FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

ENBRIDGE GAS INC.

OTTAWA OPERATIONS CENTRE
2571 LANCASTER ROAD
OTTAWA, ON

Project No.: 2020-0566-10

August 25, 2021

WALTERFEDY

ENBRIDGE GAS INC.

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
Ottawa Operations Centre

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1.0 INTRODUCTION

WalterFedy has been retained by Enbridge Gas Inc. to provide consulting engineering services in support of the proposed construction of a replacement Operations Centre located at 2571 Lancaster Road in Ottawa. The proposed development site will amalgamate with the 2595 Lancaster Road property, which is located behind the existing building to the north and is an abandoned Canadian National Railway corridor. The amalgamated property will be known municipally as 2571 Lancaster Road.

The purpose of this Functional Servicing and Stormwater Management Report is to identify how the development will be serviced, including water, sanitary, and storm connections to the existing municipal infrastructure. The report will discuss existing servicing conditions surrounding the site and the available capacity in the municipal system to determine how it will accommodate the development. Preliminary stormwater management design has been presented, demonstrating consistency with the City of Ottawa's design criteria.

1.1 Background

The property located at 2571 Lancaster Road has a site area of approximately 1.67 hectares and is zoned Light Industrial (IL). The other property at 2595 Lancaster Road has a site area of 1.63 hectares, for a combined project site area of 3.3 hectares. The overall project site is zoned both IL and IH (Heavy Industrial). Upon completion of the amalgamation process the site is accessed from Lancaster Road to the south, and is bound by tennis courts to the west, a commercial plaza to the east, and industrial buildings to the north.

The southern parcel is currently occupied by The Minto Skating Centre, which is an ice hockey rink, and associated surface parking. The northern parcel exists as an abandoned Canadian National Railway line that appears to have transformed into an overgrown grassy and bush area.

The proposed development is expected to consist of a building that will include office space, a warehouse, and a workshop. The development will also include associated surface parking and outdoor storage space. The outdoor storage space is not permitted within IL zoning, so it is proposed to be constructed within the IH area. The proposed building is expected to have a total floor area of approximately 4815 m^2.

1.2 Reference Reports and Documents

The following were referenced in the preparation of this Functional Servicing and Stormwater Management Report.

1. *Draft Geotechnical Investigation Report – Proposed Enbridge Operations Centre, 2571 Lancaster Road, Ottawa, ON.* By Malroz Engineering Inc. dated May 28, 2021. Prepared for BluMetric Environmental Inc.

The following guidance documents were also referenced in preparation of this report.

1. *Ottawa Sewer Design Guidelines*, City of Ottawa, October 2012 (including Technical Bulletin ISTB-2018-01 and Technical Bulletin ISTB-2018-03 – March 21, 2018).
2. *Ottawa Design Guidelines – Water Distribution*, City of Ottawa, July 2010 (including Technical Bulletin ISD-2010-2 – December 15, 2010, Technical Bulletin ISDTB-2014-02 – May 27, 2014, and Technical Bulletin ISDTB-2018-02 – March 21, 2018).
3. *Stormwater Management Planning and Design Manual*, Ministry of the Environment, Conservation and Parks (MECP), March 2003.
4. *Design Guidelines for Sewage Works*, Ministry of the Environment and Climate Change, March 2019.
5. *Design Guidelines for Drinking Water Systems*, Ministry of the Environment and Climate Change, May 2019.

2.0 EXISTING INFORMATION

2.1 Existing Topography

The site is currently occupied by The Minto Skating Centre in the southern parcel, and overgrown grass and bush in the northern parcel. A topographic and legal survey was completed by J.D. Barnes Limited in May 2021.

The elevation of the site ranges from approximately 68.0 m at the southwestern corner of the site to approximately 68.3 m at the southeastern corner. The western, eastern, and northern property lines for the 2571 Lancaster Road property stay relatively consistent at an elevation of 68.0 m. The existing building sits in the middle of the site, and the finished floor elevation at the front of the building is approximately 71.0 m. The elevations at the rear of the building are approximately 68.0 m. The site currently drains to multiple catch basins sitting at low points within the asphalt areas surrounding the building.

2.2 Geotechnical Report

A geotechnical investigation was completed by Malroz Engineering Inc. to determine subsurface information for the site, including soil and groundwater depths and condition. A total of 13 boreholes were advanced (BH1-BH11 and MW5-21 and MW6-21), with seven of them within the abandoned railway corridor, and the two monitoring wells and the other four boreholes within the pavement area surrounding the building.

The boreholes advanced within the former railway corridor generally found a surficial topsoil layer of up to 0.5 m, underlain by sand and gravel fill, and then native clay extending to termination depth. The fill material depth ranges between 0.6 m and 1.4 m below grade. The boreholes were terminated 2.9 m below grade.

The other six boreholes advanced within the existing asphalt area encountered approximately 50 mm of asphalt, underlain with approximately 0.8 m of granular base materials. Beneath the pavement structure is a layer of silty clay and then a layer of sandy silty clay / silt gravelly sand. Limestone bedrock was encountered in boreholes BH09 and BH11 at depths of 2.9 m and 6.1 m, respectively. Boreholes BH08 and BH10 were terminated 4.2 m below grade in sandy silty clay due to auger refusal. The boreholes associated with MW5-21 and MW6-21 were terminated 4.9 m and 3.8 m below grade, respectively.

Groundwater was observed through the two monitoring wells on two separate dates in April 2021, approximately a week apart. On the first observation day, groundwater was at an elevation of approximately 66.7 m at MW5-21, which is located near the northwestern corner of the existing building. At MW6-21, the groundwater was at an elevation of approximately 65.9 m, which is near the southeastern corner of the site. On the second observation day, the groundwater at MW5-21 was at an elevation of approximately 66.2 m, and 66.4 m at MW6-21. It should be noted that groundwater levels can vary seasonally and in response to major weather events.

2.3 Existing Servicing and Utilities

Existing services on and around the site were document by J.D. Barnes Limited during their topographic survey, and supplemental information was obtained from City of Ottawa GIS information available online.

Surrounding the existing building, there are multiple catchbasins located in low spots to collect runoff from the asphalt and landscaped areas within the 2571 Lancaster Road parcel. There are two separate storm outlets, one at either side of the building. Both of these outlets are a 375-mm-diameter pipe that appears to blind connect to the municipal infrastructure. The municipal storm sewer is a 675-mm-diameter concrete sewer sloped at 0.3%.

An existing water service exists within the western driveway and conveys water to a hydrant at the rear of the building. A domestic service branches off this watermain near the front of the building. The existing municipal watermain on Lancaster Road is a 305-mm-diameter ductile iron pipe. There is also a municipal hydrant on Lancaster Road fronting the site.

A 375-mm-diameter municipal sanitary sewer exists within Lancaster Road. It is presumed that the sanitary outlet from the site blind connects into this municipal sewer.

The site also has hydro, telecommunication, and gas services from Lancaster Road.

Services for the 2595 Lancaster Road parcel include a bell telecommunications line running east-west, and a 600-mm-diameter storm culvert. Existing drainage paths and flow regimes within this portion of the property are undefined with no readily-apparent, positive outlet. It is likely that neighbouring properties are draining onto the 2595 lands illegally as a result of previous unregulated development works. The Owner and their legal counsel have had conversations with the neighbours to notify them of these conditions and advised them to address their drainage accordingly. Appropriate documentation in the form of notice letters or communication records can be provided if required.

3.0 SANITARY SERVICING

The *City of Ottawa Sewer Design Guidelines* (October 2015) stipulate that the average daily sanitary demand for light industrial developments is 35,000 L/gross ha/day. Although the site is zoned for both Heavy Industrial and Light Industrial uses, the areas of the site producing the sanitary flows are located within the Light Industrial parcel only for both existing and proposed conditions. Sanitary demand calculations for the site have been developed based on this condition, with the IH portion of the parcel excluded. The average daily sanitary flows from industrial developments are to be peaked with a factor of 6.0 according to Appendix 4-B.1 of the Guidelines. An extraneous flow allowance of 0.33 L/s/effective gross area is to be included in the peak flow rate calculation. Refer to Table I below for a summary of the peak sanitary flow rate from the site.

Table I: Sanitary Demand

Site Area	1.67 ha
Light Industrial Average Daily Flow	35,000 L/ha/day
Peaking Factor	6.0
Peak Design Flow	**4.06 L/s**
Extraneous Flow Allowance	0.33 L/s/ha
Total Extraneous Flow	**0.55 L/s**
Total Sanitary Flow from Site	**4.61 L/s**

The design peak flow rate for proposed conditions is the same as the design peak flow rate for existing conditions, which is approximately 4.61 L/s. The 1.63 hectares of land from 2595 Lancaster Road IH zoned parcel were omitted as there is no sanitary sewer or development within its property limit in existing or proposed conditions. As no sanitary pipework is proposed on the IH portion of the parcel it is assumed that wet weather flows from this area will not be collected by the sanitary service for the site, and they will continue to drain naturally as they do in the existing condition. Refer to Appendix A for the sanitary design calculations.

The existing sanitary outlet from the site to the municipal sewer was not picked up as part of the topographical survey. However, it will be removed and replaced with a new connection to service the proposed building. The proposed service will be a 150-mm-diameter PVC sewer at 2.0%, and an inspection manhole will be installed inside the property line. The proposed service will also be equipped with a backwater valve.

4.0 WATER SERVICING

4.1 Design Criteria

The *Ottawa Design Guidelines – Water Distribution* (July 2010) references the MECP guidelines for watermain pressure requirements for proposed developments. It is recommended that, under normal operating conditions, pressure within water distribution systems ranges between 350 kPa (50 psi) and 550 kPa (80 psi).

The guidelines also state that, under the maximum hourly demand condition (non-fire scenario), the resultant pressure within the water distribution system shall not be less than 275 kPa (40 psi). With the inclusion of fire flows, the minimum residual pressure in the distribution system shall not be less than 140 kPa (20 psi). The maximum pressure in the distribution system shall never exceed 700 kPa (100 psi) under any scenario within the right-of-way. Within the site boundaries, the Ontario Building Code states that the maximum pressure in the distribution system shall not exceed 550 kPa (80 psi).

4.2 Domestic Water Demand

Calculations of the water demand for the site have been determined using the guidelines outlined within the *Ottawa Design Guidelines – Water Distribution* (July 2010). In accordance with these guidelines, the average day demand for light industrial sites is 35,000 L/gross ha/day. Domestic water servicing has been accounted for in the same manner as the sanitary generation for the site. The IH portion of the parcel has been omitted as there is no demand generated in that area. The guidelines also state that a peaking factor of 1.5 is to be used to determine the maximum day demand, and a peaking factor of 1.8 is to be applied to determine the maximum hour demand. Table II summarizes the water demand for the site.

Table II: Domestic Water Demand

Site Area	1.67 ha
Light Industrial Average Day Demand	35,000 L/ha/day
Site Average Day Demand	58,450 L/day
Average Day Demand (based on 16hr operating day)	1.0 L/s
Maximum Day Peaking Factor	1.5
Maximum Hour Peaking Factor	1.8
Maximum Day Demand	**1.01 L/s**
Maximum Hour Demand	**1.22 L/s**

The maximum day domestic demand for the site is approximately 1.01 L/s, and the maximum hour demand is approximately 1.22 L/s. Refer to Appendix B for the domestic water demand calculations. It should be noted that the 2595 Lancaster Road parcel of land was not included, as it will not house any buildings or consume any water.

4.3 Fire Flow Demand

In addition to the daily demand from the proposed development, fire flow demands are required to assess the adequacy of any proposed watermain system. The City of Ottawa specifies that all fire flow requirements shall be determined in accordance with the current issue of *Water Supply for Public Fire Protection* published by the Fire Underwriters Survey, and the Ontario Building Code. Because of this stipulation, it is necessary to determine if buildings are to be protected by sprinkler systems, as the resulting requirement for fire flow is calculated differently for buildings with or without sprinkler systems. Based on the Building Code Analysis, it is noted that the proposed building will be fitted with sprinkler systems. As such, the fire flow will need to be designed per NFPA 13 *Standard for Installation of Sprinkler Systems* (2013), which stipulates the criteria used for determining fire flow for buildings with sprinklers.

The fire flow demands for the proposed building is presented in Appendix B and summarized below.

Table III: Fire Flow Demand

Type of Construction	Non-Combustible Construction (C=0.8)
Occupancy Charge	Limited-Combustible Construction (-15%)
Automated Sprinkler Protection	Yes
Designed to NFPA 13 Standard	Yes (-30%)
Standard Water Supply to Sprinklers and Standpipes	Yes (-10%)
Fully Supervised System	Yes (-10%)
Exposure Charge (South – 2540 Lancaster Road)	35m (+5%)
Fire Demand	**100 L/s (1585 usgpm)**

The expected fire demand for the proposed building is expected to be 100 L/s. The existing building on the site has a greater floor space (6600 m^2) than the proposed building, and would have additional exposure charges due to proximity to the building to the east. Therefore, the fire demand for the proposed development is calculated to be less than the existing fire demand. A preliminary fire hydrant flow test completed by Troy Life & Fire Safety noted an available flow of 573 USGPM at 61PSI.

4.4 Service Design

As per the City of Ottawa design guidelines, the water service shall be able to convey the combination of the Basic (Maximum) Day Demand and the Fire Demand, within the pressure and velocity ranges as specified. For the proposed developed, this combined flow rate is approximately 101.01 L/s. To accommodate this flow, a minimum 200-mm-diameter water service is required. Since this demand is less than the demand for the existing building, there will be adequate availability within the municipal watermain to service the proposed development.

5.0 STORM SERVICING AND STORMWATER MANAGEMENT

5.1 Stormwater Management Objectives and Design Criteria

As per City of Ottawa regulations, the following stormwater management (SWM) criteria are applicable:

- 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; and
- The allowable runoff coefficient (C) utilized to determine the pre-development release rate shall be the lesser of the existing calculated C for the site, or a maximum of 0.5.
- City of Ottawa Requirements dictate Level 1 “Enhanced” water quality.

Rideau Valley Conservation Authority (RVCA) did not provide a water quality criterion for the site.

5.2 Storm Sewers

The preliminary storm sewer layout and drainage areas for the proposed development are illustrated on Drawing C3-1. The storm drainage design will utilize the minor/major storm design principles. Runoff up to and including the 2-year return period peak flow, as calculated using the Rational Method, and using an inlet time of concentration of 10 minutes, will be conveyed through the underground storm sewer system to the proposed

SWM underground detention facility. Storm sewer capacity calculations will be provided at the detailed design stage. A minimum slope for the storm sewers of 0.15% was used for design purposes and a maximum flow rate-to-full flow capacity ratio of 1.00 was used. Storms exceeding the capacity of the storm sewer system will flow overland via the parking lot to the proposed underground storage tanks or to the former rail corridor.

5.3 Stormwater Management

5.3.1 Hydrologic Analysis

A hydrologic model was developed using PCSWMM and was used to calculate the runoff volumes and peak flows in pre- and post-development conditions for the various design storms as defined by the City of Ottawa. Appended Table C-1 presents a summary of the design storms simulated in PCSWMM including storm duration, maximum rainfall intensity, and total rainfall depth. Figure 1 presents the pre-development drainage areas and Figure 2 presents the post-development drainage areas used in the hydrologic modelling. Table C-2 presents the sub-catchment parameters used in the hydrologic modelling. Tables C-3 and C-4 present the summary of the runoff volumes and peak flows, respectively, as calculated using the hydrologic model. Table C-5 presents the pond stage-area-storage relationship developed to represent the proposed Cultec underground storage chamber in the model. Table 6 presents a summary of the hydrologic routing performance of the proposed SWM pond for each of the simulated design storms.

5.3.2 Water Quality Control

The City of Ottawa requires a Level 1 "Enhanced" water quality control protection, specifying a long-term annual average total suspended solids (TSS) removal rate of at least 80%. The proposed oil/grit separator will be sized at the detailed design stage to provide this TSS removal rate in accordance with the recommendations in the *Stormwater Management Planning and Design Manual* (MECP, 2003).

5.4 Storm Servicing and Stormwater Management Strategy

To meet the 2-year pre-development peak flow rates, on site stormwater storage is proposed. A combination of underground storage chambers and surface ponding in the proposed parking lot will provide the required detention volume. A 200-mm-diameter orifice plate will be utilized to control the peak outflow from the site. Additional details of the underground storage chamber system will be provided at the detailed engineering design phase.

The existing storm sewer service connections are proposed to remain. The new on-site storm sewer drainage and storage system will connect to the existing service stubs at the property line. An oil-grit separator will be sized during the detailed design to provide TSS removal from the parking lot, although not explicitly required by the RVCA.

A summary of the modeling results is provided below. Additional details can be found in Tables C1-C6 located in Appendix C.

Table IV: Stormwater Management Summary

Surface Storage Volume	1140 m^3
Underground Storage Volume	**712** m^3
Total Storage Volume Provided	**1852** m^3
Maximum Storage Volume Used	**1314** m^3
Control Orifice Diameter	**200 mm**
Allowable Site Release Rate (2-year pre-development event)	**347 L/s**
Maximum Actual Site Release Rate (100-year post-development event)	**329 L/s**

6.0 SITE GRADING

The grading of the site will respect the existing grades along all property lines, with driveways matching into existing edge-of-asphalt elevations on Lancaster Road. The site will also be graded to comply with City of Ottawa and the Accessibility for Ontarians with Disabilities Act (AODA) requirements.

Grading of the site will also allow for a major overland flow path from within the site to Lancaster Road, while ensuring maximum ponding depth is limited to 30 cm or less.

6.1 Compliance with On-Site and Excess Soil Management Provincial Regulations

The MECP regulation O.Reg. 406/19 "On-Site and Excess Soil Management" under the Environmental Protection Act states that the excavation of excess material, and subsequent off-site disposal of excess soils from this site, will require testing and reporting in the MECP's Environmental Activity and Sector Registry (EASR). While soil removal for the site is not currently anticipated as a requirement, the contractor and geotechnical engineer will be responsible to meet the above noted requirements in the event material requires removal from site.

7.0 EROSION AND SEDIMENT CONTROL

Any sediment tracked onto the roadway during the course of construction will be cleaned by the Contractor. To help minimize the amount of mud being tracked onto the roadway, a mud mat will be installed at the primary construction exit. Additionally, silt fence will be installed around the entire site to eliminate any sediment from leaving the site and will remain in place and be maintained until landscaping has been completed and soil has been vegetated. Silt fence will also be installed around any stockpiles on site, with the stockpiles kept a minimum 2.5 m from the property boundary.

Silt sacs in catchbasins will be installed to prevent silt- or sediment-laden water from entering inlets. These will be inspected to ensure that they have been properly installed and function as designed throughout construction.

The controls will be maintained, and accumulated sediments removed once their capture capacity has been decreased by one third. It is proposed that, during construction activities, visual monitoring will be conducted bi-weekly and within 24 hours of any rainfall event of 25 mm or greater. During the construction period, monitoring will consist of visual observation for the effectiveness of the sediment and erosion controls and sediment migration off site. Construction inspections will be conducted until such time as the construction activities are complete and vegetation has established itself.

8.0 CONCLUSIONS

Based on the analysis presented in this report, it is concluded that:

- The sanitary sewer on Lancaster Road has sufficient capacity to accommodate sanitary drainage from the proposed development as the design flow remains unchanged from existing conditions. A 200-mm-service at 2.0% can service the proposed development.
- The domestic and fire demand for the proposed development can be accommodated by a 200-mm-diameter service connected to Lancaster Road.
- A 200-mm-diameter flow control orifice in addition to the underground storage system controls the maximum peak flow rate from the site to 329 L/s to meet the required allowable release rate of 347 L/s.
- Surface ponding and underground storage chambers provide a total detention volume of 1852 m^3 on-site.

- Water quality control is not required by RVCA. Water quality measures to meet City of Ottawa requirements will be incorporated during detailed design.
- Site grading will allow for a major overland flow path to the former rail corridor to match existing drainage patterns and directions, and ensure surface ponding does not exceed 30 cm.
- Perimeter silt fence, silt fence at the base of all stockpiles, silt sacs in catchbasins, and construction entrance mud mats can provide erosion and sediment control. These will be included in detailed design in coordination with the proposed construction staging plan.

All of which is respectfully submitted,

WALTERFEDY

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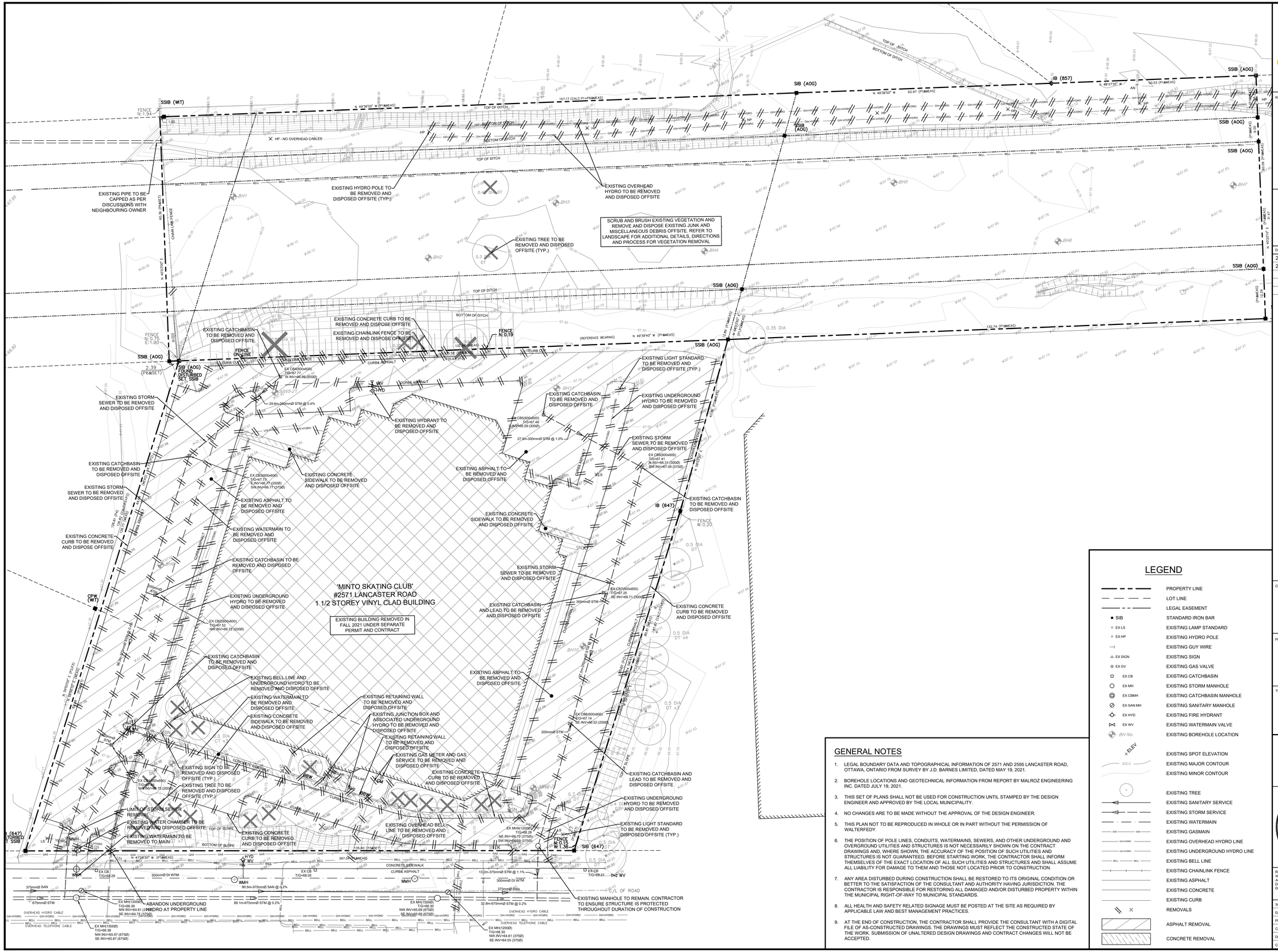
DRAWINGS



GENERAL NOTES

1. LEGAL BOUNDARY DATA AND TOPOGRAPHICAL INFORMATION OF 2571 AND 2595 LANCASTER ROAD, OTTAWA, ONTARIO FROM SURVEY BY J.D. BARNES LIMITED, DATED MAY 19, 2021.
2. BOREHOLE LOCATIONS AND GEOTECHNICAL INFORMATION FROM REPORT BY MALROZ ENGINEERING INC. DATED JULY 19, 2021.
3. THIS SET OF PLANS SHALL NOT BE USED FOR CONSTRUCTION UNTIL STAMPED BY THE DESIGN ENGINEER AND APPROVED BY THE LOCAL MUNICIPALITY.
4. NO CHANGES ARE TO BE MADE WITHOUT THE APPROVAL OF THE DESIGN ENGINEER.
5. THIS PLAN NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF WALTERFEDY.
6. THE POSITION OF 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, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM AND THOSE NOT LOCATED PRIOR TO CONSTRUCTION.
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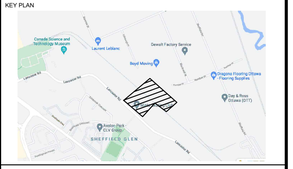
LEGEND

- PROPERTY LINE
- LOT LINE
- LEGAL EASEMENT
- SIB — STANDARD IRON BAR
- EX LS — EXISTING LAMP STANDARD
- EX HP — EXISTING HYDRO POLE
- EXISTING GUY WIRE
- EX SIGN — EXISTING SIGN
- EX GV — EXISTING GAS VALVE
- EX CB — EXISTING CATCHBASIN
- EX MH — EXISTING STORM MANHOLE
- EX CBMH — EXISTING CATCHBASIN MANHOLE
- EX SAN MH — EXISTING SANITARY MANHOLE
- EX HYD — EXISTING FIRE HYDRANT
- EX WV — EXISTING WATERMAIN VALVE
- BH No. — EXISTING BOREHOLE LOCATION
- +ELEV — EXISTING SPOT ELEVATION
- 325.0 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING TREE
- EXISTING SANITARY SERVICE
- EXISTING STORM SERVICE
- EXISTING WATERMAIN
- EXISTING GASMAIN
- EXISTING OVERHEAD HYDRO LINE
- EXISTING UNDERGROUND HYDRO LINE
- EXISTING BELL LINE
- EXISTING CHAINLINK FENCE
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING CURB
- REMOVALS
- ASPHALT REMOVAL
- CONCRETE REMOVAL

ENBRIDGE

KEY PLAN



PROJECT NORTH TRUE NORTH

DATE	ISSUANCE	NO.
2021.07.09	ISSUED FOR DEMOLITION	
2021.08.25	ISSUED FOR SITE PLAN CONTROL	

CLIENT
ENBRIDGE INC.
500 CONSUMERS RD, NORTH YORK, ON

PROJECT
OTTAWA OPERATIONS CENTRE
2571 LANCASTER RD, OTTAWA, ON

TITLE
EXISTING CONDITIONS AND REMOVALS PLAN

WALTERFEDY
KITCHENER HAMILTON 800.685.1378 walterfedy.com

LICENSED PROFESSIONAL ENGINEER J.J. ZEHR 100212980 PROVINCE OF ONTARIO

SCALE:	1:400
DATE:	2021-08-24
PROJECT NO.:	2020-0566-10
CAD FILE:	2020-0566-10_EX_PLOT
DRAWN BY:	TK
CHECKED BY:	JZ

SHEET NO.: C1-1

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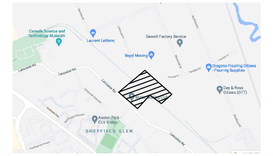
- MH — PROPOSED STORM MANHOLE
- MH — PROPOSED SANITARY MANHOLE
- PROPOSED FIRE DEPARTMENT CONNECTION
- PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
- +[123.45] — PROPOSED GRADE
- 2.0% — PROPOSED DRAINAGE ARROW/SLOPE
- PROPOSED CHAINLINK FENCE
- PROPOSED CURB
- PROPOSED ASPHALT SURFACE
- PROPOSED CONCRETE SURFACE

ENBRIDGE

KEY PLAN



PROJECT NORTH TRUE NORTH

DATE	ISSUANCE	NO.
2021.07.05	ISSUED WITH SD REPORT	
2021.08.25	ISSUED FOR SITE PLAN CONTROL	

CLIENT
ENBRIDGE INC.
500 CONSUMERS RD, NORTH YORK, ON

PROJECT
OTTAWA OPERATIONS CENTRE
2571 LANCASTER RD, OTTAWA, ON

TITLE
GRADING PLAN

WALTERFEDY
KITCHENER HAMILTON 800.685.1378 walterfedy.com

LICENSED PROFESSIONAL ENGINEER
J.J. ZEHR
100212980
PROVINCE OF ONTARIO

SCALE:	1:400
DATE:	2021-08-24
PROJECT NO.:	2020-0566-10
CAD FILE:	2020-0566-10_GRD_PLOT
DRAWN BY:	TK
CHECKED BY:	JZ

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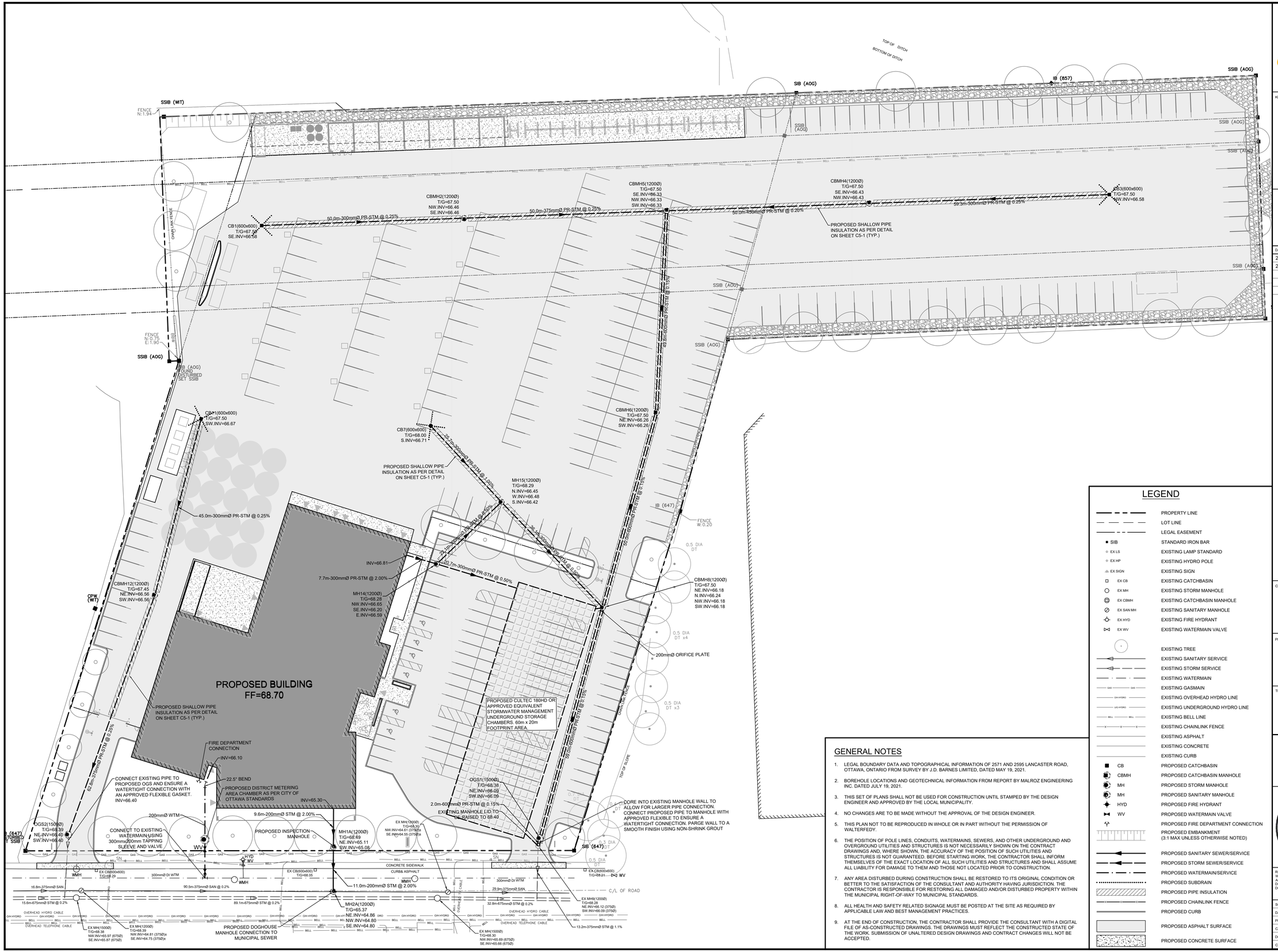
C2-1



LEGEND

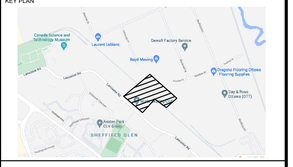
- PROPERTY LINE
- LOT LINE
- LEGAL EASEMENT
- SIB — STANDARD IRON BAR
- EX LS — EXISTING LAMP STANDARD
- EX HP — EXISTING HYDRO POLE
- EX SIGN — EXISTING SIGN
- EX CB — EXISTING CATCHBASIN
- EX MH — EXISTING STORM MANHOLE
- EX CBMH — EXISTING CATCHBASIN MANHOLE
- EX SAN MH — EXISTING SANITARY MANHOLE
- EX HYD — EXISTING FIRE HYDRANT
- EX WV — EXISTING WATERMAIN VALVE
- EXISTING TREE
- EXISTING SANITARY SERVICE
- EXISTING STORM SERVICE
- EXISTING WATERMAIN
- EXISTING GASMAIN
- EXISTING OVERHEAD HYDRO LINE
- EXISTING UNDERGROUND HYDRO LINE
- EXISTING BELL LINE
- EXISTING CHAINLINK FENCE
- EXISTING ASPHALT
- EXISTING CONCRETE
- EXISTING CURB
- CB — PROPOSED CATCHBASIN
- CBMH — PROPOSED CATCHBASIN MANHOLE
- MH — PROPOSED STORM MANHOLE
- MH — PROPOSED SANITARY MANHOLE
- HYD — PROPOSED FIRE HYDRANT
- WV — PROPOSED WATERMAIN VALVE
- PROPOSED FIRE DEPARTMENT CONNECTION
- PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
- PROPOSED SANITARY SEWER/SERVICE
- PROPOSED STORM SEWER/SERVICE
- PROPOSED WATERMAIN/SERVICE
- PROPOSED SUBDRAIN
- PROPOSED PIPE INSULATION
- PROPOSED CHAINLINK FENCE
- PROPOSED CURB
- PROPOSED ASPHALT SURFACE
- PROPOSED CONCRETE SURFACE

GENERAL NOTES

1. LEGAL BOUNDARY DATA AND TOPOGRAPHICAL INFORMATION OF 2571 AND 2595 LANCASTER ROAD, OTTAWA, ONTARIO FROM SURVEY BY J.D. BARNES LIMITED, DATED MAY 19, 2021.
2. BOREHOLE LOCATIONS AND GEOTECHNICAL INFORMATION FROM REPORT BY MALROZ ENGINEERING INC. DATED JULY 19, 2021.
3. THIS SET OF PLANS SHALL NOT BE USED FOR CONSTRUCTION UNTIL STAMPED BY THE DESIGN ENGINEER AND APPROVED BY THE LOCAL MUNICIPALITY.
4. NO CHANGES ARE TO BE MADE WITHOUT THE APPROVAL OF THE DESIGN ENGINEER.
5. THIS PLAN NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE PERMISSION OF WALTERFEDY.
6. THE POSITION OF 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, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM AND THOSE NOT LOCATED PRIOR TO CONSTRUCTION.
7. ANY AREA DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ITS ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE CONSULTANT AND AUTHORITY HAVING JURISDICTION. THE CONTRACTOR IS RESPONSIBLE FOR RESTORING ALL DAMAGED AND/OR DISTURBED PROPERTY WITHIN THE MUNICIPAL RIGHT-OF-WAY TO MUNICIPAL STANDARDS.
8. ALL HEALTH AND SAFETY RELATED SIGNAGE MUST BE POSTED AT THE SITE AS REQUIRED BY APPLICABLE LAW AND BEST MANAGEMENT PRACTICES.
9. AT THE END OF CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE CONSULTANT WITH A DIGITAL FILE OF AS-CONSTRUCTED DRAWINGS. THE DRAWINGS MUST REFLECT THE CONSTRUCTED STATE OF THE WORK. SUBMISSION OF UNALTERED DESIGN DRAWINGS AND CONTRACT CHANGES WILL NOT BE ACCEPTED.

ENBRIDGE

KEY PLAN



PROJECT NORTH TRUE NORTH

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CLIENT
ENBRIDGE INC.
500 CONSUMERS RD, NORTH YORK, ON

PROJECT
OTTAWA OPERATIONS CENTRE
2571 LANCASTER RD, OTTAWA, ON

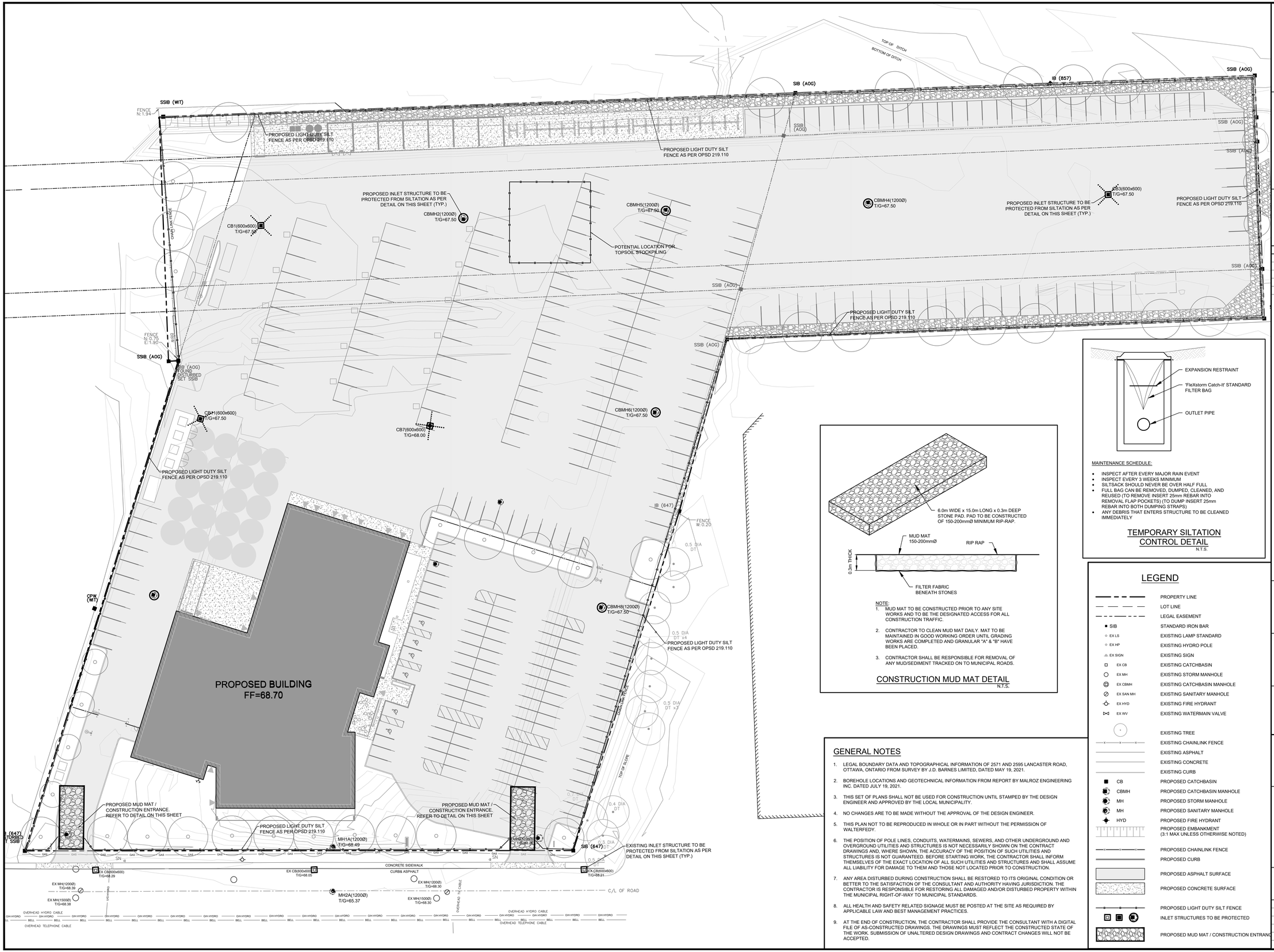
TITLE
SERVICING PLAN

WALTERFEDY
KITCHENER HAMILTON 800.685.1378 walterfedy.com

LICENSED PROFESSIONAL ENGINEER J.d ZEHR 100212980 PROVINCE OF ONTARIO

SCALE:	1:400
DATE:	2021-08-24
PROJECT NO.:	2020-0566-10
CAD FILE:	2020-0566-10_SRV_PLOT
DRAWN BY:	TK
CHECKED BY:	JZ

SHEET NO.: C3-1



NOTE:
1. MUD MAT TO BE CONSTRUCTED PRIOR TO ANY SITE WORKS AND TO BE THE DESIGNATED ACCESS FOR ALL CONSTRUCTION TRAFFIC.
2. CONTRACTOR TO CLEAN MUD MAT DAILY. MAT TO BE MAINTAINED IN GOOD WORKING ORDER UNTIL GRADING WORKS ARE COMPLETED AND GRANULAR "A" & "B" HAVE BEEN PLACED.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF ANY MUD/SEDIMENT TRACKED ON TO MUNICIPAL ROADS.

CONSTRUCTION MUD MAT DETAIL
N.T.S.

MAINTENANCE SCHEDULE:
- INSPECT AFTER EVERY MAJOR RAIN EVENT
- INSPECT EVERY 3 WEEKS MINIMUM
- SILTSACK SHOULD NEVER BE OVER HALF FULL
- FULL BAG CAN BE REMOVED, DUMPED, CLEANED, AND REUSED (TO REMOVE INSERT 25mm REBAR INTO REMOVAL FLAP POCKETS) (TO DUMP INSERT 25mm REBAR INTO BOTH DUMPING STRAPS)
- ANY DEBRIS THAT ENTERS STRUCTURE TO BE CLEANED IMMEDIATELY

TEMPORARY SILTATION CONTROL DETAIL
N.T.S.

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LEGEND

	PROPERTY LINE
	LOT LINE
	LEGAL EASEMENT
■ SIB	STANDARD IRON BAR
○ EX LS	EXISTING LAMP STANDARD
○ EX HP	EXISTING HYDRO POLE
EX SIGN	EXISTING SIGN
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	EXISTING TREE
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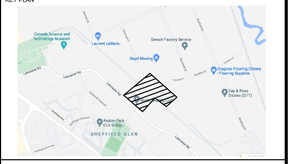
MH	PROPOSED STORM MANHOLE
MH	PROPOSED SANITARY MANHOLE
HYD	PROPOSED FIRE HYDRANT
	PROPOSED EMBANKMENT (3:1 MAX UNLESS OTHERWISE NOTED)
	PROPOSED CHAINLINK FENCE
	PROPOSED CURB
	PROPOSED ASPHALT SURFACE
	PROPOSED CONCRETE SURFACE
	PROPOSED LIGHT DUTY SILT FENCE
	INLET STRUCTURES TO BE PROTECTED
	PROPOSED MUD MAT / CONSTRUCTION ENTRANCE

ENBRIDGE

KEY PLAN



PROJECT NORTH TRUE NORTH

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CLIENT
ENBRIDGE INC.
500 CONSUMERS RD, NORTH YORK, ON

PROJECT
OTTAWA OPERATIONS CENTRE
2571 LANCASTER RD, OTTAWA, ON

TITLE
EROSION AND SEDIMENT CONTROL PLAN

WALTERFEDY
KITCHENER HAMILTON 800.685.1378 walterfedy.com

LICENSED PROFESSIONAL ENGINEER
J. J. ZEHR
100212980
AUG 25/21
PROVINCE OF ONTARIO

SCALE:	1:400
DATE:	2021-08-24
PROJECT NO.:	2020-0566-10
CAD FILE:	2020-0566-10_ESC_PLOT
DRAWN BY:	TK
CHECKED BY:	JZ

SHEET NO.: C4-1

GENERAL NOTES

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EROSION CONTROL NOTES

1. ALL EROSION CONTROL FENCING, TEMPORARY FILTRATION, AND MUD MATS MUST BE INSTALLED BY THE CONTRACTOR AND INSPECTED BY THE CONSULTANT PRIOR TO COMMENCEMENT OF ANY AREA GRADING, EXCAVATING, OR DEMOLITION. CONTRACTOR TO NOTIFY CONSULTANT FOR INSPECTION.
2. ATTACH EROSION CONTROL FENCE TO EXISTING CHAINLINK FENCE WITHIN THE LIMITS OF THE SITE WHERE POSSIBLE.
3. EROSION CONTROL FENCING TO BE PLACED AROUND THE BASE OF ALL STOCKPILES. ALL STOCKPILES TO BE KEPT A MINIMUM OF 2.5m FROM PROPERTY LINES.
4. FILTER FABRIC TO BE TERRAFIX 270R OR APPROVED EQUIVALENT.
5. MUD MATS TO BE PROVIDED ON SITE AT ALL LOCATIONS WHERE CONSTRUCTION VEHICLES EXIT THE SITE. MUD MATS SHALL BE SUPPLIED AS INSTALLED AS PER THE DETAIL ON SHEET C4-1. CONTRACTOR TO ENSURE ALL VEHICLES LEAVE THE SITE VIA THE MUD MAT AND THAT THE MAT IS MAINTAINED IN A MANNER TO MAXIMIZE ITS EFFECTIVENESS AT ALL TIMES.
6. ALL DITCH INLET CATCHBASINS, CATCHBASINS AND CATCHBASIN MANHOLES TO HAVE TEMPORARY FILTRATION INSTALLED AND MAINTAINED AS PER THE DETAIL ON SHEET C4-1.
7. NO ALTERNATE METHODS OF EROSION CONTROL PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY CONSULTANT AND THE AUTHORITY HAVING JURISDICTION.
8. ALL EROSION CONTROL STRUCTURES TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN RE-STABILIZED EITHER BY PAVING OR RESTORATION WITH VEGETATIVE GROUND COVER.
9. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SEDIMENTS FROM THE PUBLIC ROADWAY AND SIDEWALKS AT THE END OF EACH WORK DAY OR AS DIRECTED BY THE CONSULTANT.
10. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSPECTED BY THE CONTRACTOR AFTER MAJOR RAINFALL EVENTS AND CLEANED OR REPLACED AS REQUIRED TO MEET THEIR INTENDED FUNCTION. SEDIMENTS TO BE REMOVED WHEN ACCUMULATIONS REACH A MAXIMUM OF ONE THIRD (1/3) THE STRUCTURE CAPACITY.
11. THE CONSULTANT SHALL MONITOR SITE DEVELOPMENT TO ENSURE ALL EROSION CONTROLS ARE INSTALLED AND MAINTAINED TO CITY OF OTTAWA REQUIREMENTS. CONTRACTOR TO COMPLY WITH THE CONSULTANTS INSTRUCTIONS TO INSTALL, MODIFY, OR MAINTAIN EROSION CONTROL WORKS.
12. THIS PLAN TO BE READ IN CONJUNCTION WITH THE EXISTING CONDITIONS PLAN, SITE SERVICING PLAN, STORM WATER MANAGEMENT PLAN, LANDSCAPING PLAN, AND THE STORM WATER MANAGEMENT REPORT DATED AUGUST 2021.

GRADING NOTES

1. MATCH EXISTING GRADES AT ALL PROPERTY LINES AND/OR LIMITS OF CONSTRUCTION EXCEPT WHERE PROPOSED GRADES ARE NOTED.
2. MANAGEMENT OF EXCESS MATERIALS SHALL BE IN ACCORDANCE WITH OPSS 180. ENVIRONMENTALLY IMPACTED SOILS, WHERE AND WHEN ENCOUNTERED, SHALL BE MANAGED ON SITE AS REQUIRED UNTIL SUCH TIME THAT LABORATORY TESTING RESULTS HAVE CONFIRMED THE NATURE OF THE IMPACTS AND A SUITABLE DISPOSAL METHOD.
3. SURPLUS MATERIAL OF ALL TYPES NOT REQUIRED FOR BACKFILL, GRADING OR LANDSCAPING SHALL BECOME THE PROPERTY OF THE OWNER AND BE REMOVED FROM THE SITE AS DIRECTED BY THE CONSULTANT. THE COSTS OF ALL OFFSITE DISPOSAL SHALL BE BORNE BY THE CONTRACTOR UNLESS A SPECIFIC PROVISION IS MADE IN THE CONTRACT DOCUMENTS FOR PAYMENT FROM DISPOSAL OF A SPECIFIC SURPLUS MATERIAL.
4. MATERIALS TO BE REMOVED SHALL BE NEATLY SAW-CUT ALONG ITS LIMITS, IN ADVANCE OF THE REMOVAL. THE LIMITS OF REMOVAL SHALL BE AS NOTED ON THE PLANS UNLESS AN EXTENSION OR REDUCTION OF THE MATERIAL TO BE REMOVED IS APPROVED IN ADVANCE BY THE CONSULTANT. AS SUCH, THE COSTS OF ANY OVER-EXCAVATION NOT APPROVED IN ADVANCE SHALL BE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR. THIS RESPONSIBILITY SHALL ALSO EXTEND TO RESTORATION OR REPLACEMENT OF DISTURBED FEATURES AND SURFACES DUE TO UNAUTHORIZED EXCAVATION.
5. ALL FILL PLACED ON SITE SHALL BE COMPACTED TO A MINIMUM 95% SPMDD (UNLESS OTHERWISE RECOMMENDED BY THE GEOTECHNICAL ENGINEER OR ON THE DRAWINGS AND IN THE SPECIFICATIONS). ALL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm LIFTS EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
6. MAXIMUM SLOPE IN GRASSED AREAS TO BE 3:1. SLOPES GREATER THAN 3:1 TO BE LANDSCAPED WITH LOW MAINTENANCE GROUND COVER. MINIMUM SLOPE IN GRASSED AREAS TO BE 1%. GRASS SWALES WITH A SLOPE LESS THAN 1% TO BE UNDERLAIN WITH A FRENCH DRAIN.
7. FINISH GRADE AT FOUNDATION WALLS TO BE MINIMUM 150mm BELOW THE TOP OF FOUNDATION WALL/BRICK LINE UNLESS SPECIFIED OTHERWISE ON THE DRAWINGS.
8. CONTRACTOR TO PROVIDE POSITIVE DRAINAGE ON ALL SURFACES TO THE APPROPRIATE OUTLET STRUCTURE. AREAS OF PONDING CAUSED BY CONSTRUCTION ERROR WILL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE CONSULTANT AT THE CONTRACTORS EXPENSE.
9. SHOULD THE NATURE OF THE SOIL AT THE DEPTH INDICATED PROVE UNSATISFACTORY AS DETERMINED BY THE GEOTECHNICAL ENGINEER, THE EXCAVATION SHALL BE CARRIED DOWN TO SUCH A DEEPER LEVEL AS THE GEOTECHNICAL ENGINEER MAY REQUIRE UNTIL A SATISFACTORY BEARING STRATUM IS REACHED.
    - 9.1. THIS CONTRACTOR SHALL BE PAID THE COST OF SUCH EXTRA EXCAVATION AT THE UNIT PRICE ESTABLISHED IN THE CONTRACT.
    - 9.2. ALL EXTRA DEPTHS OF EXCAVATION AND FILLING MUST HAVE THEIR AREA AND VOLUME DOCUMENTED BY AN INDEPENDENT INSPECTION AND TESTING COMPANY OR THE CONSULTANT TO QUALIFY FOR PAYMENT.
    - 9.3. QUANTITIES USED FOR PAYMENT OF EXCAVATION AND FILLING AT EXTRA DEPTHS TO BE DETERMINED BY THE CONSULTANT.

GENERAL SERVICING

1. ALL WORK TO BE COMPLETED IN ACCORDANCE WITH THE REGULATIONS SET OUT BY THE MUNICIPALITY HAVING JURISDICTION.
2. RIGID PIPE BEDDING: CLASS 'B' AS PER OPSD 802.030 (EARTH EXCAVATION, TYPE 1 OR 2 SOIL), OPSD 802.031 (EARTH EXCAVATION, TYPE 3 SOIL), OPSD 802.032 (EARTH EXCAVATION, TYPE 4 SOIL).
3. FLEXIBLE PIPE BEDDING: AS PER OPSD 802.010 (EARTH)
4. GRANULAR FILL SHALL BE DEPOSITED IN THE TRENCH, FOR THE FULL WIDTH OF THE TRENCH, COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY IN LAYERS NOT OVER 300mm DEPTH, EXCEPT WHERE UNDER PAVING, AND WALKS WHEN LAYERS SHALL BE 150mm MAX.
5. SITE SERVICING CONTRACTOR TO TERMINATE ALL SERVICES 1.0m FROM FOUNDATION WALL AND COORDINATE WITH THE GENERAL OR MECHANICAL CONTRACTOR AS REQUIRED TO FACILITATE THE CONNECTION.
6. WHEN BELL AND SPIGOT PIPE IS LAID, THE BELL END OF THE PIPE SHALL BE LAID UPGRADE.
7. PIPE SHALL BE KEPT CLEAN AND DRY AS WORK PROGRESSES. THE TRENCH SHALL BE KEPT DRY.
8. A REMOVABLE WATERTIGHT BULKHEAD SHALL BE INSTALLED DAILY AT THE OPEN END OF THE LAST PIPE LAID.
9. PIPE SHALL NOT BE LAID UNTIL THE PRECEDING PIPE JOINT HAS BEEN COMPLETED AND THE PIPE IS BEDDED AND SECURED IN PLACE.
10. ALL PIPE ENDS SHALL BE THOROUGHLY CLEANED PRIOR TO THE INSTALLATION OF GASKETS. ALL GASKETS TO BE LUBRICATED PRIOR TO BEING INSTALLED OR AS RECOMMENDED BY THE PIPE MANUFACTURER.
11. A TEMPORARY LOCATION MARKER 50x75mm SHALL BE PLACED AT THE END OF ALL CAPPED SERVICE CONNECTIONS. THE MARKER SHALL BE PLACED 300mm ABOVE THE PLUGGED END OF THE SERVICE PIPE, CUT AT LEAST 500mm ABOVE THE FINISHED GRADE, AND MARKED WITH BRIGHT PAINT.
12. ALL MANHOLES, BASINS, CHAMBERS ETC. TO BE INSTALLED LEVEL AND PLUMB TO THE SATISFACTION OF THE CONSULTANT.

STORM AND SANITARY SEWER

1. ALL SEWER MATERIALS TO COMPLY WITH CITY OF OTTAWA MS-22.15 REQUIREMENTS.
2. THE SITE SERVICING CONTRACTOR SHALL PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. SPECIFICALLY, THE LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.01.15 AND 407.07.25 AND IN ACCORDANCE WITH THE PLUMBING CODE. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS TO THE CITY OF OTTAWA. CONTRACTOR TO PROVIDE CONSULTANT MINIMUM 1 WEEK NOTICE OF SCHEDULING PRIOR TO COMPLETING TESTING ON SITE.
3. POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS: SMOOTH PROFILES, TO OPSS 1841 AND CSA B182.2, WITH SEPARATE GASKET AND INTEGRAL BELL SYSTEM, IN 6.0m NOMINAL LENGTHS AS FOLLOWS:
    - 3.1. 200mm OD AND LARGER: SDR35 PVC WITH 320 kPa STIFFNESS.
4. SUBSURFACE DRAINAGE PIPE AND FITTINGS: TO OPSS 405, PERFORATED PVC PIPE TO OPSS 1841 OR PE PIPE TO OPSS.MUNI 1840, TO CAN/CSA-B182.1; COMPLETE WITH KNITTED SOCK GEOTEXTILE AS REQUIRED (TERRAFIX 270R OR EQUIVALENT).
5. MANHOLES AND CATCHBASIN MANHOLES TO BE PRECAST 1200mm DIAMETER WITH ALUMINUM STEPS AT 300mm SPACING AS PER OPSD 701.010 UNLESS SPECIFIED OTHERWISE.
6. CATCHBASINS TO BE 600mm SQUARE PRECAST AS PER OPSD 705.010. DOUBLE CATCHBASINS TO BE 600x1450mm PRECAST AS PER OPSD 705.020.
7. CATCHBASIN MANHOLES, CATCHBASINS, AND DOUBLE CATCHBASINS TO HAVE A MINIMUM 600mm DEEP SUMP.
8. STORM MANHOLES TO HAVE MINIMUM 300mm DEEP SUMP.
9. MANHOLE AND CATCHBASIN, FRAMES, GRATES, CASTINGS, LIDS TO BE AS PER OPSS 1850.
10. CAST IRON FRAMES AND COVERS OR GRATES- STORM SEWERS: TO OPSS 1850 AND OPSD 400.020, OPSD 401.010 (B, OPEN).
11. CAST IRON FRAMES AND COVERS OR GRATES - SANITARY SEWERS: TO OPSS 1850, OPSD 401.010 (A, CLOSED).
12. ALL SANITARY MANHOLES LOCATED IN STORM WATER PONDING AREAS TO HAVE WATERTIGHT FRAME AND COVERS AS PER OPSD 401.030
13. STORM SEWERS AND SERVICES TO HAVE MINIMUM 2.0m COVER TO TOP OF PIPE. WHERE COVER TO TOP OF PIPE IS DEFICIENT, CONTRACTOR SHALL INSTALL SHALLOW BURIED SEWER PIPE IN ACCORDANCE WITH APPLICABLE 'SEWER PIPE INSULATION DETAIL' INDICATED IN DRAWING DETAILS.
14. SANITARY SEWERS AND SERVICES TO HAVE A MINIMUM 2.5m COVER TO TOP OF PIPE. WHERE COVER TO TOP OF PIPE IS DEFICIENT, CONTRACTOR SHALL INSTALL SHALLOW BURIED SEWER PIPE IN ACCORDANCE WITH APPLICABLE 'SEWER PIPE INSULATION DETAIL' INDICATED IN DRAWING DETAILS.
15. ALL PIPES, TO BE INSTALLED FLUSH WITH THE INSIDE WALLS OF THE STRUCTURE AND PARGED TO A SMOOTH FINISH.
16. ALL SANITARY MANHOLES TO BE PRE-BENCHED OR BENCHED WITH 30MPa CONCRETE AS PER OPSD 701.021. BENCHING SHALL EXTEND TO THE SPRING LINE OF LARGEST PIPE IN THE MANHOLE AND SHALL HAVE A SLOPE OF 1:8.
17. CONTRACTOR TO SUPPLY AND PAY FOR CCTV INSPECTION OF ALL SEWER LINES AND STRUCTURES.
18. ACCEPTANCE OF SEWER LINES AND STRUCTURES SHALL BE MADE AFTER THE CONSULTANT HAS REVIEWED THE CCTV DOCUMENTATION AND VIDEOS, AND EXPRESSED IN WRITING THAT THE SEWER LINES AND STRUCTURES ARE ACCEPTABLE.
19. IF CCTV INSPECTIONS SHOW ADDITIONAL CLEANING IS REQUIRED, CLEAN AND RE-INSPECT THE SEWER UNTIL ACCEPTED BY THE CONSULTANT.
20. A MINIMUM OF ONE (1) AND MAXIMUM OF THREE (3) ADJUSTMENT UNITS SHALL BE INSTALLED ON EACH STRUCTURE TO A MINIMUM HEIGHT OF 75mm AND MAXIMUM OF 300mm. THE FIRST ADJUSTMENT UNIT SHALL BE LAID IN A FULL BED OF MORTAR AND ALIGNED WITH THE OPENING IN THE STRUCTURE. SUCCESSIVE ADJUSTMENT UNITS SHALL BE LAID PLUMB TO THE FIRST ADJUSTMENT UNIT AND SEALED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. FRAMES WITH GRATES OR COVERS SHALL BE SET IN A FULL BED OF MORTAR ON THE ADJUSTMENT UNITS AND SUPPORTED USING SHIMS. ROCKS, STONES AND DEBRIS WILL NOT BE PERMITTED FOR USE AS SHIMS.

WATERMAINS

1. ALL WATERMAIN MATERIALS TO COMPLY WITH CITY OF OTTAWA MS-19.15 REQUIREMENTS.
2. POLYVINYL CHLORIDE (PVC) PIPE: MANUFACTURED TO CAST IRON OD (CIOD); COLOUR CODED BLUE, WITH INTEGRAL WALL THICKENED BELL DESIGNED FOR JOINT ASSEMBLY USING AN ELASTOMERIC GASKET CONFORMING TO ASTM D3139 AND CSA B137.3., TO CSA B137.3, COMPLETE WITH TRACER WIRE.
    - 2.1. 100 TO 300mm: TO AWWA C900, DR 18, IPEX OR APPROVED EQUAL.
3. MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPE: MANUFACTURED TO CIOD; COLOUR CODED BLUE, BIAXIALLY ORIENTED, WITH INTEGRAL WALL THICKENED BELL DESIGNED FOR JOINT ASSEMBLY USING AN ELASTOMERIC GASKET CONFORMING TO ASTM D3139 AND CSA B137.3.1, COMPLETE WITH TRACER WIRE.
    - 3.1. 100 TO 300mm: TO AWWA C909, PC 1620 kPa, BIONAX OR APPROVED EQUAL.
4. ALL WATER SERVICING TO HAVE MINIMUM 2.4m COVER.
5. ALL WATER SERVICING PROVIDING FIRE FLOWS MUST BE PRESSURE TESTED TO 200 PSI AS PER THE OBC PLUMBING CODE.
6. FITTINGS: FOR POLYVINYL CHLORIDE (PVC) AND MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPE SHALL BE EITHER:
    - 6.1. GRAY IRON ACCORDING TO AWWA C110/A21.10.
    - 6.2. DUCTILE IRON ACCORDING TO C110/A21.10 OR AWWA C153 AND SHALL BE CEMENT LINED ACCORDING TO AWWA C104/A21.4.
    - 6.3. INJECTION MOULDED POLYVINYL CHLORIDE, BLUE IN COLOUR AND ACCORDING TO AWWA C907 AND CSA B137.2.
    - 6.4. PREFABRICATED POLYVINYL CHLORIDE, BLUE IN COLOUR AND ACCORDING TO AWWA C905 AND CSA B137.3.
7. JOINT RESTRAINTS:
    - 7.1. FOR PVC PIPE AND FITTINGS: TO ASTM F1674 AND AWWA C111, SERRATED RING TYPE; FOR PUSH ON JOINTS UNIFLANGE (SERIES 1300, 1350 & 1360), EBAA (SERIES 1600, 2500 & 2800) OR CLOW (SERIES 300 & 350); OR WEDGE ACTION TYPE AS MANUFACTURED BY EBAA (SERIES 2000PV), OR UNIFLANGE (SERIES 1500) AND STAR STARGRIP 4000, 4100P.
    - 7.2. FOR PVCO PIPE (AWWA C909) AND FITTINGS: SERRATED RING TYPE; FOR PUSH ON JOINTS UNIFLANGE (SERIES 1360), EBAA (SERIES 2500); WEDGE ACTION TYPE AS MANUFACTURED BY CLOW (SERIES 2000 TUF GRIP), STAR (STARGRIP 3500).
    - 7.3. ALL MECHANICAL JOINTS IN TEMPORARY AND PERMANENT CONNECTIONS TO INCLUDE MECHANICAL JOINT RESTRAINTS.
    - 7.4. WATERMAIN FITTINGS WHICH CHANGE DIRECTIONS VERTICALLY OR HORIZONTALLY TO BE FULLY RESTRAINED BY MECHANICAL JOINT RESTRAINT OR THRUST BLOCKS (OPSD 1103.01 AND 1103.02). THREADED ROD WILL NOT BE PERMITTED.
    - 7.5. WATERMAIN FITTINGS TO BE SUPPLIED WITH MECHANICAL JOINT RESTRAINTS. FOR WATERMAIN PIPE SIZES 150mmØ OR LESS ALL PIPE JOINTS TO BE RESTRAINED WITHIN 5.0m FROM ALL FITTINGS, IN EACH DIRECTION, UNLESS SHOWN OTHERWISE ON THE CONTRACT DRAWINGS. FOR WATERMAIN PIPE SIZES GREATER THAN 150mmØ ALL PIPE JOINTS TO BE RESTRAINED WITHIN 10.0m FROM ALL FITTING, IN EACH DIRECTION, UNLESS SHOWN OTHERWISE ON THE CONTRACT DRAWINGS. ALL TEES TO HAVE MINIMUM 2.0m SOLID PIPE LENGTH ON EACH RUN OF THE TEE, OR PROVIDE A THRUST BLOCK PER OPSD 1103.010.
8. TRACER WIRE:
    - 8.1. T.W.U. OR R.W.U #10 GAUGE MIN. 7 STRANDS COPPER WIRE, MIN 60°C OR HIGHER, 600v OR APPROVED EQUIVALENT.
    - 8.2. PVC WATERMAIN SHALL HAVE TRACER WIRE STRAPPED TO TOP AT 5.0m INTERVALS. TRACER WIRE SHALL BE BROUGHT TO THE SURFACE AT ALL HYDRANTS AND CONNECTED TO THE LOWER FLANGE OF THE HYDRANT.
    - 8.3. DO NOT CONNECT THE TRACER WIRE ON NON-METALLIC SYSTEMS TO NEW OR EXISTING METALLIC WATERMAIN PIPING AND/OR ASSOCIATED FITTINGS.
9. WATERMAIN VALVES, 100mm AND LARGER, SHALL BE AS PER AWWA C509-MUELLER A2362 OR APPROVED EQUIVALENT (OPEN LEFT) INCLUDING VALVE BOX AND CATHODIC PROTECTION.
10. HYDRANTS: CONFORM TO AWWA C502 FOR DRY-BARREL HYDRANTS, WITH TWO 63.5mm HOSE NOZZLES AT 180 DEGREES AND A 114.3mm PUMPER NOZZLE WITH A 100mm ULC APPROVED STORTZ CONNECTION; 32mm SQUARE OPERATING NUT, OPEN COUNTER-CLOCKWISE AND HAVE MECHANICAL JOINT END; COMPLETE WITH 150mm LEAD, 150mm GATE VALVE, ANCHOR TEE, VALVE AND BOX PROVIDED IN ACCORDANCE WITH THE CITY OF OTTAWA.
11. ANODES TO BE PROVIDED AS REQUIRED BY THE CITY OF OTTAWA MS-19.15 REQUIREMENTS.
12. CHAMBERS FOR VALVES AND METERS TO BE PROVIDED IN ACCORDANCE WITH OPSS 407 AND 408.
    - 12.1. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR CHAMBER AND METER ASSEMBLY TO THE CONSULTANT FOR REVIEW.
    - 12.2. COMPLETE WITH FACTORY INSTALLED GALVANIZED OR ALUMINUM MANHOLE LADDER RUNGS.
    - 12.3. PROVIDE AND INSTALL ACCESS HATCH FRAME AND COVERS TO OPSD 402.030, CAST IN PLACE. ACCESS HATCH SHALL BE LOCKABLE.
13. PETROLATUM TAPE SYSTEMS: TO BE COMPRISED OF THREE COMPONENTS; PASTE, MASTIC, AND TAPE THAT MEET AWWA C217-09, SUPPLIED BY DENSO NORTH AMERICA INC. OR PETRO COATING SYSTEMS LTD. OR RUSTROL SYSTEMS (INTERPROVINCIAL CORROSION CONTROL COMPANY LTD.). ONLY MATERIAL FROM SUPPLIERS LISTED SHALL BE USED. AT NO TIME SHALL MATERIALS FROM EITHER SYSTEM BE UTILISED WITH ONE AND OTHER.
    - 13.1. ALL MECHANICAL JOINT RESTRAINTS TO BE WRAPPED WITH APPROVED PETROLEUM TAPE SYSTEM.
14. PROVIDE ADEQUATE SUMP BELOW CONNECTION, AND PUMPING IF REQUIRED, TO PREVENT CONTAMINATION OF NEW WATERMAIN WITH TRENCH GROUND WATER OR ANY OTHER FOREIGN MATTER.
15. ALL WATERMAIN AND SERVICE COMMISSIONING, PRESSURE/LEAKAGE TESTING, DISINFECTION, BACTERIOLOGICAL ANALYSIS AND FLUSHING TO BE SUCCESSFULLY COMPLETED BY THE CONTRACTOR AND ACCEPTED BY THE CITY OF OTTAWA AND THE CONSULTANT PRIOR TO PERMANENT CONNECTION TO WATER DISTRIBUTION SYSTEM. REFER TO CONTRACT SPECIFICATIONS FOR REQUIREMENTS.
    - 15.1. CONTRACTOR TO SUBMIT A WATERMAIN COMMISSIONING PLAN TO THE CITY OF OTTAWA AND CONSULTANT AT LEAST TWO WEEKS PRIOR TO CHLORINE RESIDUAL & BACTERIOLOGICAL TESTING.

CONSTRUCTION NOTES

GENERAL

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR MUST:
    - 1.1. CHECK AND VERIFY ALL DIMENSIONS AND EXISTING ELEVATIONS WHICH INCLUDES, BUT IS NOT LIMITED TO, THE BENCHMARK ELEVATIONS, EXISTING SERVICE CONNECTIONS AND EXISTING INVERTS.
    - 1.2. OBTAIN ALL UTILITY LOCATES AND REQUIRED PERMITS AND LICENSES.
    - 1.3. VERIFY THAT THE FINISHED FLOOR ELEVATIONS AND EXISTING FLOOR ELEVATIONS (WHICH MAY APPEAR ON THIS PLAN) COMPLY WITH THE FINAL ARCHITECTURAL DRAWINGS.
    - 1.4. CONFIRM ALL DRAWINGS USED FOR CONSTRUCTION ARE OF THE MOST RECENT REVISION.
    - 1.5. REPORT DISCREPANCIES IN EXISTING CONDITION INFORMATION IMMEDIATELY TO THE CONSULTANT.
2. THE CONTRACTOR SHALL ASSUME ALL LIABILITY FOR DAMAGE TO EXISTING WORKS. DAMAGE SHALL BE RECTIFIED TO THE SATISFACTION OF THE CONSULTANT AND OWNER.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE TEMPORARY SUPPORT AND/OR RELOCATION OF EXISTING UTILITIES DURING CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE AND COMPLY WITH THE REQUIREMENTS OF ALL UTILITY COMPANIES WHEN CROSSING OR WORKING NEAR THEIR PLANT.
4. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE ACCURACY OF ALL TEMPORARY BENCHMARKS ESTABLISHED FOR DESIGN PURPOSES, PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR BEFORE COMMENCING WORK.
5. THE CONTRACTOR SHALL CONTACT THE CONSULTANT 48 HOURS PRIOR TO COMMENCING WORK TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION.
6. THE RIGHT-OF-WAY (INCLUDING THE BOULEVARD) IS NOT TO BE USED FOR ANY CONSTRUCTION ACTIVITY UNTIL A WORK PERMIT HAS BEEN OBTAINED AS PER THE CITY OF OTTAWA REQUIREMENTS.
7. ALL WORK ON THE MUNICIPAL RIGHT-OF-WAY WILL BE INSTALLED BY THE SITE CONTRACTOR UPON SUCCESSFUL APPLICATION FOR A WORK PERMIT BY THE CONTRACTOR.
8. LIMIT CONSTRUCTION TO ACCEPTABLE TIMES WITHIN THE CITY OF OTTAWA NOISE BYLAW. CONSTRUCTION HOURS ARE 6AM TO 10PM MONDAY TO SUNDAY WITHOUT EXCEPTION.
9. IF, FOR UNFORESEEN REASONS, THE OWNER AND/OR THEIR REPRESENTATIVE MUST ENCROACH ONTO PRIVATE LANDS TO UNDERTAKE ANY WORKS, THEY MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNERS PRIOR TO ENTERING UPON THE PRIVATE PROPERTY TO PERFORM ANY WORKS. COPIES OF THESE LETTERS OF CONSENT MUST BE SUBMITTED TO CITY OF OTTAWA ENGINEERING DEVELOPMENT DIVISION, PRIOR TO ANY WORK BEING PERFORMED. FAILURE TO COMPLY WITH THE ABOVE IS AT THE PROPERTY OWNER'S & CONTRACTOR'S OWN RISK.

TRAFFIC, ACCESS, SAFETY

1. PEDESTRIANS MUST BE ASSURED SAFE PASSAGE ALONG LANCASTER ROAD AT ALL TIMES. ALL PEDESTRIAN WALKWAYS MUST BE MAINTAINED AS LONG AS POSSIBLE AFTER WHICH TIME IT IS TEMPORARILY REPLACED BY A SUITABLE GRANULAR MATERIAL TO THE SATISFACTION OF THE CONSULTANT AND/OR CITY OF OTTAWA.
2. ON STREET PARKING WILL NOT BE PERMITTED FOR ANY CONSTRUCTION VEHICLES OR CONSTRUCTION STAFF. THE CONTRACTOR SHALL PROVIDE ADEQUATE PARKING FACILITIES ON SITE TO SUIT THE NATURE AND LOCATION OF THE WORK.
3. FOR EMERGENCY RESPONSE, CONTRACTOR MUST MAINTAIN CONSTRUCTION ACCESS FREE AND CLEAR OF DEBRIS, MATERIALS, VEHICLES, AND EQUIPMENT.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC AND SAFETY MEASURES DURING THE CONSTRUCTION PERIOD INCLUDING THE SUPPLY, INSTALLATION, AND REMOVAL OF ALL NECESSARY SIGNALS, DELINEATORS, MARKERS, AND BARRIERS. ALL SIGNS, ETC. SHALL CONFORM TO THE STANDARDS OF THE CITY OF OTTAWA AND THE MTO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

REMOVALS

1. ALL REMOVALS TO BE IN ACCORDANCE WITH OPSS.MUNI 510.

ASPHALT

1. ASPHALT MATERIAL TO BE PROVIDED AS PER OPSS 1150 AND INSTALLED AS PER OPSS 310.
2. WHERE NEW ASPHALT ABUTS EXISTING ASPHALT, EXISTING ASPHALT SHALL BE SAW CUT AND HAVE TACK COAT APPLIED AS PER OPSS 308 TO A CLEAN DRY FACE BEFORE NEW ASPHALT IS PLACED.
3. SUBMIT ONE COPY OF THE PROPOSED ASPHALT MIX DESIGN FOR ANY PAVING MATERIALS DIRECTLY TO THE CONSULTANT A MINIMUM OF TWO WEEKS IN ADVANCE OF SCHEDULED ASPHALT PAVING.

CONCRETE

1. EXISTING SIDEWALK ON THE RIGHT OF WAY IS NOT TO BE REMOVED UNTIL THE CONTRACTOR IS READY TO REPLACE SIDEWALKS.
2. CONCRETE SIDEWALK WITHIN THE RIGHT OF WAY SHALL BE AS PER OPSD 310.010 AND 310.030.
3. CONCRETE BARRIER CURB TO BE AS PER OPSD 600.110 - 32MPa @ 28 DAYS CONCRETE TO OPSS 353, 7±1.5% AIR ENTRAINMENT, 19mm MAX COURSE AGGREGATE, 60mm MAX SLUMP.
4. CONCRETE SIDEWALK TO BE AS PER DETAIL ON THIS SHEET - 32MPa @ 28 DAYS CONCRETE TO OPSS 351, 7±1.5% AIR ENTRAINMENT, 19mm MAX COURSE AGGREGATE, 70±20mm SLUMP.
5. UNSHRINKABLE FILL: TO OPSS 1359, 28-DAY COMPRESSIVE STRENGTH: 0.4 - 0.7 MPa, MAXIMUM 25mm COURSE AGGREGATE SIZE.
6. SUBMIT ONE COPY OF ALL PROPOSED CONCRETE MIX DESIGNS DIRECTLY TO THE CONSULTANT A MINIMUM OF TWO WEEKS IN ADVANCE OF SCHEDULED CONCRETE POURING.

GRANULAR

1. ALL GRANULAR BASE, SUBBASE, SUBGRADE AND BACKFILL TO BE PROVIDED AS PER OPSS.MUNI 1010 AND INSTALLED AS PER OPSS.MUNI 314.
2. COARSE GRANULAR FILL: MATERIAL AS SPECIFIED BELOW; COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY, UNLESS SPECIFIED OTHERWISE, IN LIFTS NOT EXCEEDING 300mm IN COMPACTED THICKNESS; MOISTURE CONTENT WITHIN PLUS OR MINUS 2% OF THE REQUIREMENTS OF ASTM D698.
    - 2.1. GRANULAR 'B', TYPE 2 TO OPSS.MUNI 1010.
3. FINE GRANULAR FILL: MATERIAL AS SPECIFIED BELOW; COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY, UNLESS SPECIFIED OTHERWISE, IN LIFTS NOT EXCEEDING 150mm IN COMPACTED THICKNESS; MOISTURE CONTENT WITHIN PLUS OR MINUS 2% OF THE REQUIREMENTS OF ASTM D698.
    - 3.1. GRANULAR 'A' TO OPSS.MUNI 1010.

EARTHWORK

1. IN ACCORDANCE WITH THE CITY OF OTTAWA SITE ALTERATION BY-LAW; NO FILLING, PRE-GRADING OR TREE REMOVAL SHALL OCCUR, IN ADVANCE OF THE FINAL SITE PLAN ENGINEERING ACCEPTANCE, WITHOUT PERMIT. SHOULD THE DEVELOPER OR CONTRACTOR WISH TO PREPARE THE SITE FOR CONSTRUCTION PRIOR TO ENGINEERING ACCEPTANCE, AN APPLICATION FOR A SITE ALTERATION PERMIT MUST BE SUBMITTED BY THE CONTRACTOR TO THE ENGINEERING AND CONSTRUCTION DIVISION FOR REVIEW AND APPROVAL.
2. ANY AREAS WHICH REQUIRE FILL IN EXCESS OF 0.30m ARE SUBJECT TO COMPACTION TESTS AND SUCH TESTS MUST SHOW A MINIMUM COMPACTION OF 95% SPMDD AT ALL DEPTHS.
3. RETAINING WALLS TO BE DESIGNED BY OTHERS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ALL PROPOSED RETAINING WALLS, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER CERTIFIED IN THE PROVINCE OF ONTARIO TO THE CONSULTANT, PRIOR TO CONSTRUCTION. SHOP DRAWINGS TO BE APPROVED BY CONSULTANT IN ADVANCE OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE A CERTIFICATE OF COMPLETION COMPLETED BY THE RETAINING WALL DESIGN ENGINEER BEFORE ACCEPTANCE OF THE WORK.

TOPSOIL/SOD

1. TOPSOIL TO BE PROVIDED AND INSTALLED AS PER OPSS 802. SOD TO BE PROVIDED AND INSTALLED AS PER OPSS 803.

PAVEMENT MARKING & SIGNS

1. PAVEMENT MARKINGS TO BE LAID OUT AS PER THE DRAWINGS AND CONTRACTOR TO CONTACT CONSULTANT TO REVIEW LAYOUT PRIOR TO PAINTING. ALL PAINT LINES TO BE OF UNIFORM COLOR AND DENSITY WITH SHARP EDGES TO THE SATISFACTION OF THE CONSULTANT.
2. PAVEMENT MARKINGS TO BE
    - 2.1. THERMOPLASTIC PAVEMENT MARKING MATERIAL TO CONFORM TO OPSS 1713 AND APPLIED AS PER OPSS 710
        - 2.1.1. WHITE - CGSB 1-GP-12C WHITE 513-301.
        - 2.1.2. YELLOW - SHALL MATCH EITHER THE YELLOW COLOUR CHIP OF THE MINISTRY OF TRANSPORTATION ONTARIO OR U.S. FEDERAL 595B, YELLOW 33538
3. ALL EXISTING SIGNS, MAIL BOXES, POSTS, ETC., WHICH MUST BE REMOVED TO ACCOMMODATE CONSTRUCTION SHALL BE SALVAGED AND REINSTATED AS DIRECTED BY THE CONTRACT ADMINISTRATOR IN EQUAL OR BETTER CONDITION. THE CONTRACTOR SHALL MAKE GOOD ANY DAMAGE CAUSED TO SUCH FACILITIES AT HIS OWN EXPENSE. ALL EXISTING TRAFFIC CONTROL SIGNS MUST BE REINSTATED BY THE END OF EACH WORKING DAY. EXISTING STOP CONTROL SIGNS SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION TO THE SATISFACTION OF THE ROAD AUTHORITY AND THE CONTRACT ADMINISTRATOR.

NOTE:

1. TACK COAT TO BE APPLIED TO ALL CONSTRUCTION JOINTS PRIOR TO COMPACTING ASPHALT

ASPHALT RESTORATION DETAIL

N.T.S.

CONCRETE SIDEWALK DETAIL

N.T.S.

*DEPTHS CAN BE REDUCED USING MECHANICAL REINFORCEMENT AS SPECIFIED IN THE GEOTECHNICAL REPORT

PAVEMENT STRUCTURE DETAIL

N.T.S.

NOTE:
INSTALL REINFORCED EDGE AT ALL ASPHALT EDGES NOT ADJACENT TO CURB

ASPHALT EDGE DETAIL

N.T.S.

ORIFICE PLATE DETAIL

N.T.S.

NOTES:

1. PERFORATED CORRUGATED POLYETHYLENE DRAINAGE PIPE SHALL MEET THE REQUIREMENTS OF OPSS 1840.
2. PIPE FILTER FABRIC CONFORMING TO OPSS 1860 FOR GEOTEXTILE CLASS 1 WITH A FILTRATION OPENING SIZE OF 150 TO 450 MICRONS SHALL BE SUPPLIED ON ALL SECTIONS OF PERFORATED PIPE.
3. LAY PERFORATED PIPE WITH PERFORATIONS DOWNWARD.
4. OPEN UPSTREAM ENDS OF PIPES SHOULD BE CAPPED.
5. SUBDRAIN PIPES TO BE SET ON AT LEAST 1.0% GRADE DRAINING TO A POSITIVE FROST-FREE OUTLET.
6. BEDDING AND BACKFILL MATERIAL SHALL BE CONCRETE SAND MEETING THE GRADATION REQUIREMENTS OF OPSS 1002 (FINE AGGREGATE FOR CONCRETE)
7. DO NOT CONNECT UPSTREAM ENDS TO STRUCTURES

SUBDRAIN DETAIL

N.T.S.

NOTE:
INSULATION TO BE 1.8m WIDE FOR PIPES UP TO 250mmØ AND 2.4m WIDE FOR PIPES 300mmØ TO 600mmØ

SHALLOW PIPE INSULATION DETAIL

N.T.S.

ENBRIDGE®

KEY PLAN

DATE	ISSUANCE	NO.
2021.07.09	ISSUED FOR DEMOLITION	
2021.08.25	ISSUED FOR SITE PLAN CONTROL	

CLIENT
ENBRIDGE INC.
500 CONSUMERS RD, NORTH YORK, ON

PROJECT
OTTAWA OPERATIONS CENTRE
2571 LANCASTER RD, OTTAWA, ON

TITLE
DETAILS AND NOTES PLAN

WALTERFEDY
KITCHENER HAMILTON 800.685.1378 walterfedy.com

J. J. ZEHR
100212980
AUG 25/21

SCALE: NTS
DATE: 2021-08-24
PROJECT NO.: 2020-0566-10
CAD FILE: 2020-0566-10_DET_PLOT
DRAWN BY: TK
CHECKED BY: JZ

SHEET NO.: C5-1

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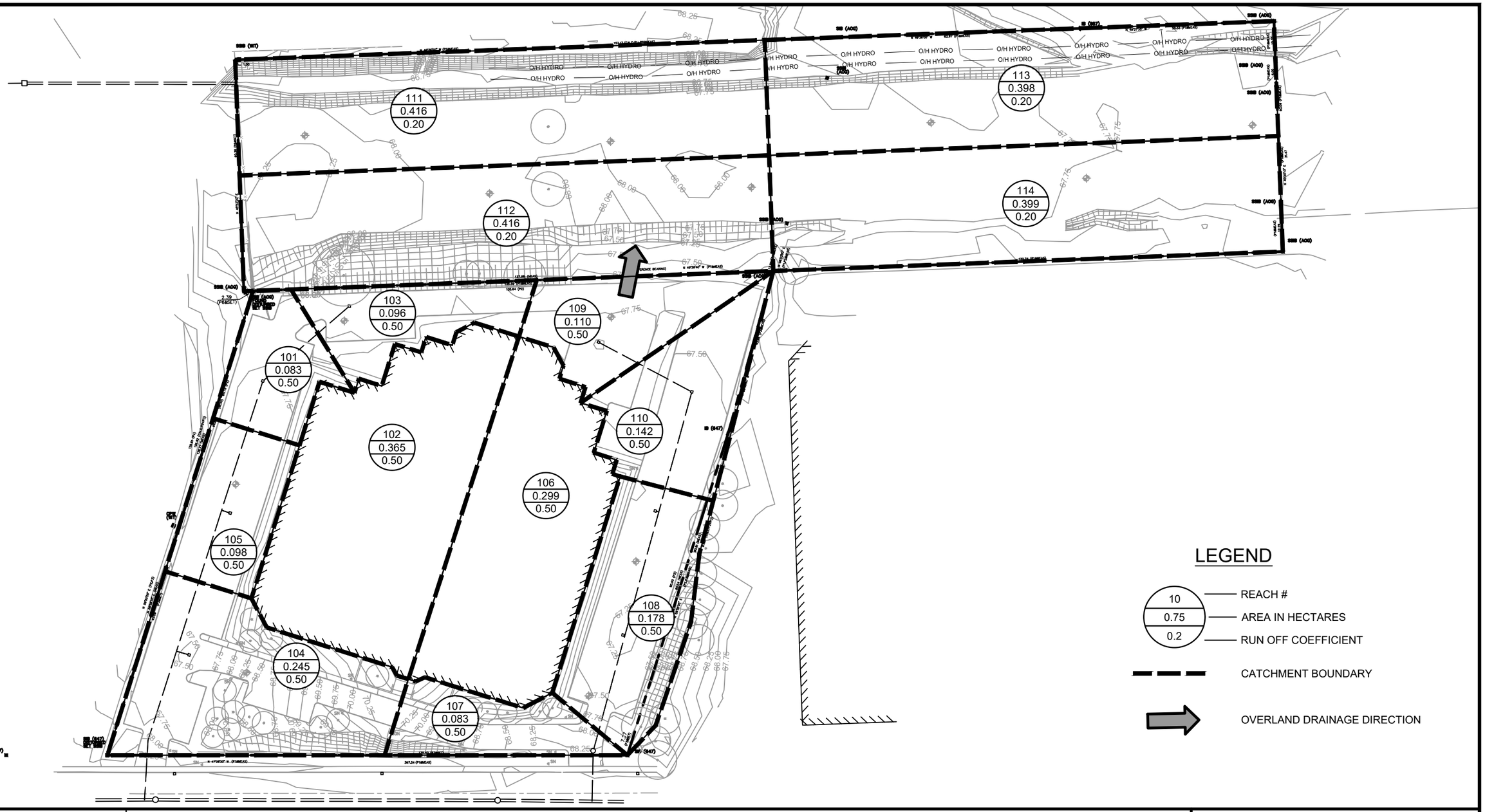
FIGURES



LEGEND

- 10 / 0.75 / 0.2 — REACH # / AREA IN HECTARES / RUN OFF COEFFICIENT
- CATCHMENT BOUNDARY
- OVERLAND DRAINAGE DIRECTION

PROJECT:

ENBRIDGE - OTTAWA OPERATIONS CENTRE

TITLE:

EXISTING CATCHMENT AREAS

WALTERFEDY

KITCHENER OFFICE
675 Queen Street South, Suite 111, Kitchener, Ontario N2M 1A1
T: 519.576.2150 F: 519.576.5499 walterfedy.com

SCALE:	1:1000	DATE:	2021-07-20
DRAWN BY:	TK	PROJECT NO.:	2020-0566-10
CHECKED BY:	JZ	FILE:	2020-0566-10_EX SWM

SHEET NO.:

FIG-1

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None; Tyler Keller; 2021-09-03 9:41:15 AM

LEGEND

- 10 / 0.75 / 0.2 — REACH # / AREA IN HECTARES / RUN OFF COEFFICIENT
- CATCHMENT BOUNDARY
- OVERLAND DRAINAGE DIRECTION

PROJECT:

ENBRIDGE - OTTAWA OPERATIONS CENTRE

TITLE:

PROPOSED CATCHMENT AREAS

WALTERFEDY

KITCHENER OFFICE
675 Queen Street South, Suite 111, Kitchener, Ontario N2M 1A1
T: 519.576.2150 F: 519.576.5499 walterfedy.com

SCALE: 1:1000	DATE: 2021-08-24
DRAWN BY: TK	PROJECT NO.: 2020-0566-10
CHECKED BY: JZ	FILE: 2020-0566-10_PR SWM

SHEET NO.:

FIG-2

APPENDIX A

Sanitary Design Calculations

SANITARY SEWER DESIGN CALCULATIONS

WALTERFEDY

Project:	Enbridge - Ottawa
Project No:	2020-0566-10
Date:	2021-08-24
Designed By:	TK
Checked By:	JZ

Design Data

Min. Velocity	0.6	m/s
Max. Velocity	3.0	m/s
Manning's 'n'	0.013	
Infiltration	0.33	l/s/ha

Residential

Peaking Factor	Harmon	
Avg. Daily Flow		L/c/d

Industrial

Peaking Factor	6	
Avg. Daily Flow	35000	L/ha/day

	Residential				**Cumulative**			**Commercial**		**Infiltration**		**Total Flow**	**Design Data**			
	Area	Units	Density	Population	Area	Population	Peak Factor	Area	Peak Factor	Area	Total Area		Diameter	Slope	Q_{FULL}	V_{FULL}
	(ha)		*(ppu)*	*(people)*	*(ha)*	*(people)*		*(ha)*		*(ha)*	*(ha)*	*(L/s)*	*(mm)*	*(%)*	*(L/s)*	*(m/s)*
Proposed Building	-	-	-		-	-	**-**	1.67	**6.00**	1.67	1.67	**4.61**	200	1.00	**32.80**	**1.04**

APPENDIX B

Water Design Criteria
Fire Demand Calculations (FUS 1999)

FLOW TEST REPORT

OFFICE REPORT: OTTAWA ON

LOCATION: 2571 LANCASTER ROAD OTTAWA ON

DATE OF FLOW TEST: JULY 28 2021 **TIME OF FLOW TEST**: 09:00 AM

COMANY CONDUCTING TEST: *Troy Life & Fire safety* **CONDUCTED BY**: *MICH LACHANCE*

WITNESSED BY:MICHEAL McLEESE

W NOZZLE TYPE (HOSE MONSTER/PLAY PIPE): *LITTLE HOSE MONSTER*

WATER MAIN SIZE (IF AVAILABLE): N/A

DRANT ELEVATION COMPARED TO BUILDING: *SAME ELEVATION AS BUILDING*

HYDRANT FLOW DATA

STANDING PRESSURE (HYDR #1):	65PSI			
SIZE OF OPENING:	1”	1-1/8”	1-3/4”	2-1/2”
DISCHARGE COEFICIENT:			0.9	
PITOT READING (HYDRANT #2):			30PSI	
FLOW USGPM:			573GPM	
RESIDUAL PRESSURE (HYDRANT#1):			61PSI	

REQUIRED FIRE FLOW

Water Supply for Public Fire Protection (FUS 1999)

WALTERFEDY

Project	Enbridge - Ottawa
Project #	2020-0566-10
Designer	TK
Address	2571 Lancaster Road, Ottawa, ON
Description	Fire Flows

$$F = 220 \times C \times \sqrt{A}$$

F = Required fire flow (LPM)
C = Coefficient related to type of construction
A = Total floor area (including all storeys but excluding any basement levels at least 50% below grade)

Type of Construction	Non-Combustible Construction	**C =**	0.8
Description	**Unprotected Metal Structural Components, Masonry or Metal Walls. All Structural Members are Non-Combustible but does not qualify as Fire-Resisitive**		

Floor Area	Varies	m^2
# Storeys	2	
Fire Resistant Building?	NO	
Vertical Openings and Exterior Vertical Communications protected with minimum one (1) hr rating?	NO	
Area	5033	m^2
Description	Total Building Floor Area	
Required Fire Flow	12000	L/min

Occupancy Charge	Limited-Combustible Contents			
Fire Flow Reduction	-15%	**OR**	-1800	L/min
Required Fire Flow	10200	L/min		

Automated Sprinker Protection	YES		
Designed to NFPA 13 Standard	YES	-30%	
Standard Water Supply to Sprinklers and Standpipes	YES	-10%	
Fully Supervised System	YES	-10%	
Fire Flow Adjustment		-5100	L/min

Exposure 1 (North)	**Distance**	>45	m	**Charge**	0%	
Description	1215 Humber Place					
Exposure 2 (East)	**Distance**	>45	m	**Charge**	0%	
Description	2615 Lancaster Road					
Exposure 3 (West)	**Distance**	>45	m	**Charge**	0%	
Description	2525 Lancaster Road					
Exposure 4 (South)	**Distance**	35	m	**Charge**	5%	
Description	2540 Lancaster Road					
Total Exposure Charge					5%	
Fire Flow Adjustment					510	L/min

Total Required Fire Flow	6000	L/min
Total Required Fire Flow	1585	U.S. GPM
Total Required Fire Flow	100	L/s

REQUIRED DOMESTIC FLOW

WALTERFEDY

Project	Enbridge - Ottawa
Project #	2020-0566-10
Designer	TK
Address	2571 Lancaster Road, Ottawa, ON
Description	Domestic Water Demand

Building Description	Area (ha)	Units	Population	Demand	Max Daily Peak Factor	Max Hourly Peak Factor	Max Daily Demand (L/s)	Max Hourly Demand (L/s)
Proposed Building	1.67	N/A	N/A	35000 L/ha/day	1.5	1.8	1.01	1.22
					TOTAL		**1.01**	**1.22**

APPENDIX C

Stormwater Management Design Tables and Calculations

TABLE C-1
DESIGN STORM PARAMETERS

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
ENBRIDGE INC. - OTTAWA OPERATIONS CENTRE
OTTAWA, ONTARIO

Design Storm	IDF Parameters			Time to Peak Ratio	Duration	Max. intensity	Total Depth
	a	b	c	(-)	(h)	(mm/h)	(mm)
25-mm	502.532	5.334	0.785	0.40	3	117.99	25.00
2-year	732.951	6.199	0.810	0.40	3	148.14	31.88
5-year	998.071	6.053	0.814	0.40	3	203.51	42.54
10-year	1174.184	6.014	0.816	0.40	3	239.57	49.53
25-year	1402.884	6.018	0.819	0.40	3	284.43	58.26
50-year	1569.580	6.014	0.820	0.40	3	317.75	64.85
100-year	1735.688	6.014	0.820	0.40	3	351.38	71.71

Note:
IDF Parameters as per City of Ottawa Sewer Design Guidelines, Second Edition, October 2012

TABLE C-2
SUMMARY OF CATCHMENT PARAMETERS
PCSWMM MODEL

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
ENBRIDGE INC. - OTTAWA OPERATIONS CENTRE
OTTAWA, ONTARIO

Sub-Catchment ID		Total Area	Total Percent Impervious	Flow Length	Slope	Pervious Parameters			Impervious Parameters			Subarea Routing	Percent Routed
						Curve Number[1]	Depression Storage[2]	Manning's Roughness	Depression Storage[2]	Zero Imperv	Manning's Roughness		
		(ha)	(%)	(m)	(%)		(mm)		(mm)	(%)			(%)
Pre-Development													
Name													
101	Existing parking lot	0.08	70	35	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
102	Existing building	0.36	95	81	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
103	Existing parking lot	0.10	65	60	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
104	Existing parking lot	0.25	50	77	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
105	Existing parking lot	0.10	70	42	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
106	Existing building	0.30	95	86	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
107	Existing parking lot	0.08	50	64	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
108	Existing parking lot	0.18	65	61	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
109	Existing parking lot	0.11	85	38	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
110	Existing parking lot	0.14	80	39	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
111	Existing open space	0.37	15	133	0.5	80	4.67	0.035	1.57	25	0.015	OUTLET	100
112	Existing open space	0.46	15	153	0.5	80	4.67	0.035	1.57	25	0.015	OUTLET	100
113	Existing open space	0.38	10	134	0.5	80	4.67	0.035	1.57	25	0.015	OUTLET	100
114	Existing open space	0.42	10	146	0.5	80	4.67	0.035	1.57	25	0.015	OUTLET	100
TOTAL		**3.33**	**45**										
Post-Development													
Name													
201	Proposed parking lot	0.37	90	68	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
202	Proposed parking lot	0.29	90	55	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
203	Proposed parking lot	0.26	90	48	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
204	Proposed parking lot	0.27	90	52	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
205	Proposed parking lot	0.25	75	48	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
206	Proposed parking lot	0.17	90	45	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
207	Proposed parking lot	0.27	90	51	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
208	Proposed parking lot	0.21	90	55	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
209	Proposed parking lot	0.49	90	78	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
210	Proposed building	0.31	98	91	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
211	Proposed parking lot	0.22	90	130	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
212	Proposed parking lot	0.11	30	54	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
213	Proposed landscape area	0.10	30	13	1.0	80	4.67	0.035	1.57	25	0.015	OUTLET	100
TOTAL		**3.33**	**86**										

Notes:

1. Pervious Soil Conservation Service (SCS) Curve Number based on Type C soil (Loamy Till) and land use description
2. Depression storage calculated as S = (1000/CN) -10

TABLE C-3
SUMMARY OF RUNOFF VOLUMES

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
ENBRIDGE INC. - OTTAWA OPERATIONS CENTRE
OTTAWA, ONTARIO

Location	Design Storm					
	2-year	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
Pre-Development Runoff Volume Summary (m^3)						
Site						
101	20	30	30	40	40	50
102	110	150	180	210	230	260
103	20	30	40	50	50	60
104	50	70	90	110	120	140
105	20	30	40	50	50	60
106	90	120	140	170	190	210
107	20	20	30	30	40	40
108	40	60	70	90	100	110
109	30	40	50	60	60	70
110	40	50	60	70	80	90
111	30	60	80	100	120	140
112	40	70	90	120	150	170
113	30	50	70	90	110	130
Outlets						
OF1	227	314	372	445	498	550
OF2	217	298	352	421	469	516
OF3	126	237	316	433	521	609
Post-Development Runoff Volume Summary (m^3)						
Site						
201	100	140	170	200	220	250
202	80	110	130	160	180	200
203	70	100	120	140	160	170
204	80	110	120	150	160	180
205	60	80	100	120	140	150
206	50	70	80	90	100	110
207	80	100	120	140	160	180
208	60	80	100	110	130	140
209	140	190	220	260	300	330
210	90	130	150	170	200	220
211	60	80	100	120	130	150
212	10	20	30	40	40	50
213	10	20	30	30	40	40
Outlets						
OF1	124	172	205	245	276	308
OF2	687	966	1,150	1,330	1,400	1,470
OF3	13	21	27	34	39	45

Note:

TABLE C-4
SUMMARY OF PEAK FLOWS

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
ENBRIDGE INC. - OTTAWA OPERATIONS CENTRE
OTTAWA, ONTARIO

Location	Design Storm					
	2-year	*5-year*	*10-year*	*25-year*	*50-year*	*100-year*
Pre-Development Peak Flow Summary (m^3/s)						
Site						
101	0.02	0.03	0.03	0.04	0.05	0.06
102	0.09	0.12	0.15	0.18	0.21	0.23
103	0.02	0.03	0.04	0.05	0.05	0.06
104	0.04	0.06	0.07	0.09	0.11	0.13
105	0.02	0.03	0.04	0.05	0.06	0.07
106	0.07	0.10	0.12	0.15	0.17	0.19
107	0.01	0.02	0.02	0.03	0.04	0.04
108	0.04	0.05	0.07	0.08	0.10	0.11
109	0.03	0.04	0.05	0.06	0.07	0.08
110	0.03	0.05	0.06	0.08	0.09	0.10
111	0.02	0.02	0.03	0.04	0.05	0.06
112	0.02	0.03	0.04	0.05	0.06	0.07
113	0.01	0.02	0.02	0.03	0.04	0.05
Site Outlets						
OF1	0.18	0.27	0.32	0.33	0.35	0.36
OF2	0.18	0.26	0.30	0.31	0.32	0.32
OF3	0.01	0.03	0.05	0.07	0.10	0.12
Post-Development Peak Flow Summary (m^3/s)						
Site						
201	0.08	0.12	0.15	0.19	0.22	0.25
202	0.07	0.10	0.13	0.16	0.18	0.21
203	0.06	0.09	0.12	0.15	0.17	0.19
204	0.07	0.10	0.12	0.15	0.17	0.20
205	0.05	0.08	0.10	0.13	0.15	0.17
206	0.04	0.06	0.08	0.10	0.11	0.13
207	0.07	0.10	0.12	0.15	0.17	0.19
208	0.05	0.07	0.09	0.12	0.13	0.15
209	0.11	0.16	0.19	0.24	0.28	0.31
210	0.07	0.10	0.12	0.15	0.17	0.19
211	0.04	0.06	0.08	0.09	0.11	0.12
212	0.01	0.02	0.02	0.03	0.03	0.04
213	0.01	0.02	0.02	0.04	0.05	0.06
Site Outlets						
OF1	0.09	0.14	0.16	0.17	0.19	0.20
OF2	0.06	0.07	0.10	0.10	0.10	0.10
OF3	0.01	0.02	0.02	0.04	0.05	0.06
Site Outlet Comparision	**-56.3%**	**-59.5%**	**-57.7%**	**-56.2%**	**-55.8%**	**-55.5%**

Note:

TABLE C-5
STORMWATER MANAGEMENT POND STAGE-STORAGE

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
ENBRIDGE INC. - OTTAWA OPERATIONS CENTRE
OTTAWA, ONTARIO

Recharger 180HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector		Stone Volume		Cumulative		Total Cumulative		Elevation	
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft	m
43.5	1105	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	25150.77	712.19	3.63	1.10
42.5	1080	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	24736.03	700.45	3.54	1.08
41.5	1054	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	24321.30	688.70	3.46	1.05
40.5	1029	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	23906.56	676.96	3.38	1.03
39.5	1003	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	23491.83	665.21	3.29	1.00
38.5	978	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	23077.09	653.47	3.21	0.98
37.5	953	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	22662.36	641.73	3.13	0.95
36.5	927	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	22247.62	629.98	3.04	0.93
35.5	902	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	21832.89	618.24	2.96	0.90
34.5	876	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	21418.15	606.49	2.88	0.88
33.5	851	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	21003.42	594.75	2.79	0.85
32.5	826	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	20588.68	583.01	2.71	0.83
31.5	800	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	20173.95	571.26	2.63	0.80
30.5	775	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	19759.21	559.52	2.54	0.77
29.5	749	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	19344.48	547.77	2.46	0.75
28.5	724	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	18929.74	536.03	2.38	0.72
27.5	699	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	18515.01	524.29	2.29	0.70
26.5	673	0.3	0.0	0.0	0.0	207.2	5.9	207.574	5.9	18100.27	512.54	2.21	0.67
26.0	660	800.6	22.7	0.0	0.0	94.5	2.7	895.116	25.3	17892.70	506.66	2.17	0.66
25.0	635	762.8	21.6	0.0	0.0	109.6	3.1	872.437	24.7	16997.58	481.32	2.08	0.64
24.0	610	762.8	21.6	0.0	0.0	109.6	3.1	872.437	24.7	16125.14	456.61	2.00	0.61
23.0	584	759.4	21.5	0.0	0.0	111.0	3.1	870.375	24.6	15252.71	431.91	1.92	0.58
22.0	559	756.0	21.4	0.0	0.0	112.3	3.2	868.313	24.6	14382.33	407.26	1.83	0.56
21.0	533	742.2	21.0	0.0	0.0	117.8	3.3	860.067	24.4	13514.02	382.67	1.75	0.53
20.0	508	718.2	20.3	0.0	0.0	127.5	3.6	845.634	23.9	12653.95	358.32	1.67	0.51
19.0	483	707.9	20.0	0.0	0.0	131.6	3.7	839.449	23.8	11808.32	334.37	1.58	0.48
18.0	457	694.1	19.7	0.1	0.0	137.1	3.9	832.137	23.6	10968.87	310.60	1.50	0.46
17.0	432	680.4	19.3	0.1	0.0	142.6	4.0	823.721	23.3	10136.73	287.04	1.42	0.43
16.0	406	663.2	18.8	0.1	0.0	149.5	4.2	813.378	23.0	9313.01	263.71	1.33	0.41
15.0	381	622.0	17.6	0.1	0.0	166.0	4.7	788.629	22.3	8499.63	240.68	1.25	0.38
14.0	356	587.6	16.6	0.1	0.0	179.7	5.1	767.995	21.7	7711.00	218.35	1.17	0.36
13.0	330	553.2	15.7	0.1	0.0	193.4	5.5	747.343	21.2	6943.01	196.60	1.08	0.33
12.0	305	515.4	14.6	0.1	0.0	208.6	5.9	724.622	20.5	6195.67	175.44	1.00	0.30
11.0	279	463.9	13.1	0.1	0.0	229.2	6.5	693.671	19.6	5471.04	154.92	0.92	0.28
10.0	254	402.0	11.4	0.1	0.0	253.9	7.2	656.483	18.6	4777.37	135.28	0.83	0.25
9.0	229	309.3	8.8	0.0	0.0	291.0	8.2	600.681	17.0	4120.89	116.69	0.75	0.23
8.0	203	206.2	5.8	0.0	0.0	332.3	9.4	538.608	15.3	3520.21	99.68	0.67	0.20
7.0	178	130.6	3.7	0.0	0.0	362.5	10.3	493.191	14.0	2981.60	84.43	0.58	0.18
6.0	152	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	2488.41	70.46	0.50	0.15
5.0	127	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	2073.68	58.72	0.42	0.13
4.0	102	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	1658.94	46.98	0.33	0.10
3.0	76	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	1244.21	35.23	0.25	0.08
2.0	51	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	829.47	23.49	0.17	0.05
1.0	25	0.0	0.0	0.0	0.0	414.7	11.7	414.735	11.7	414.74	11.74	0.08	0.03
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00

TABLE C-6
SUMMARY OF POND PERFORMANCE

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
ENBRIDGE INC. - OTTAWA OPERATIONS CENTRE
OTTAWA, ONTARIO

Design Storm	Peak Inflow (m^3/s)	Peak Outflow (m^3/s)	Max. Storage (m^3)	Max. Depth (m)	Max. Water Level (m)
2-year	0.501	0.039	434	0.590	66.590
5-year	0.687	0.047	599	0.870	66.870
10-year	0.805	0.051	715	1.500	67.500
25-year	0.893	0.084	715	1.500	67.500
50-year	0.950	0.087	715	1.500	67.500
100-year	0.998	0.108	715	1.500	67.500

Note:

CULTEC RECHARGER 180HD SPECIFICATIONS

GENERAL

CULTEC RECHARGER® 180HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS

1. THE CHAMBERS SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER SHALL BE ARCHED IN SHAPE.
4. THE CHAMBER SHALL BE OPEN-BOTTOMED.
5. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS OR SEPARATE END WALLS.
6. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER® 180HD SHALL BE 20.5 INCHES (521 MM) TALL, 36 INCHES (914 MM) WIDE AND 7.33 FEET (2.23 M) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER® 180HD SHALL BE 6.33 FEET (1.93 M).
7. MAXIMUM INLET OPENING ON THE CHAMBER ENDWALL IS 15 INCH (375 MM) HDPE.
8. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV® FC-24 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. MAXIMUM ALLOWABLE O.D. IN THE SIDE PORTAL IS 12.25 INCHES (311 MM).
9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV® FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 MM) TALL, 16 INCHES (406 MM) WIDE AND 24.2 INCHES (614 MM) LONG.
10. THE NOMINAL STORAGE VOLUME OF THE RECHARGER® 180HD CHAMBER SHALL BE 3.445 FT3 / FT (0.32 M3 / M) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A SINGLE RECHARGER 180RHD STAND ALONE UNIT SHALL BE 25.25 FT3 (0.72 M3) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER® 180EHD AS AN INTERMEDIATE UNIT SHALL BE 21.81 FT3 (0.62 M3) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF THE LENGTH ADJUSTMENT AMOUNT PER RUN SHALL BE 3.445 FT3 (0.32 M3) - WITHOUT STONE.
11. THE NOMINAL STORAGE VOLUME OF THE HVLV® FC-24 FEED CONNECTOR SHALL BE 0.913 FT3 / FT (0.085 M3 / M) - WITHOUT STONE.
12. THE RECHARGER® 180HD CHAMBER SHALL HAVE SEVENTY-EIGHT DISCHARGE HOLES BORED INTO THE SIDEWALLS OF THE UNIT'S CORE TO PROMOTE LATERAL CONVEYANCE OF WATER.
13. THE RECHARGER® 180HD CHAMBER SHALL HAVE 14 CORRUGATIONS.
14. THE ENDWALL OF THE CHAMBER, WHEN PRESENT, SHALL BE AN INTEGRAL PART OF THE CONTINUOUSLY FORMED UNIT. SEPARATE END PLATES CANNOT BE USED WITH THIS UNIT.
15. THE RECHARGER® 180RHD STAND ALONE/STARTER UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO FULLY FORMED INTEGRAL ENDWALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS.
16. THE RECHARGER® 180EHD END UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE FULLY OPEN END WALL AND HAVING NO SEPARATE END PLATES OR END WALLS.
17. THE HVLV® FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE RECHARGER® 180HD AND ACT AS CROSS FEED CONNECTIONS.
18. CHAMBERS MUST HAVE HORIZONTAL STIFFENING FLEX REDUCTION STEPS BETWEEN THE RIBS.
19. THE CHAMBER SHALL HAVE A RAISED INTEGRAL CAP AT THE TOP OF THE ARCH IN THE CENTER OF EACH UNIT TO BE USED AS AN OPTIONAL INSPECTION PORT OR CLEAN-OUT.
20. THE UNITS MAY BE TRIMMED TO CUSTOM LENGTHS BY CUTTING BACK TO ANY CORRUGATION ON THE LARGE RIB END.
21. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.
22. MAXIMUM ALLOWABLE COVER OVER THE TOP OF THE CHAMBER SHALL BE 12.0' (3.66 M).
23. THE CHAMBER SHALL BE DESIGNED AND MANUFACTURED TO MEET THE MATERIAL AND STRUCTURAL REQUIREMENTS OF IAPMO PS 63-2019, INCLUDING RESISTANCE TO AASHTO H-10 HIGHWAY LIVE LOADS, WHEN INSTALLED IN ACCORDANCE WITH CULTEC'S INSTALLATION INSTRUCTIONS.
24. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.

CULTEC FC-24 FEED CONNECTOR SPECIFICATIONS

GENERAL

CULTEC HVLV (HIGH VOLUME, LOW VELOCITY) FEED CONNECTOR POLYETHYLENE CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED TO MANIFOLD CULTEC RECHARGER MODEL 180HD CHAMBER SYSTEMS FOR RETENTION, RECHARGING, DETENTION, AND CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PROPERTIES

1. THE CHAMBERS SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT (203-775-4416).
2. CONTACT CULTEC, INC. AT 203-775-4416 FOR SUBMITTAL PACKAGES AND TO PURCHASE PRODUCT.
3. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV FC FEED CONNECTOR SHALL BE 12 INCHES TALL, 16 INCHES WIDE. THE HVLV FC-48 IS 54 INCHES LONG. THE HVLV FC-24 IS 24.2 INCHES LONG
4. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR SHALL BE 0.819 CF/LF.
5. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
6. THE HVLV FC FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS, AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE RECHARGER 180HD.
7. ALL CHAMBERS SHALL BE ARCHED IN SHAPE.
8. HEAVY DUTY UNITS ARE DESIGNED ACCORDING TO AASHTO HS-25 LOAD RATING (40,000 LBS. /AXLE) WHEN BURIED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
9. HEAVY DUTY UNITS ARE DESIGNATED BY A COLORED STRIPE ALONG THE LENGTH OF THE CHAMBER.
10. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE

CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS

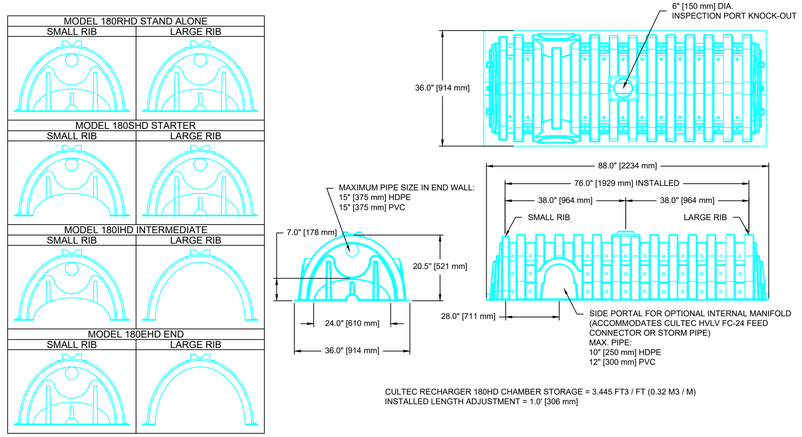
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

CULTEC NO. 4800™ WOVEN GEOTEXTILE

CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS

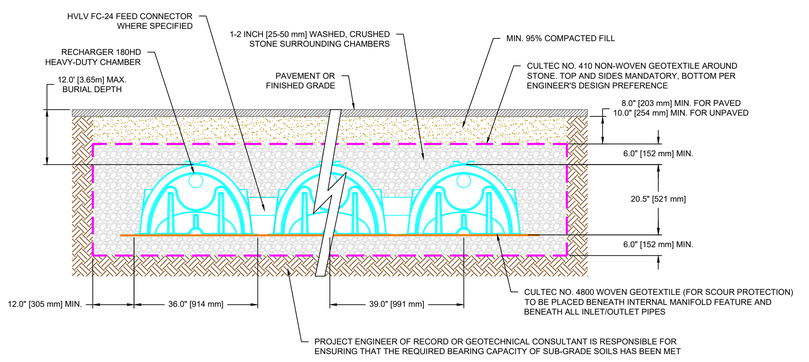
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2, 740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT2 (470 LPM/M2) PER ASTM D4491 TESTING METHOD.
14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

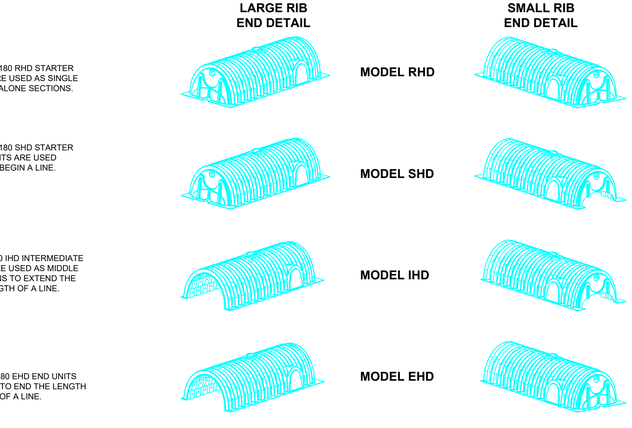


CULTEC RECHARGER 180HD CHAMBER STORAGE = 3.445 FT3 / FT (0.32 M3 / M)
INSTALLED LENGTH ADJUSTMENT = 1.0' [306 mm]

180HD 2.0

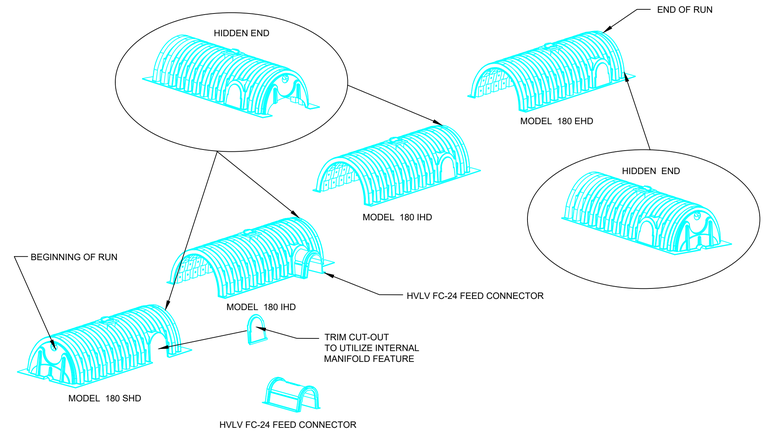
CULTEC RECHARGER 180HD HEAVY DUTY THREE VIEW





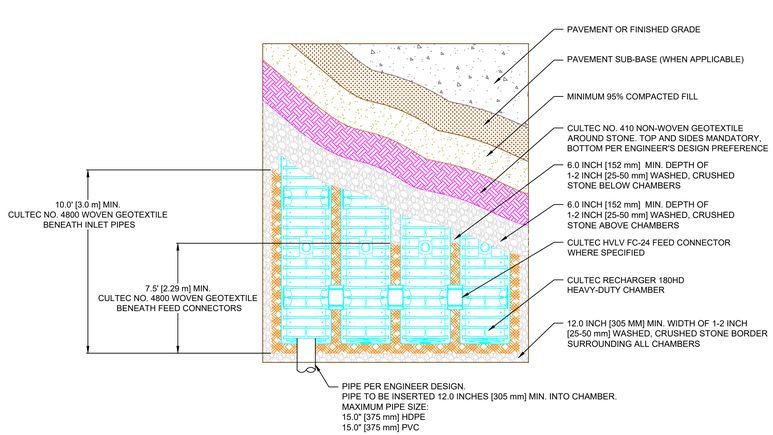
180HD 3.0

CULTEC RECHARGER 180HD HEAVY DUTY END DETAIL INFORMATION



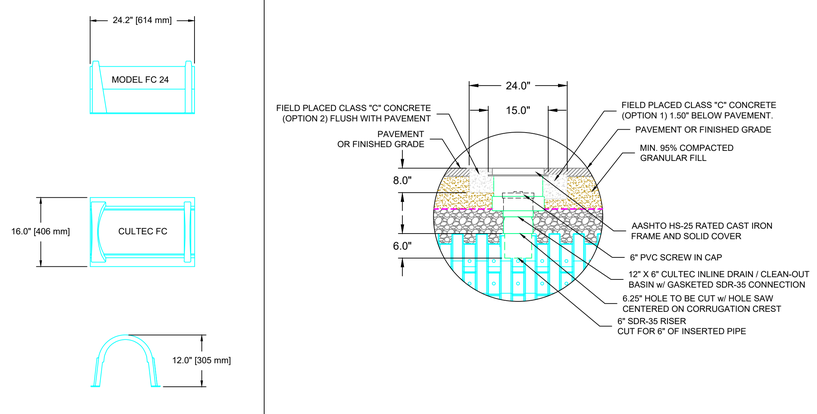
180HD 1.0

GENERAL NOTES



180HD 4.0

CULTEC RECHARGER 180HD HEAVY DUTY CROSS SECTION



180HD 5.0

CULTEC RECHARGER 180HD HEAVY DUTY TYPICAL INTERLOCK

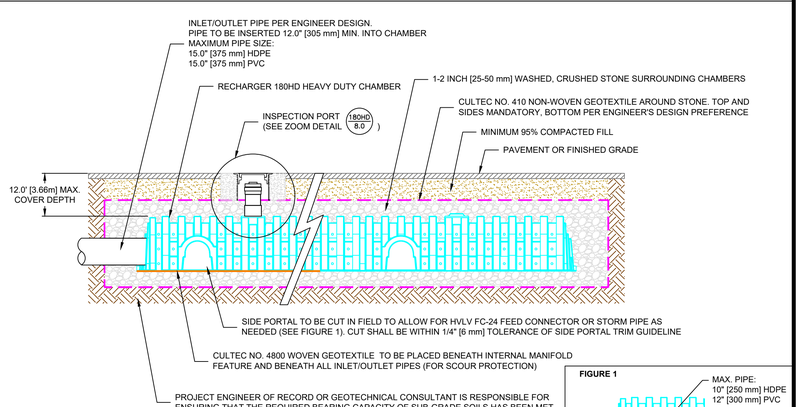
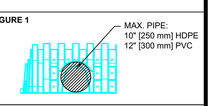


FIGURE 1



ZOOM OF SIDE PORTAL SHOWING MAX. PIPE O.D.

180HD 6.0

CULTEC RECHARGER 180HD HEAVY DUTY PLAN VIEW

180HD 7.0

CULTEC HVLV FC-24 FEED CONNECTOR THREE VIEW

180HD 8.0

OPTIONAL INSPECTION PORT - ZOOM DETAIL

180HD 9.0

CULTEC INTERNAL MANIFOLD DETAIL - OPTIONAL INSPECTION PORT DETAIL

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RECHARGER 180HD
DETAIL SHEET
TRAFFIC APPLICATION

CULTEC STORMWATER CHAMBER

PROJECT NO:		DATE:	2019
DRAWN BY:	CULTEC, INC	CHECKED BY:	TECH
SCALE:	N.T.S.	SHEET NO:	1 OF 1