tender invitation for final acceptance inspection

Final acceptance of sewers using camera inspection has long since become a matter of course in sewer construction.
Also in the construction of storage/infiltration systems, the final acceptance inspection is important! Planning engineers should absolutely include this in their tender documents. For instructions on the professional system configuration of the CCTV inspection technology, please refer to **www.fraenkische.com**

Loading

GreenStorm ST* Heavy traffic

Storage/infiltration systems are subsoil structures and must have sufficient load-carrying capacity against impacting soil and traffic loads.

GreenStorm ST* storage/ infiltration systems are extremely strong and have been designed with various applications in mind:
While GreenStorm ST* has been designed in
particular for traffic loads of up to 13 tons axle load.

Certification CSTB

High resistance

When installed under traffic areas, relevant national guidelines must be observed.

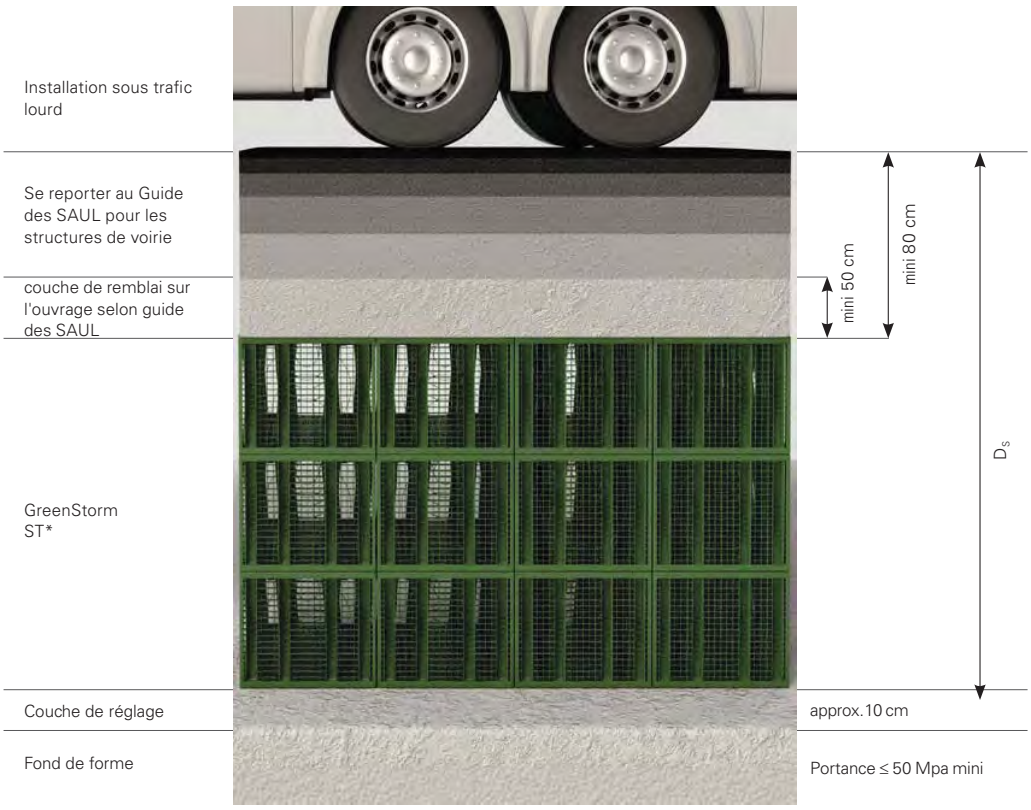
To build the planum for the road construction, an upper levelling layer must be provided. It should preferably be built as a gravel sub-base with a thickness of at least 350 mm, other materials usually result in larger covers.

Generally, a uniform modulus of deformation EV2 ≥ 45 MN/m² must be proven on the planum.

Installation under traffic area

The subsoil structures must have sufficient load-carrying capacity against impacting soil and traffic loads to ensure reliable stability.

This is why GreenStorm ST* is suitable for traffic loads of up to 15 tons axle load (20 tons possible, please refer to our technical department).



With conventional installation parameters*, depths of cover of DC 4 m and soil depths DSof 6 m are possible for infiltration systems. A project-specific stability analysis can be prepared by STORMCON.

*specific weight of soil 18 kN/m³
Mean soil temperature max. 23 °C,
6 m soil depth, = 0.3, 4-laye

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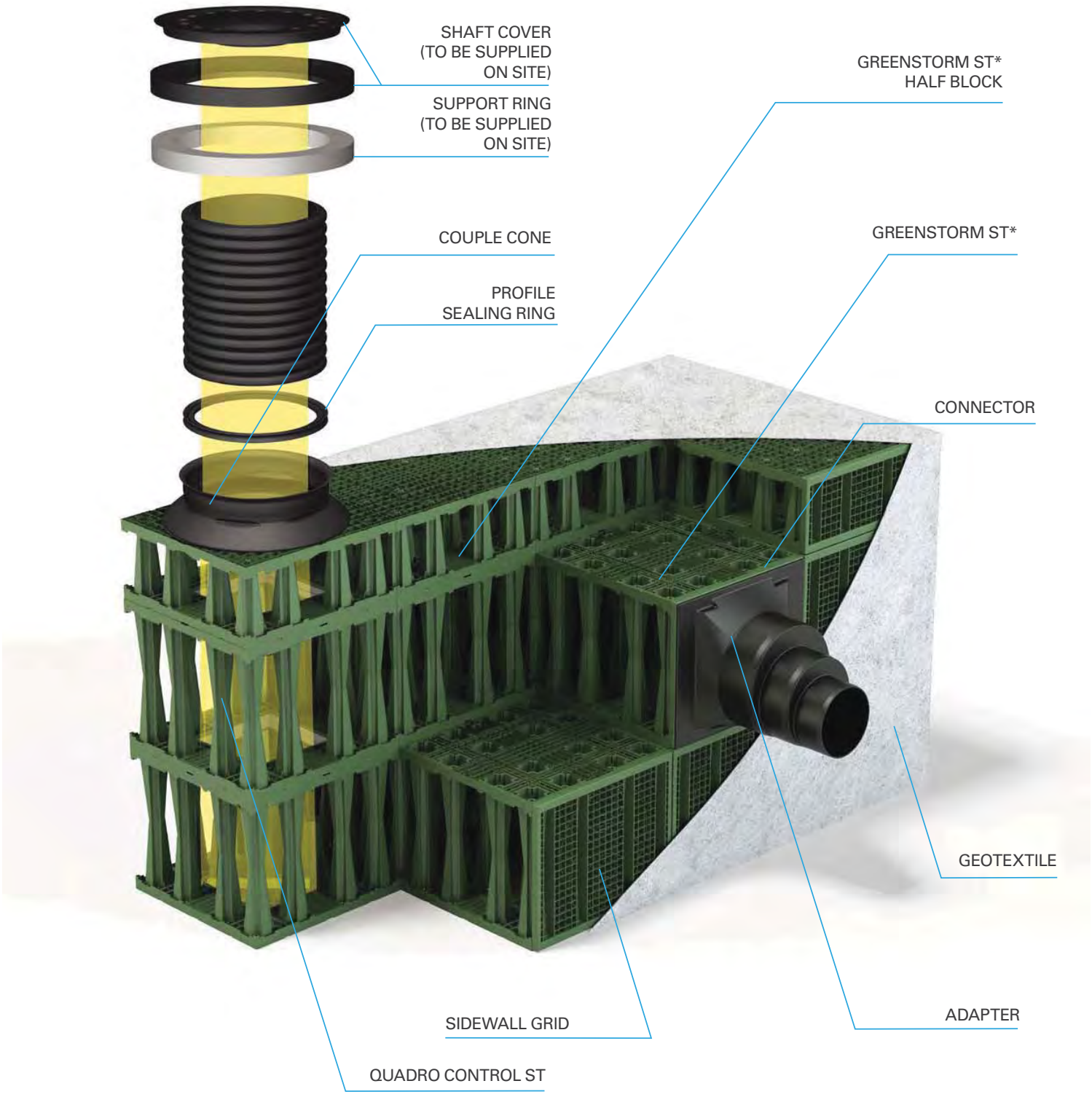
Example

GreenStorm ST* Heavy traffic

*Rigofill ST product by FRÄNKISCHE

Quadro® Control ST – system shaft



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Quadro® Control ST – system shaft

Integrated inspection shafts

Quadro® Control ST is a polypropylene inspection shaft which can be integrated in the storage/infiltration system.

It is square with a base of 800 x 800 mm and can be used in any position of the layout.

Its height results from the number of layers of the connected storage/infiltration system. The shaft allows for comfortable access to the inspection tunnel from aboveground. High-performance inspection and flushing equipment can easily be inserted into the inspection tunnel. The shaft is integrated in the storage/infiltration system and grows layer by layer as construction progresses. QuadroControl ST is delivered with all required components and will be assembled on site.

Structure

The shaft cone is the transition to the extension pipe. The length of the extension pipe is chosen depending on the installation depth.

The shaft is integrated in the storage/infiltration system and grows layer by layer as construction progresses.

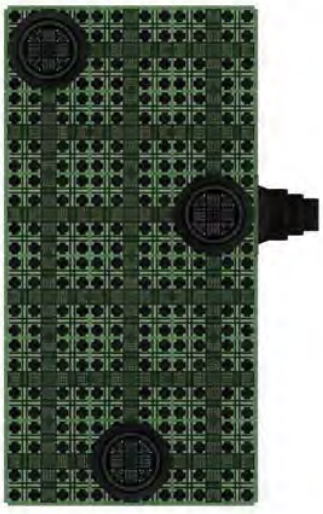
The shaft components are stackable and delivery includes the cone with all required components as shaft package.

Arrangement of inspection shafts

Number of and position in the system are above all determined by the size of the system, access, pipe connections and design of the outdoor facilities.

In order to ensure that flushing of the complete system is possible, each module should comprise at least one inspection shaft. In addition, the shafts should be positioned such that the shaft covers do not interfere with the design of the outdoor facilities, but can easily be accessed by vehicles for maintenance purposes.

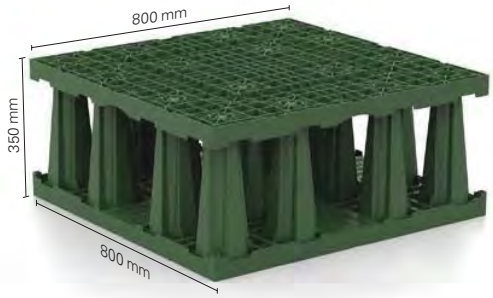
Adjacent shafts should be staggered in the layout.



*Rigofill ST product by FRÄNKISCHE

GreenStorm ST* – Design-relevant dimensions

Dimensions



Sidewall grid connection options

Full block connection options
Dia 100 mm, 135 mm, 150 mm, 200 mm,
250 mm, 300 mm, 375 mm et 450 mm

This allows all available nominal diameters to be realised both at the top and the bottom of the module.

GreenStorm ST* – Design-relevant dimensions

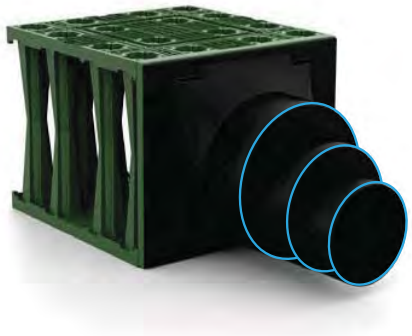
Sidewall grid connection options

Half block connection options
Dia 100 mm, 135 mm, 150 mm, 200 mm
et 250 mm

The side plates can be drilled to the height and desired position within the frame.

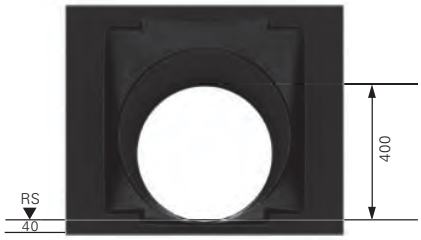
Adapter connection options

Connections:
Dia 300 mm, 450 mm
et 525 mm



Outside diameter 315 mm for a pipe diameter 300 mm PVC

Outside diameter 400 mm for a pipe diameter 450 mm PVC. A flexible sleeve off center is required.

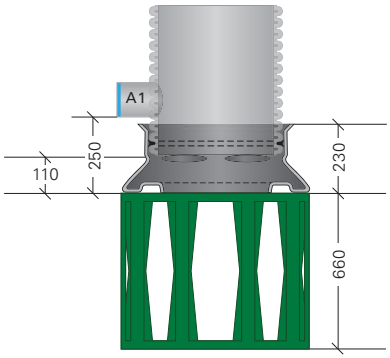


Outside diameter 500 mm for a pipe of diameter 525 mm. A flexible sleeve off center is required

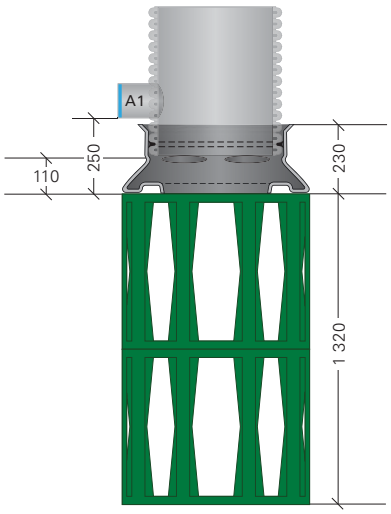
Quadro® Control ST – Design-relevant dimensions

Dimensions of Quadro® Control ST

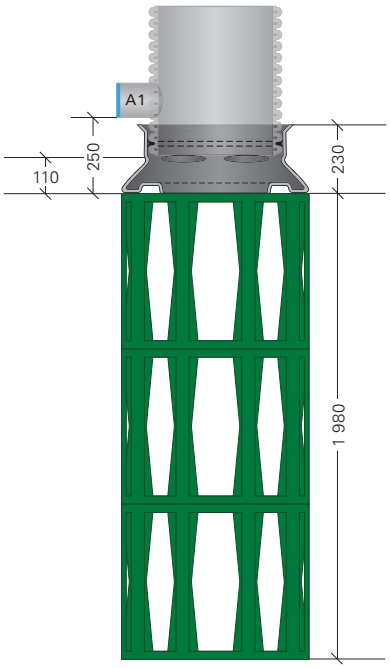
Connection options	
A1	DN/OD 200 or DN/OD 315 connection possible



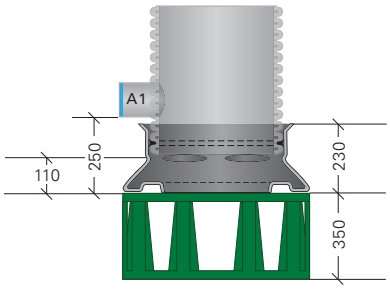
1-layer



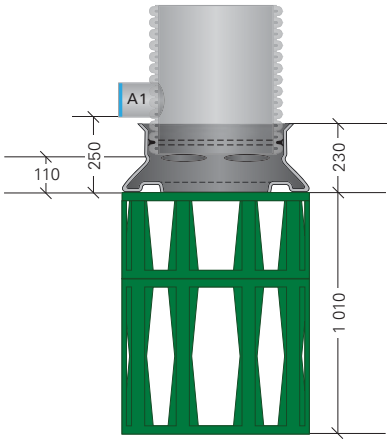
2-layer



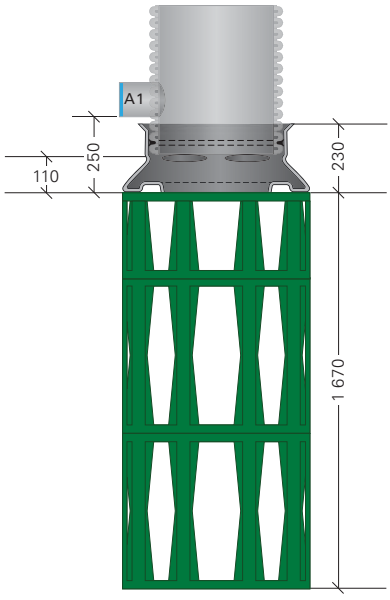
3-layer



1/2-layer



1 1/2-layer

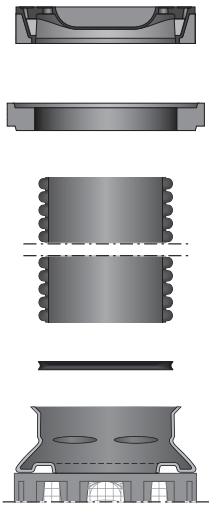


2 1/2-layer

Quadro® Control ST – Design-relevant dimensions

Shaft design of Quadro® Control ST

Structure of inspection shaft



Class B or D
shaft cover acc. to DIN EN 124,
CW 610

Support ring acc. to DIN 4034,
D_i = 625 mm

Extension pipe
D_o 600

Sealing ring

*Rigofill ST product by FRÄNKISCHE

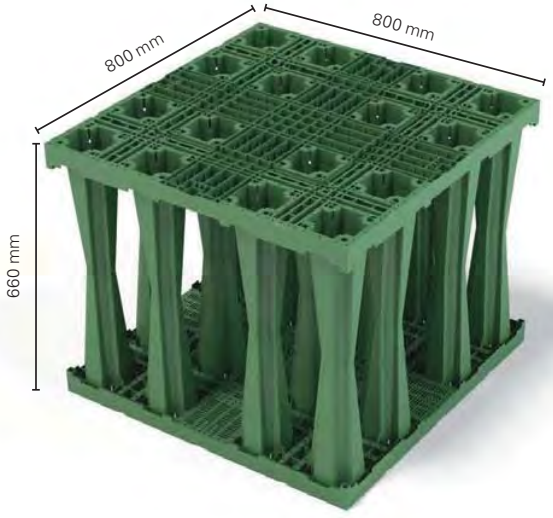
GreenStorm ST*

GreenStorm ST*

GreenStorm ST* IS highly durable and hard-wearing storage/infiltration module with a base of 800 x 800 mm and a height of 660 mm full blocks.

The polypropylene full block consists of two half elements to be installed on site and has a void ratio of more than 96 %. Water can flow through the module three-dimensionally almost without any obstacles. GreenStorm ST* allows for virtually any size and geometry of the systems.

The cross-shaped inspection tunnel in the storage/ infiltration modules has been designed for the use of automotive dollies. This allows the effective drainage surface and the entire system volume with all statically relevant bearing-type fixtures to be inspected.



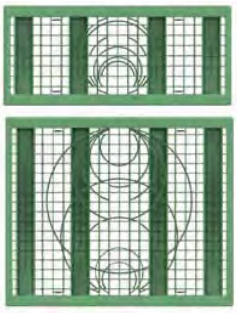
GreenStorm ST* – half block

The GreenStorm ST* half block has a base of 800 x 800 mm and a height of 350 mm.

It consists of only one half element which must be assembled with a roof slab on site. This roof slab is only required for the half block. The GreenStorm ST* half block is used in particular for systems with shallow installation depths, e.g., in case of high groundwater levels.

Systems in various heights can be realised in 35 cm steps and adjusted to almost any layout in combination with the full block.

GreenStorm ST* – Accessories



Différentes hauteurs de connexion (indépendamment du diamètre nominal) sont requises au-dessus du fond selon le nombre d'étages :

Nombre d'étages	Hauteur de raccord
0.5-layer	40 mm
1-layer	40 mm
1.5-layer	700 mm
2-layer	700 mm
2.5-layer	1 360 mm
3-layer	1 360 mm

Sidewall grid

The sidewall grids serve as external boundary.

They can be assembled easily using snap connections. The predefined position of the connections at the sidewall grids guarantees that the connections of inlet pipe and outlet pipe and the tunnel are same level. The sidewall grids can be assembled easily also outside the excavation pit.

The sidewall grid for the full block and Quadro® Control ST has a size of W x D x H = 800 x 30 x 660 mm and is suited for connecting lateral solid wall pipes DN 110, 125, 160, 200, 225, 250, 315, 400 and 500.

The sidewall grid for the half block or the half-layer shaft has a size of W x D x H = 800 x 30 x 350 mm and is suited for connecting lateral solid wall pipes DN 110, 125, 160, 200, 225 and 250. In storage/infiltration designs with inside corners, shortened sidewall grids are used at one side.

Adapter

The adapter for GreenStorm ST* has a length of 800 mm and a height of 660 mm and serves as an inlet and outlet connection.

It provides an inlet connection with an optimised flow design with diffusor effect for solid wall pipes DN 315, 400 and 500. It can be connected to GreenStorm ST* easily and quickly thanks to the snap connection.

The predefined position of the snap connection at the module guarantees that inlet pipe and outlet pipe and tunnel connect same level.

The adapter ensures a connection with the same crown, as it is installed turned by 180°.

STORMCON
STORMWATER MANAGEMENT SOLUTIONS

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Tel. +1 647 463 9803 | sales@stormcon.ca | www.stormcon.ca

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

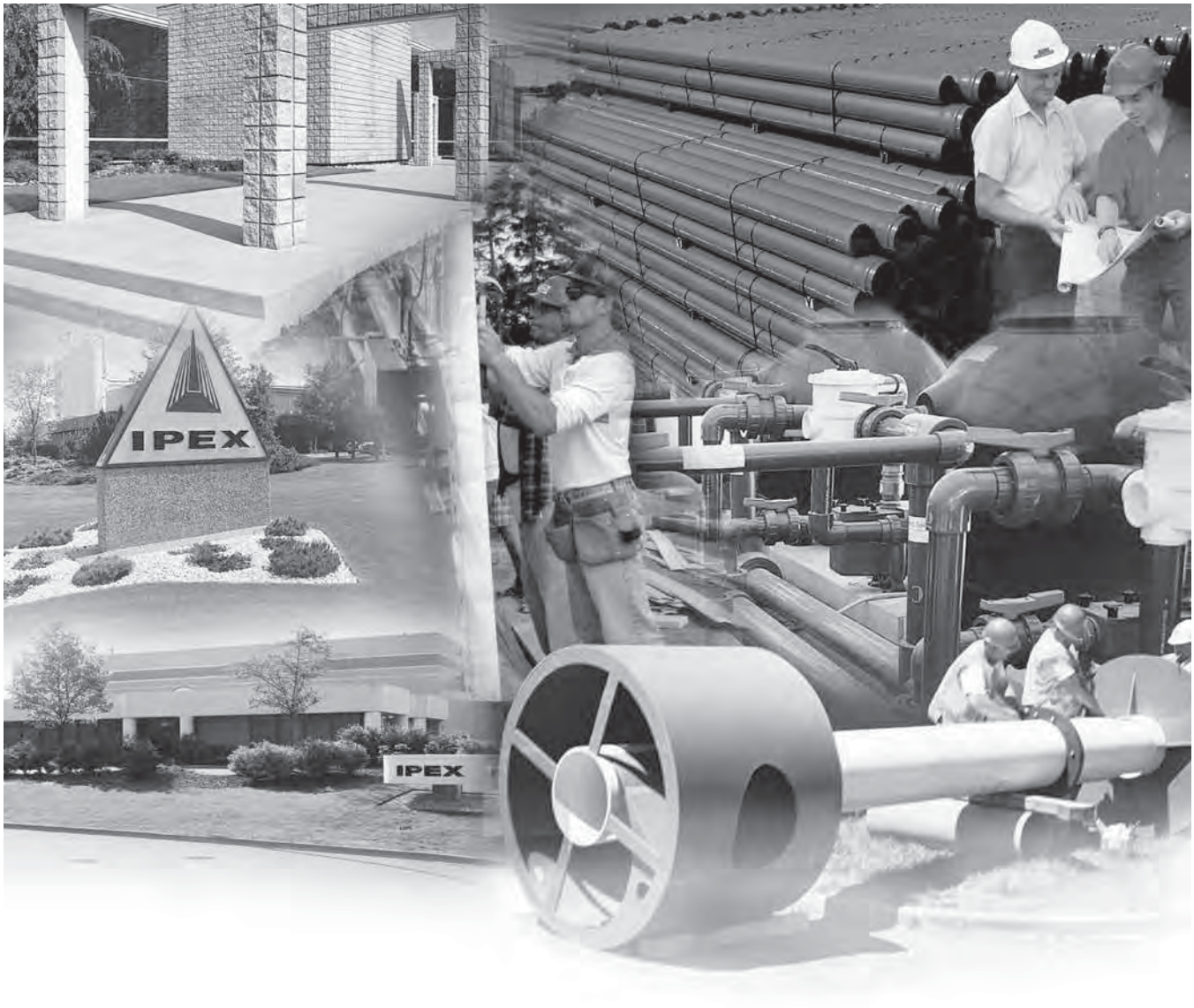
IPEX
by aliaxis

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.

CONTENTS

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

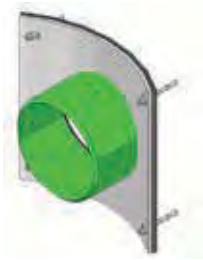
Constructed from durable PVC, the LMF ICD is light weight 8.9 Kg (19.7 lbs).

Product Applications

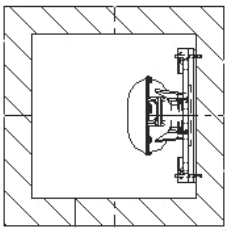
Will accommodate both square and round applications:

Square Application

Round Application



Universal
Mounting Plate



Spigot CB
Wall Plate

=

Universal
Mounting
Plate Hub
Adapter

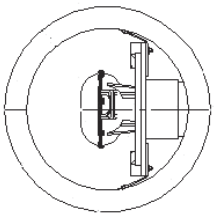


Chart 1: LMF 14 Preset Flow Curves

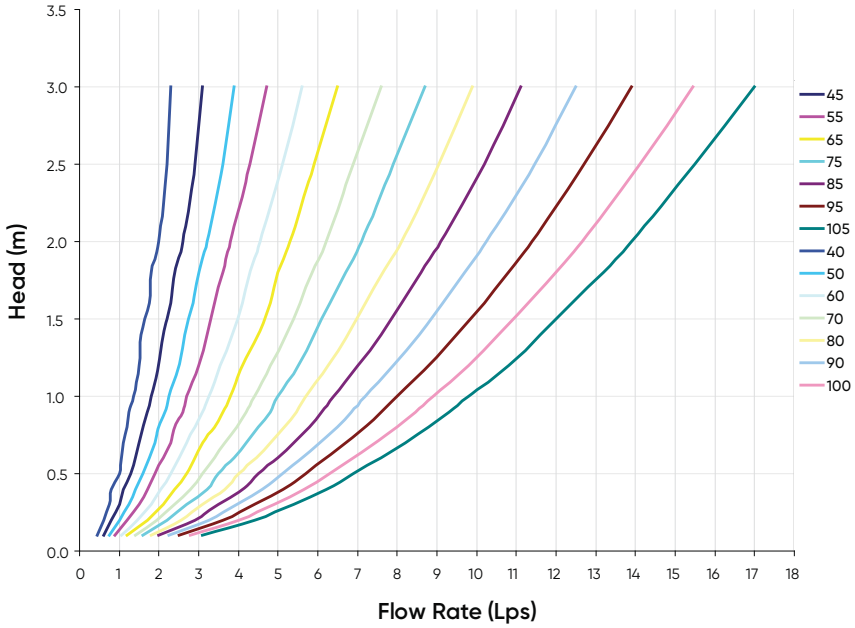
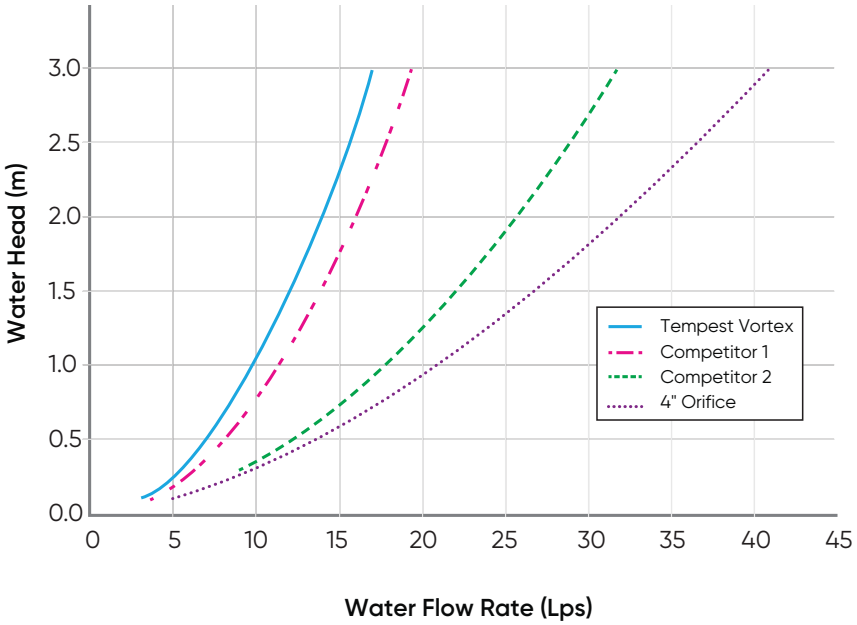


Chart 2: LMF Flow vs. ICD Alternatives



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.

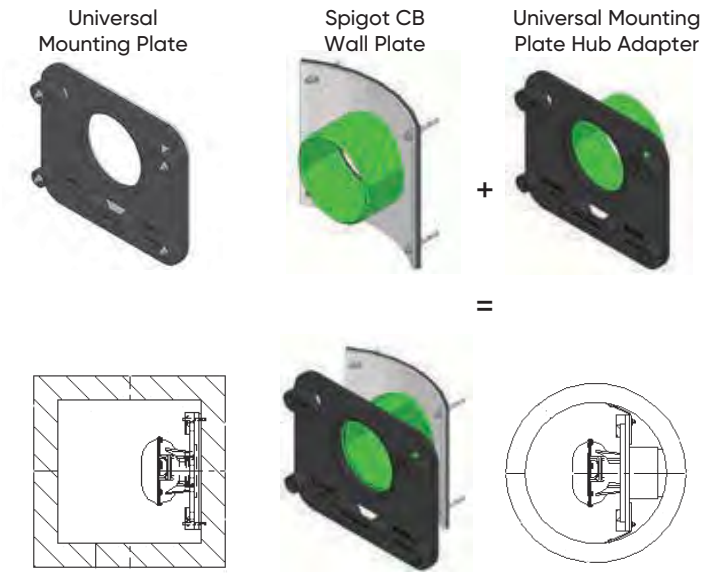
Product Construction

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:

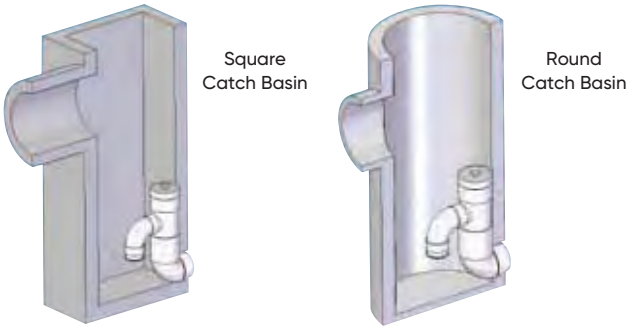
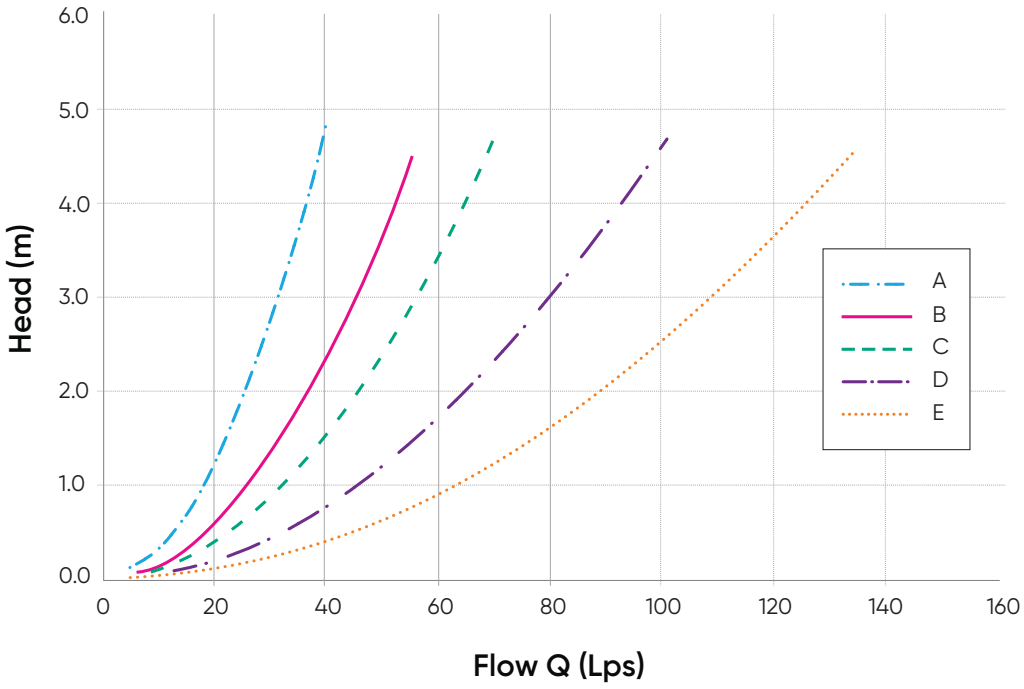


Chart 3: HF & MHF Preset Flow Curves



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 USA LLC
Toll Free: (800) 463-9572
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. and distributed in the United States by IPEX USA LLC.

IPEX by aliaxis

MNMNTPIP110817RU

Stormceptor®

Rinker MATERIALS

Stormceptor® EF Sizing Report

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

07/25/2023

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

Site Name:	

Drainage Area (ha):	2.86
Runoff Coefficient 'c':	0.89

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

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	82.15
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	False
Peak Conveyance (maximum) Flow Rate (L/s):	91.10
Influent TSS Concentration (mg/L):	150
Estimated Average Annual Sediment Load (kg/yr):	2296
Estimated Average Annual Sediment Volume (L/yr):	1867

Project Name:	1319 Johnston Road
Project Number:	23034
Designer Name:	Stephen McCaughey
Designer Company:	Robinson Consultants
Designer Email:	smccaughey@rcii.com
Designer Phone:	613-592-6060
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	54
EFO6	70
EFO8	80
EFO10	86
EFO12	92

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 80

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.

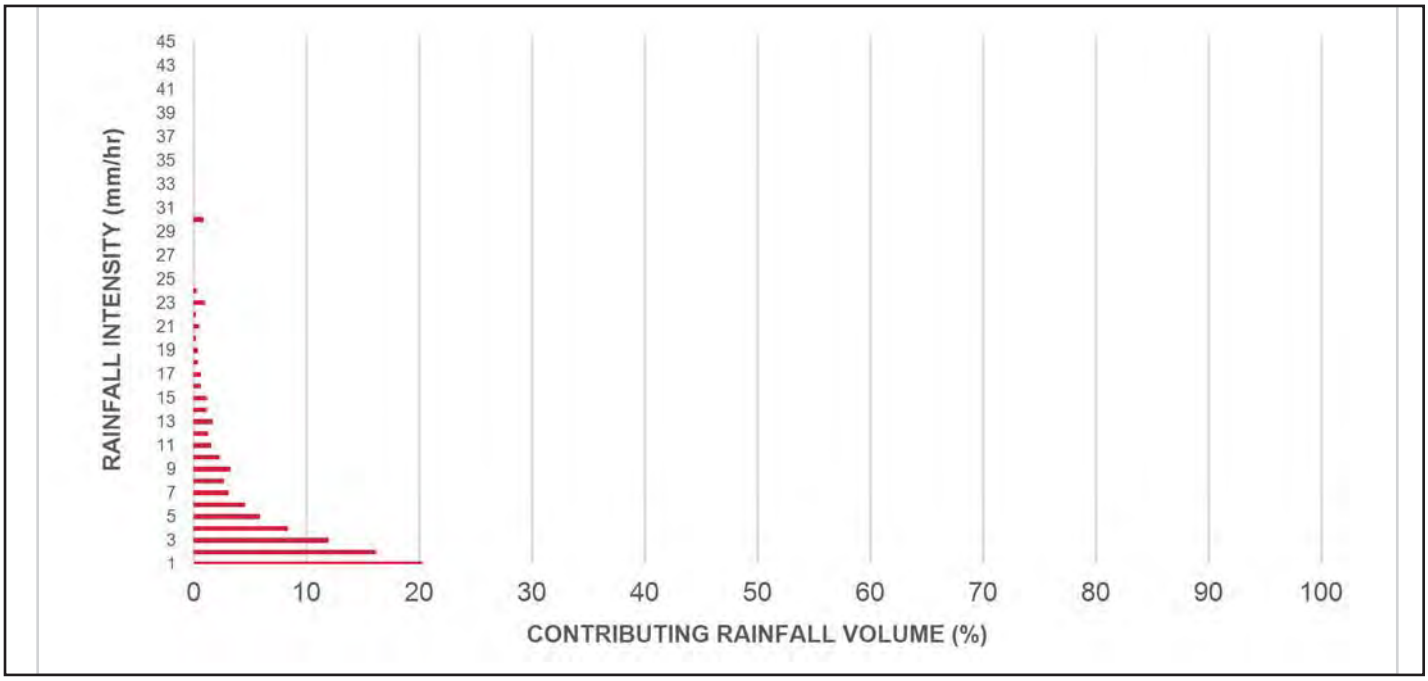
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

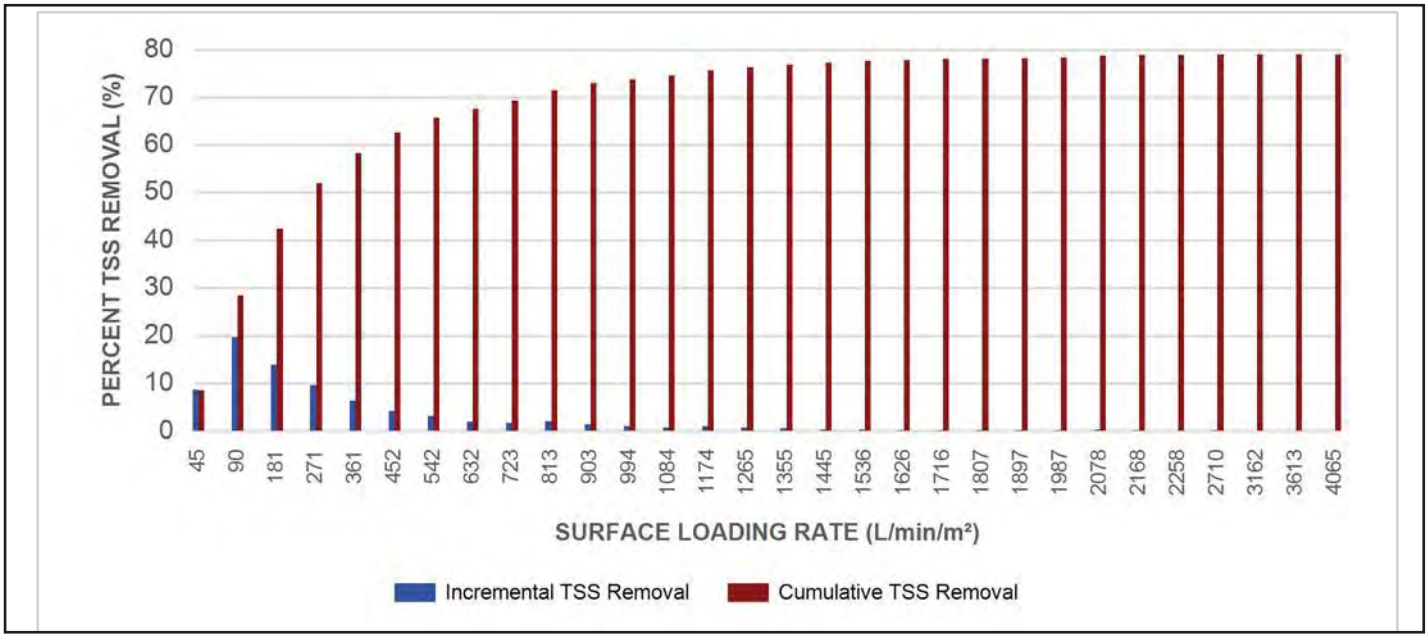
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	3.54	212.0	45.0	100	8.6	8.6
1.00	20.3	29.0	7.08	425.0	90.0	97	19.8	28.4
2.00	16.2	45.2	14.15	849.0	181.0	86	13.9	42.3
3.00	12.0	57.2	21.23	1274.0	271.0	80	9.6	51.9
4.00	8.4	65.6	28.30	1698.0	361.0	76	6.4	58.2
5.00	5.9	71.6	35.38	2123.0	452.0	72	4.3	62.5
6.00	4.6	76.2	42.46	2547.0	542.0	67	3.1	65.6
7.00	3.1	79.3	49.53	2972.0	632.0	64	2.0	67.6
8.00	2.7	82.0	56.61	3397.0	723.0	64	1.7	69.3
9.00	3.3	85.3	63.69	3821.0	813.0	63	2.1	71.4
10.00	2.3	87.6	70.76	4246.0	903.0	62	1.4	72.9
11.00	1.6	89.2	77.84	4670.0	994.0	62	1.0	73.8
12.00	10.8	100.0	84.91	5095.0	1084.0	60	6.4	80.3
13.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
14.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
15.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
16.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
17.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
18.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
19.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
20.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
21.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
22.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
23.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
24.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
25.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
30.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
35.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
40.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
45.00	0.0	100.0	91.00	5460.0	1162.0	58	0.0	80.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**80 %**

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
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

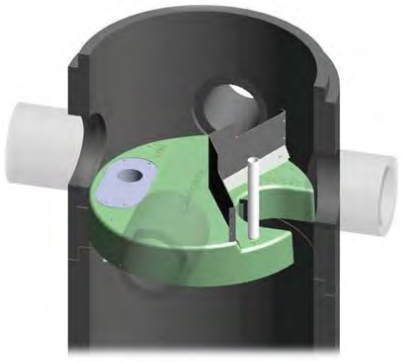
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

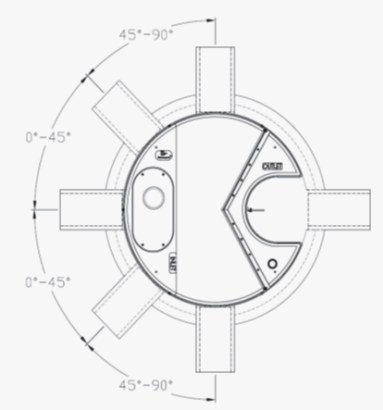
DESIGN FLEXIBILITY

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

OIL CAPTURE AND RETENTION

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





INLET-TO-OUTLET DROP

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

HEAD LOSS

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

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

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

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

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

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

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

3.2 SIZING METHODOLOGY

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

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

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

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

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

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

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

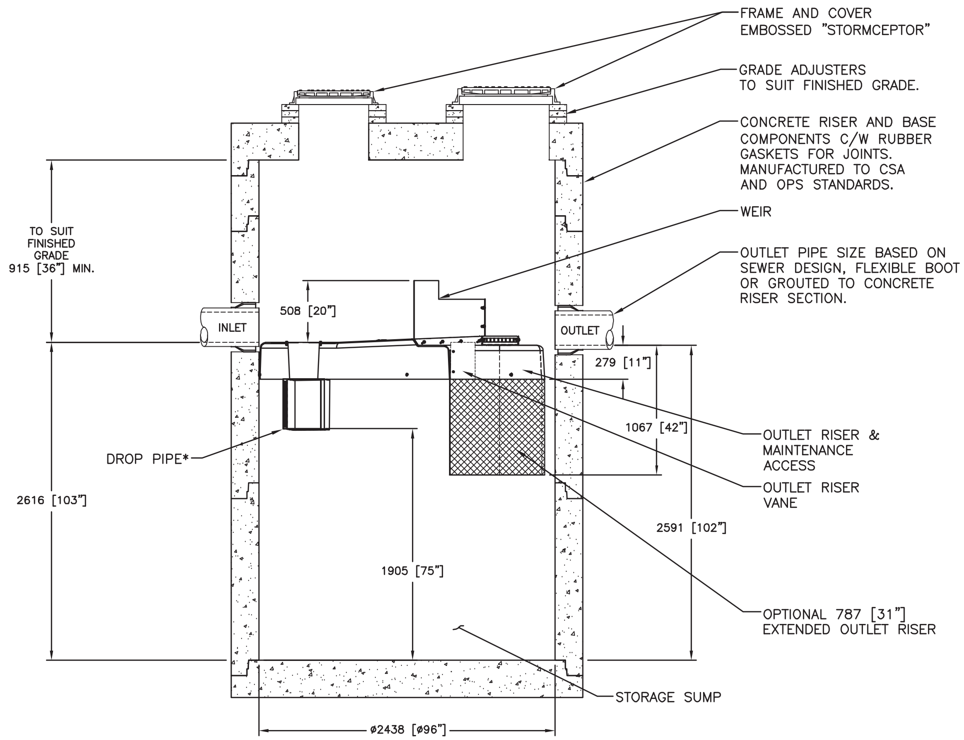
3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

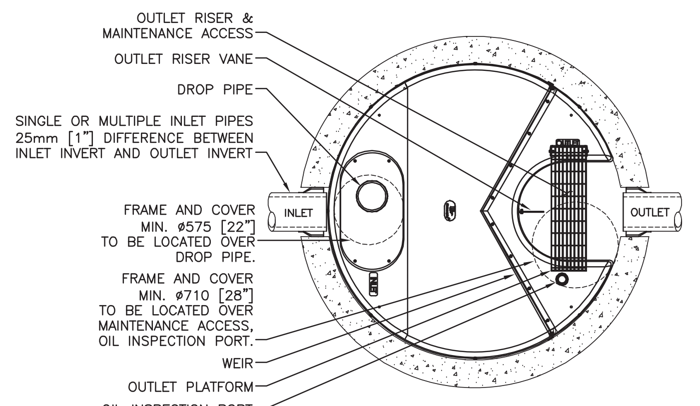
assess whether light liquids captured after a spill are effectively retained at high flow rates.

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

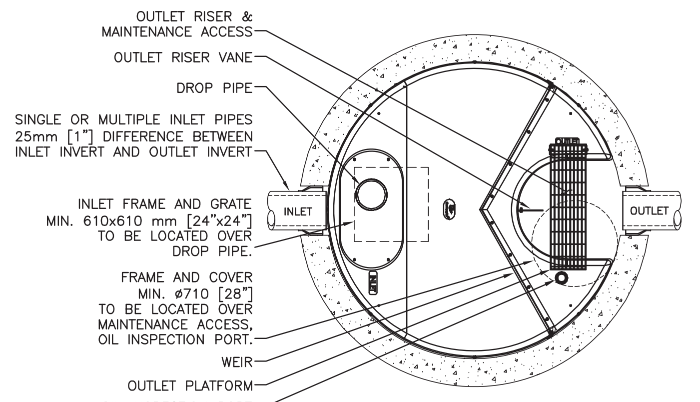
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

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 EF8 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO8 (OIL CAPTURE CONFIGURATION).

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.

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).

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	EFO8				
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	OUTLET PLATFORM	JSK
0	5/26/17	INITIAL RELEASE	JSK

SCALE = NTS

Stormceptor® EF

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON L1N 3A9
TF 800-565-4801 CA 416-960-9900 INTL +1-416-960-9900

DATE: 10/13/2017
DESIGNED: JSK | DRAWN: JSK
CHECKED: BSF | APPROVED: *
PROJECT No.: EFO8 | SEQUENCE No.: *
SHEET: 1 OF 1

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Stormceptor®

Rinker MATERIALS

Stormceptor® EF Sizing Report

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

07/25/2023

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

Site Name:	

Drainage Area (ha):	0.78
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):	20.90
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	False
Peak Conveyance (maximum) Flow Rate (L/s):	8.70
Influent TSS Concentration (mg/L):	150
Estimated Average Annual Sediment Load (kg/yr):	584
Estimated Average Annual Sediment Volume (L/yr):	475

Project Name:	1319 Johnston Road
Project Number:	23034
Designer Name:	Stephen McCaughey
Designer Company:	Robinson Consultants
Designer Email:	smccaughey@rcii.com
Designer Phone:	613-592-6060
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	83
EFO6	92
EFO8	98
EFO10	100
EFO12	100

Recommended Stormceptor EFO Model: EFO4

Estimated Net Annual Sediment (TSS) Load Reduction (%): 83

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

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PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

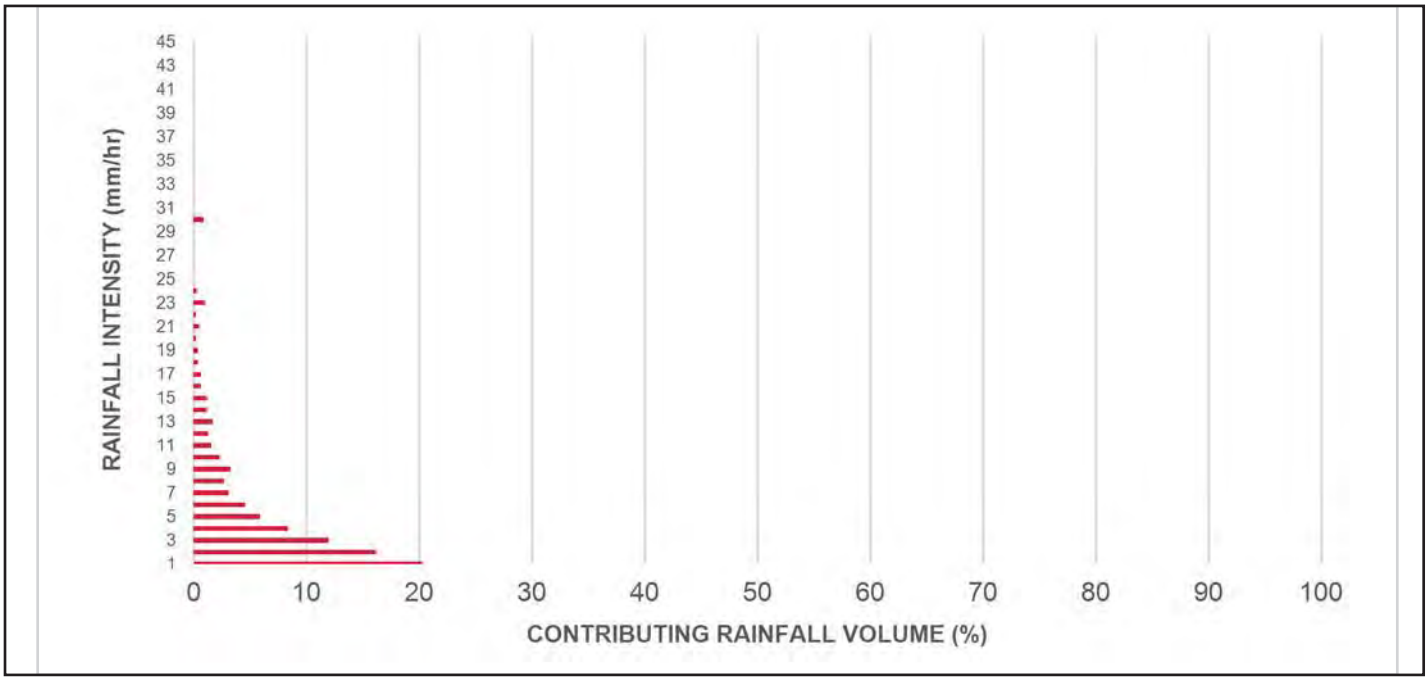
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

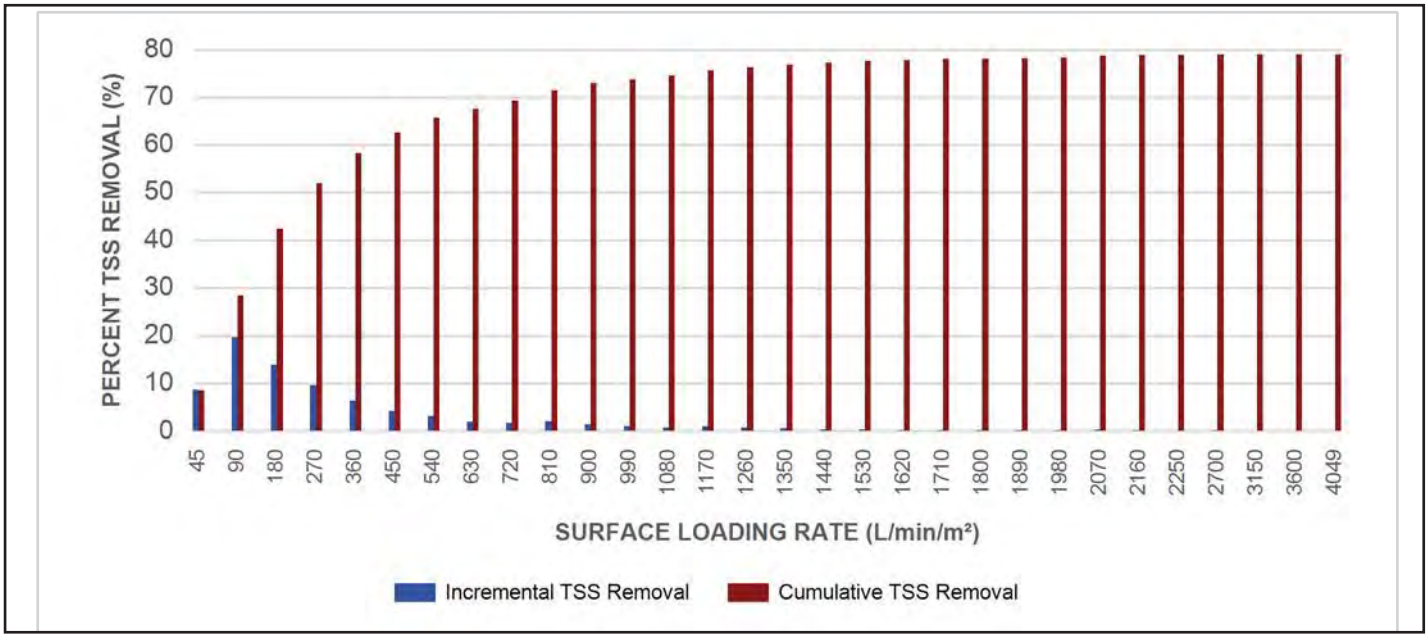
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	0.90	54.0	45.0	100	8.6	8.6
1.00	20.3	29.0	1.80	108.0	90.0	97	19.8	28.4
2.00	16.2	45.2	3.60	216.0	180.0	86	13.9	42.3
3.00	12.0	57.2	5.40	324.0	270.0	80	9.6	51.9
4.00	8.4	65.6	7.20	432.0	360.0	76	6.4	58.2
5.00	34.4	100.0	9.00	540.0	450.0	72	24.6	82.8
6.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
7.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
8.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
9.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
10.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
11.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
12.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
13.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
14.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
15.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
16.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
17.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
18.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
19.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
20.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
21.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
22.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
23.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
24.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
25.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
30.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
35.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
40.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
45.00	0.0	100.0	9.00	540.0	450.0	72	0.0	82.8
						Estimated Net Annual Sediment (TSS) Load Reduction =		**83 %**

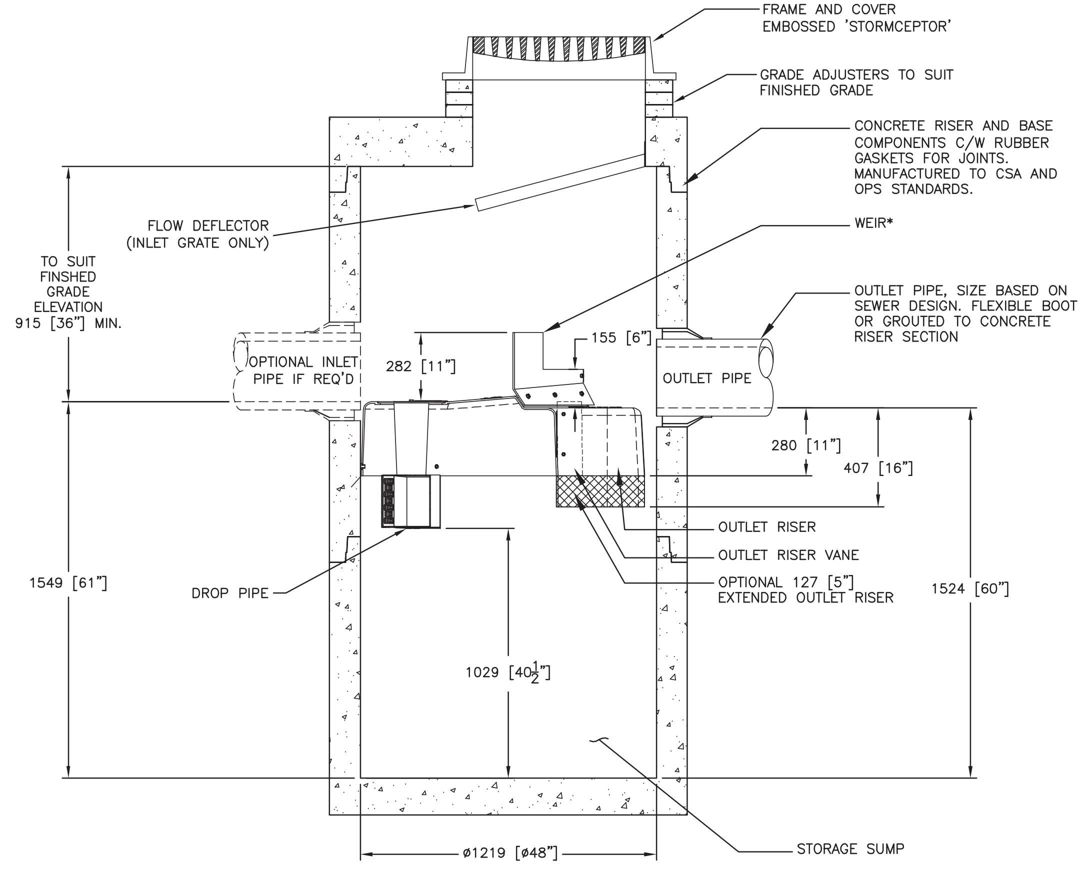
Climate Station ID: 6105978 *Years of Rainfall Data*: 20

RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION

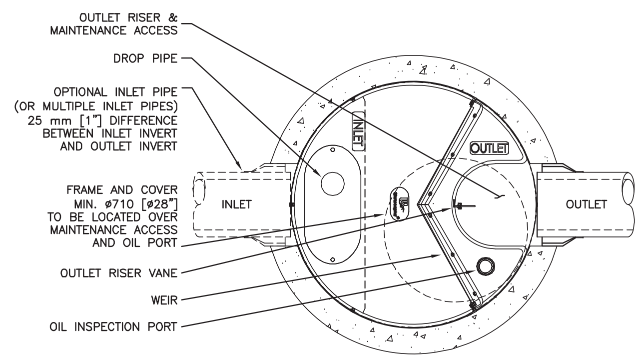


INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL

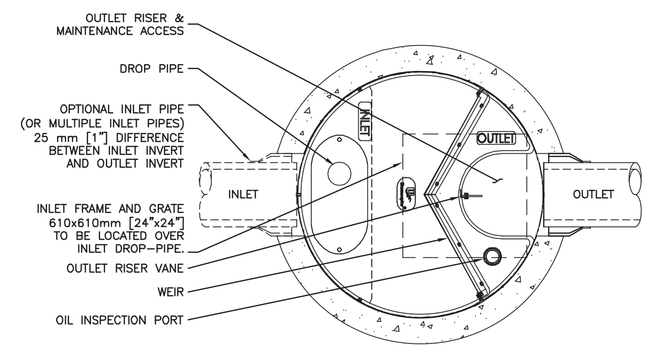




SECTION VIEW



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 3A9
TF 800-565-4801 CA 416-960-9900 INTL +1-416-960-9900

DATE: 10/13/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: SP
PROJECT No.: EFO4	SEQUENCE No.: *
SHEET: 1 OF 1	

experience • knowledge • integrity

civil	civil
geotechnical	géotechnique
environmental	environnementale
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité