

# Functional Servicing & Stormwater Management Report

For:

## Burloak Plaza

**Abdullah Al Eyadeh**

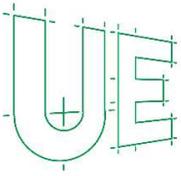
580 Burloak Drive  
Oakville

Submitted by:

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***Issued for 1<sup>st</sup> Submission (2026.01.16)***



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- Plan and Profile by Schaeffers Engineering Dwg. No. PP-14

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## 1.0 Introduction

Urbtech Engineering Inc. was retained by Mr. Abdullah Al Eyadeh to prepare this Functional Servicing and Stormwater Management Report in support of the proposed redevelopment of the Burloak Plaza located at 580 Burloak Drive in the Town of Oakville.

This Functional Servicing and Stormwater Management Report was prepared as per the recommendation from the reports and standards listed below:

- *Town of Oakville Development Engineering Procedure and Guidelines*
- *Regional Municipality of Halton, Water and Wastewater Linear Design Manual*
- *Erosion and Sediment Control Guideline for Urban Construction (ESCGUC)*
- *Topographical Survey prepared by IBW Surveyors, updated May 13, 2025*
- *Subsurface Utility Investigation by T2 Utility Engineers, dated June 24, 2024*
- *Water Supply for Public Fire Protection (FUS)*
- *Pre-Consultation Checklist & Preliminary Comments*

## 1.1 Study Area

The total site area is 7,020m<sup>2</sup> and presently is an open field covered with weeds.

The site is located at the junction of Burloak Drive is bounded by Burloak Drive to the north and east and an existing residential subdivision to the south.

There is an existing 200 mm sanitary running through this site within easement, an existing 375mm diameter storm sewer running just south on this subject property, an existing 400mm diameter watermain just south of this site and 450mm sanitary, 600 mm and 450mm diameter storm and 300mm on watermain on Burloak Drive. There are several other services, such as Hydro, Gas, bell running just south of this subject property.

## **2.0 Stormwater Management**

The existing minor drainage is collected by the existing 375mm storm sewer system located just south of these subject lands and 375mm diameter storm connection off Burloak Drive. The major drainage is from the north/west to south/west on Burloak Drive.

As per the Town of Oakville Development Engineering Procedure and Guidelines and comments provided at the Pre-consultation meeting the site post-development flows for storms up to including the 100-year storm shall be controlled to 5-year pre-development levels.

### **2.1 Surficial Geology**

There is no Soil Investigation Report available at this time. However, based on the soli strata noted on the Town of Oakville Plan and Profiles for Burlock Dive and Great Lakes Boulevard, the subsoil consist of Clayey Silt Till followed by Weathered Shale.

These soils have very low permeability.

### **2.2 Design Criteria and Methodology**

- Water balance: 25mm storm event to determine the water balance changes.
- Water quality Level 1, long term average removal of 80% TSS.
- Control post-development flows to 5 years pre-development levels for all storm events up to and including the 100-year storm.
- Storm flows in excess of the 100-year flows will be directed overland to the road allowance.
- Sediment and erosion control during construction.

## 2.3 Water Balance

As per the Town Stormwater Master Plan and CLI/ECA, the 25mm event is required for determining the water Balance changes on site.

Since the site underlaying soils is Clayey Silt Till followed by Weathered Shale, therefore the permeability of the subsoils is almost nonexistent.

However, to address the water balance deficit it is proposed to increase the soil volumes within the landscaped area to 0.40m and even deeper for shrubs and trees. The soil volume will be provided by the landscaped architect.

## 2.4 Water Quality

As per the Town criteria, quality control Level 1, 80% TSS removal is required.

To meet the 80% TSS removal target for the drainage area of 5,371m<sup>2</sup> going to the Hydro Filter HF12 manufactured by HydroWorks, is proposed with an average TSS removal of 83% and 90% annual volume runoff treated.

This HydroFilter system has been certified for 80% TSS removal.

- Controlled area including roof of 5,371m<sup>2</sup>      80% TSS removal  
*Treated via Hydro Filter HF12*
- Uncontrolled previous surfaces 1,476m<sup>2</sup>      80% TSS removal
- Uncontrolled impervious surfaces 173m<sup>2</sup>      0% TSS removal

Thus, the TSS removal for this site will be 78%, which is very close to 80%. The HydroFilter performance calculations, details and Verification Statement is attached in Appendix 'B'.

## **2.5 Water Quantity**

### **2.5.1 Allowable Release**

As noted in section 2.1, this site runoff shall be controlled to 5-year predevelopment level for all storm events up to and including the 100-year storm.

The pre-development flows have been modeled with the SWMHYMO Model and found to be 0.134m<sup>3</sup>/s.

### **2.5.2 Post-Development Flows and Storage Volumes**

In the post-development condition, the proposed development site will be occupied by the building roof of 2,459m<sup>2</sup>, paved area of 3,085m<sup>2</sup> and landscaped area of 1,476m<sup>2</sup>. There are no external flows to this site. Due to grading constrains there will be a small uncontrolled area of 454m<sup>2</sup> (however draining to the HydroFilter) and 173m<sup>2</sup> of paved and 1,476m<sup>2</sup> and landscaped area draining to Burlock Drive. However, these areas were accounted for in the SWMHYMO Model.

The stormwater detention will be provided on the proposed roof, in the oversized storm sewer and surface. The proposed site discharge rate will be controlled by a 140mm dia. Orifice plate in Manhole 102.

The total 100 year flows from this site will be 127 l/s (62l/s controlled by an orifice and 65l/s of uncontrolled flows) which is less than the allowable flow of 134 l/s for the 5-year pre-development flow.

For the post development flow calculation refers to Appendix 'B' and the Table 2.5.2.1.

**Table 2.5.2.1 Summaries of Release Rates and Storage Volumes**

|          | <b>Storage<br/>Required*</b><br>m <sup>3</sup> | <b>Storage<br/>Provided*</b><br>m <sup>3</sup> | <b>Actual<br/>Release**</b><br>l/s | <b>Allowable<br/>Release</b><br>l/s | <b>Orifice<br/>Plate Size</b> |
|----------|--|--|------------------------------------|-------------------------------------|-------------------------------|
| 5 Year   | 64/26  | 64/26  | 75                                 | 134                                 | 140                           |
| 100 Year | 120/56   | 120/56   | 127                                | 134                                 | 140                           |

*\*00/00 Building Storage/Sewer Storage*

*\*\*Including controlled building flows*

The emergency overflow routes are shown on the Site Grading Plan in Appendix ‘C’ and the Post-Development Drainage Plan in Appendix ‘B’.

### 2.5.3 Storm Sewer Connection

There is an existing 375mm diameter storm located just south of this site. This storm is further connected to the exiting storm on Burloak Drive. It is proposed to construct a new 300 mm diameter storm connection to service this site.

## 2.6 Erosion and Sedimentation Control

Urban development increases peak runoff, flow velocities and affects the quality of the runoff.

This condition is most noticeable during the construction phase, when the vegetation cover is lessened. The exposed material can be eroded and carried into the receiving storm sewer.

### 2.6.1 Sediment and Erosion Control During Construction

Prior to any construction works, a sediment fence and catchbasin protection on all the existing catchbasins on the street adjacent to this site and within the site shall be installed.

The sediment control devices will remain in place and will be replaced, if necessary, until all construction, grading and sodding is completed. This site will discharge to the existing 375mm dia. storm sewer just west of this subject lands.

## 2.6.2 Construction Schedule

- Prior to any construction activities, the sediment fence, catchbasin sediment protection on existing catchbasins on the existing roads adjacent to this site and within the site and the construction access mud mat shall be installed.
- Once the sediment devices are in place, the earth works, and the construction of the underground services will commence.
- During construction, erosion and sediment control measures should be inspected weekly at a minimum, after every rainfall and snow melt event and daily during extended rain or snow melt periods. During inactive periods, where the site is inactive for 30 days or longer, a monthly inspection of the sediment devices should be performed and the devices repaired if necessary.
- After completion of the building, grading, sodding and asphalt, the sediment devices will be removed, and the disturbed area restored.
- Schedule
  - Initial Sediment Control Installation; Spring 2026
  - Underground Servicing Operations; Spring/Summer 2026
  - Building Construction; Summer/Fall 2026
  - Final Grading Operation; Fall 2026

## 2.6.3 Sediment Control Inspection and Maintenance

### Sediment Fence

- Check for any loose ends and attach to the tee stakes or bury into the ground and/or place clear stone at the bottom of the fence as required.
- Check for any damaged, broken fence and replace with new filter fabric, attach to the tee stakes and bury into the ground as required.

- Check for sediment build up and clean if necessary.

#### Construction Access Mud Mat

- Check for condition and if excessive build up of mud, scrape/remove stone as necessary and replace with new stone.

#### Catchbasin Sediment Protection

- Check catchbasin for sediment build up and clean if necessary.
- Check sediment protection condition, if damaged/ripped then replace with new unit.
- Remove sediment protection for the winter season and clean catchbasin.
- In the spring, clean catchbasin and install sediment protection.

The erosion and sediment control measures should be inspected weekly, at a minimum, after every rainfall and snowmelt event and daily during extended rain or snow melt periods.

### **3.0 Sanitary Sewer**

There is an existing 200mm diameter sanitary sewer running through this site connected to the sanitary sewer on Burlock Drive. It was requested by the Region that the section of the exiting sanitary sewer from this site to approximately Randolph Crescent be analyzed for sufficient capacity.

For this purpose, a GIS mapping was purchased from Region of Halton. This information includes Manhole numbers and inverts, sewer sizes and slopes. In addition, a Halton region base map was overlaid on the GIS mapping to determine the type of developments and drainage areas.

The population was calculated based on the Region's Water and Wastewater Linear Design Manual, Section 3, Table 3.1 and IMP recommended Design Criteria.

Base on the above the sanitary flows were calculated and are presented in the Sanitary Sewer Design in Appendix 'D'.

As can be noted from this Design Sheet, all of the existing sanitary sewer on Burlock Drive up to Randolph Crescent 525mm diameter sewer flow depth is less than half of pipe diameter. And therefore, this existing sewer has sufficient capacity for the proposed development.

#### 4.0 Water Supply

As noted in section 1.1, there is an existing 400mm diameter watermain just south of this site and a 300mm on watermain on Burloak Drive.

A new 200mm diameter fire connection and 100mm diameter domestic connection are proposed from the existing 300mm diameter watermain on Burlock Drive as shown the Site Servicing Plan.

The flows and pressure of the existing 300mm diameter watermain on Burlock Drive was recorded by Bruce Fire Engineering and the flows and pressures are as follows:

##### ***Static Pressure was 48psi***

Residual pressure with 1 port open 46psi and flows of 919.8usgpm, residual pressure with 2 ports open 44psi and flows of 1,423.8usgpm and theoretical flow at 20psi (140kPa) of 4,070usgpm (257l/s)

The domestic water demand will be as follows

(Lot Area) 0.7020ha \* 90 (Population as per table 2-1) = 63.2 rounded off to 64

Average Daily Demand 64p \* 260l/p/day = 16,640l/day

Maximum Daily Demand 16,640l/day \* 2.25 = 37,440l/day

Maximum Hourly Demand 16,640l/day \* 2.25 = 37,440l/day = 0.43l/s

As per Fire Underwriters Survey (FUS) the fire flows must deliver flows for a 2-hour duration in addition to the maximum daily domestic demand, with a residual pressure of not less than 140 kPa or 20.3psi.

The total domestic and fire flows (based on the FUS calculation) of 183.43 l/s (0.43l/s domestic + 183l/s Fire) is less than the existing watermain anticipated flow of 257l/s at 140 kPa. Therefore, based on the information provided by Bruce Fire Engineering, dated August 08, 2025 the existing 300mm diameter watermain on Burlock Drive can support this development.

Copy of the signed water flow test and the FUS fire flow calculation are attached to this report in Appendix 'E'.

## 5.0 Conclusion

On the basis of the investigation and analysis carried out and identified in this report, the facilities to be provided meet the stormwater management and site servicing guidelines and requirements of The Town of Oakville Criteria and Halton Region Water and Wastewater Linear Design Manual and the Town and regio infrastructure can support the proposed development.

- Storm sewer connection will be provided via the proposed 300 mm diameter storm connected to the existing 375mm diameter storm sewer west of this proposed site
- The water balance will be addressed via increased soil volumes for shrubs and trees.
- Stormwater quality control will be achieved with the use Hydro Filter HF12.
- Stormwater quantity control will be achieved by a 140mm diameter orifice plate installed in MH 102, roof-controlled drains. On-site stormwater detention will also be provided in the oversized storm sewer, parking surface and building roof.
- Erosion and sediment control during construction will be provided via sediment fence, catchbasin sediment protection.

- A new sanitary service will be provided from the existing 200mm diameter sanitary running through this subject lands. The existing sanitary on Burlock Drive have sufficient capacity to support this development.
- Water supply will be available with fire and domestic connections to the existing 300mm diameter watermain on Burlock Drive. Based on the information provided by Bruce Fire Engineering, the existing 300mm watermain on Burlock Drive can support this development.

### **URBTECH ENGINEERING INC.**



Andrzej Jaworski, P.Eng.  
***Consulting Engineer***

# APPENDIX A

## Design Criteria

- Intensity Duration Frequency Values, Town of Oakville
  - Plan and Profile by Rand Engineering Dwg. No. 15
  - Plan and Profile by Schaeffers Engineering Dwg. No. PP-14
-

Refer to Section 3.7.9 (Foundation Drain Criteria) for foundation drain criteria and hydraulic grade line requirements.

### 3.7.3.3 Rational Method

The Rational Method, while simple and popular, has limitations in its crude representation of physical runoff parameters and its inability to simulate the actual runoff distribution in time. However, it can be used for the sizing of the minor sewer in the final design stage.

Storm sewers shall be designed to drain all lands as calculated by the Rational Method. The Rational Method calculations must be checked using the hydrologic/hydraulic model where the drainage area is greater than 5 ha. The larger of the flows is to be used in the design of the sewer system.

$$Q = 0.0028 C I A R$$

where,

- $Q$  = flow in cubic metres per second
- $C$  = runoff coefficient (see Section 3.7.3.4)
- $I$  = intensity in millimetres per hour (see Section 3.7.3.5)
- $A$  = area in hectares (see Section 3.7.3.8)
- $R$  = return period factor (see Section 3.7.3.9)

These parameters are further defined in the following subsections.

### 3.7.3.4 Runoff Coefficient

Pre-development values shall be based on the soil characteristics and the slope of the land.

Post-development values shall be as shown in Table 3.1.

**Table 3.1 Runoff Coefficients**

| Land Use                       | Runoff Coefficient  |
|--------------------------------|---------------------|
| Single residential (detached)  | 0.70 <sup>(1)</sup> |
| Medium density (townhouses)    | 0.75                |
| High density (condo/high rise) | 0.85                |
| Industrial and commercial      | 0.90                |
| Institutional                  | 0.75                |
| Parks                          | 0.35                |

Note:

(1) With supporting calculations on imperviousness (see below), single residential value may be lowered to an allowable limit of 0.65.

To calculate the corresponding runoff coefficient for existing development, or where coefficients may be lower than standard values (to the allowable limit), the following formula may be used:

$$C = 0.25 (1 - i) + 0.9 i$$

where,

$C$  = runoff coefficient

$i$  = imperviousness ratio

Supporting calculations demonstrating the calculated imperviousness ratio ( $i$ ) must be provided. Lower runoff coefficient ( $C$ ) values must be accepted by the Town.

### 3.7.3.5 Rainfall Intensity and Design Storms

All hydrologic models derive their predicted flows from input of storms based on a given statistical return period frequency. The frequency of the predicted flow rate is, in general, not identical to the frequency of the storm. The Rational Method uses rainfall intensity-duration-frequency (IDF) curves. All other models use synthetically derived design storms or, in special cases, real storm distributions.

The intensity of rainfall for Rational Method analysis is to be determined from the most recent Town standard IDF rainfall curves. The meteorological data for Oakville was studied as part of the SWMP, which concluded that the IDF data presented in this Development Engineering Manual provides a conservative basis for the Town. The IDF data are based on the historical Atmospheric Environment Services (AES) Toronto (Bloor Street) gauge, which is now the Toronto City (ID 6158355) Environment and Climate Change Canada (ECCC) climate station and has long-term records of continuous rainfall data. These data may also be used to generate other synthetic storm hyetographs (i.e., distributions).

The intensity of rainfall shall be determined using the following equation:

$$I \text{ (mm/hour)} = A \div (T + B)^C$$

where,

$T$  = time of concentration in minutes.

The values of  $A$ ,  $B$ , and  $C$  for the various storm return periods are listed in Table 3.2.

**Table 3.2 Intensity-Duration-Frequency Regression Equation Constants**

|   | IDF Regression Constants |        |         |         |         |          |
|---|--------------------------|--------|---------|---------|---------|----------|
|   | 2-year                   | 5-year | 10-year | 25-year | 50-year | 100-year |
| A | 725                      | 1,170  | 1,400   | 1,680   | 1,960   | 2,150    |
| B | 4.8                      | 5.8    | 5.8     | 5.6     | 5.8     | 5.7      |
| C | 0.808                    | 0.843  | 0.848   | 0.851   | 0.861   | 0.861    |

Notes:

The values of  $A$ ,  $B$ , and  $C$  for the various storms, where intensity is calculated as:

$$I \text{ (mm/hour)} = A \div (T + B)^C, \text{ where } T \text{ is time of concentration in minutes.}$$

Table 3.3 shows the rainfall IDF values that shall be used for all frequencies from the 1:2-year to 1:100-year return period based on the regression equations.

The 1:5-year return period shall be used for the minor system design. The 1:100-year return period shall be used for the major system design.

The 24-hour Chicago design storm distribution type should be used to develop hydrographs for urban and rural basins and for determining the required detention storage.

A time step of 5 minutes, with a ratio of time of maximum intensity to storm duration of 0.33, should be used to discretize the design storm, and an initial time of concentration of 10 min.

**Table 3.3 Intensity-Duration-Frequency Values**

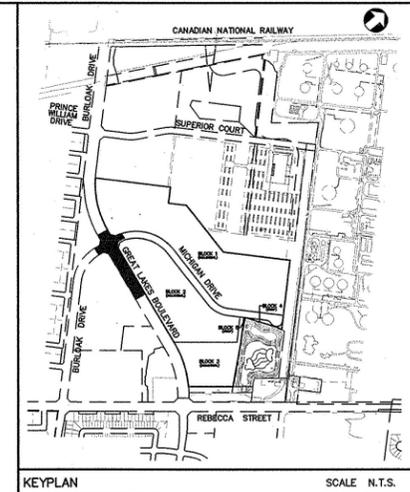
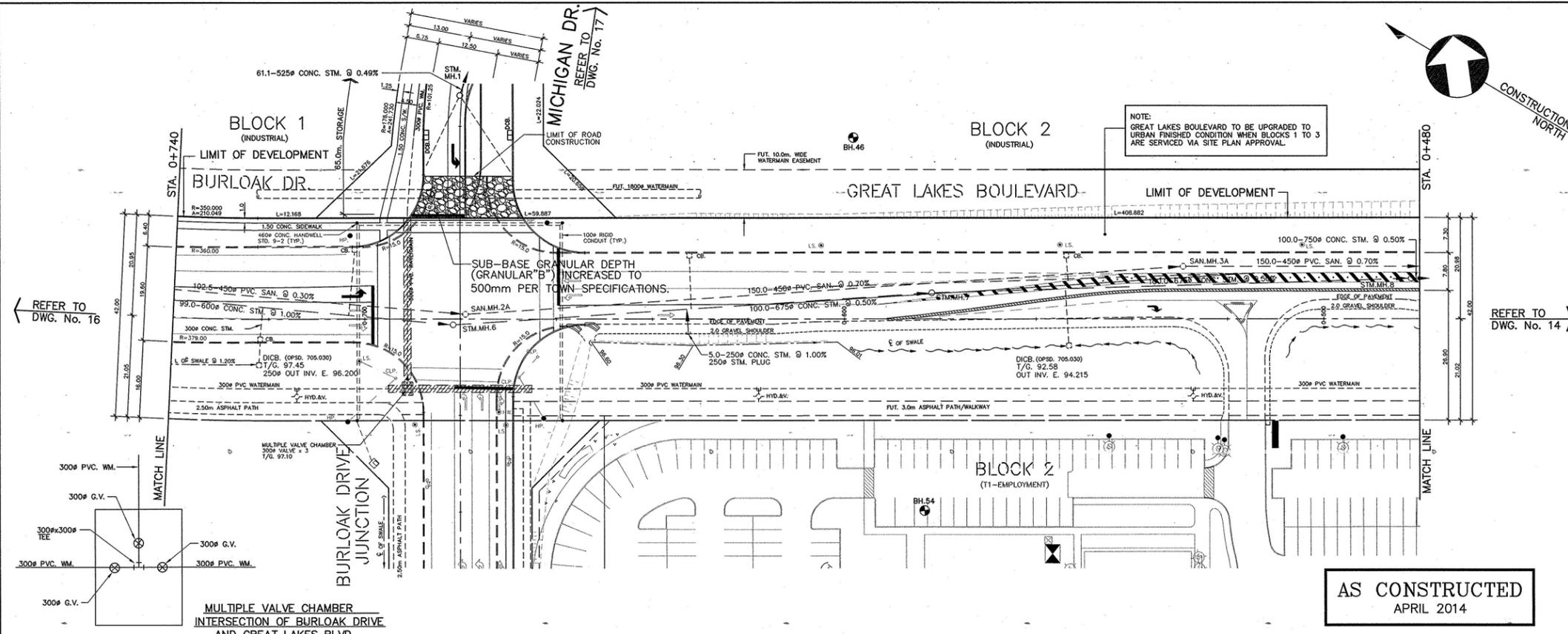
| Duration<br>(minutes) | Rainfall Intensity (mm/hour) |        |         |         |         |          |
|-----------------------|------------------------------|--------|---------|---------|---------|----------|
|                       | 2-year                       | 5-year | 10-year | 25-year | 50-year | 100-year |
| 5                     | 115                          | 157    | 186     | 225     | 253     | 279      |
| 10                    | 82                           | 114    | 135     | 162     | 182     | 201      |
| 15                    | 65                           | 91     | 107     | 128     | 144     | 158      |
| 30                    | 41                           | 57     | 67      | 80      | 90      | 99       |
| 60                    | 25                           | 34     | 40      | 48      | 53      | 59       |
| 120                   | 15                           | 20     | 23      | 27      | 31      | 33       |
| 360                   | 6.2                          | 8.1    | 9.4     | 11      | 12      | 13       |
| 720                   | 3.5                          | 4.5    | 5.2     | 6.2     | 6.7     | 7.4      |
| 1,440                 | 2.0                          | 2.5    | 2.9     | 3.4     | 3.7     | 4.1      |

### 3.7.3.6 Future Climate Scenarios

As part of the SWMP, recommendations for reasonable estimates of future rainfall were provided based on the IDF relationships for the 1:5-year and 1:100-year return period 24-hour duration events for the 2050s (i.e., 2035-2065) and 2080s (i.e., 2065-2100). The relationships are based on an ensemble of Global Climate Model (GCM) projections using socioeconomic scenarios to represent carbon emissions called Representative Concentration Pathways (RCPs). As climate science is continuously evolving and improving, the latest available models and predictions published by the Intergovernmental Panel on Climate Change (IPCC) should be used, as well as the latest IDF tools. The Town will continue to monitor developments with regard to emissions scenarios and may periodically re-evaluate the modelling approach and recommendations presented in this manual. It is the consultant's/owner's responsibility to consult with the Town when evaluating these recommendations.

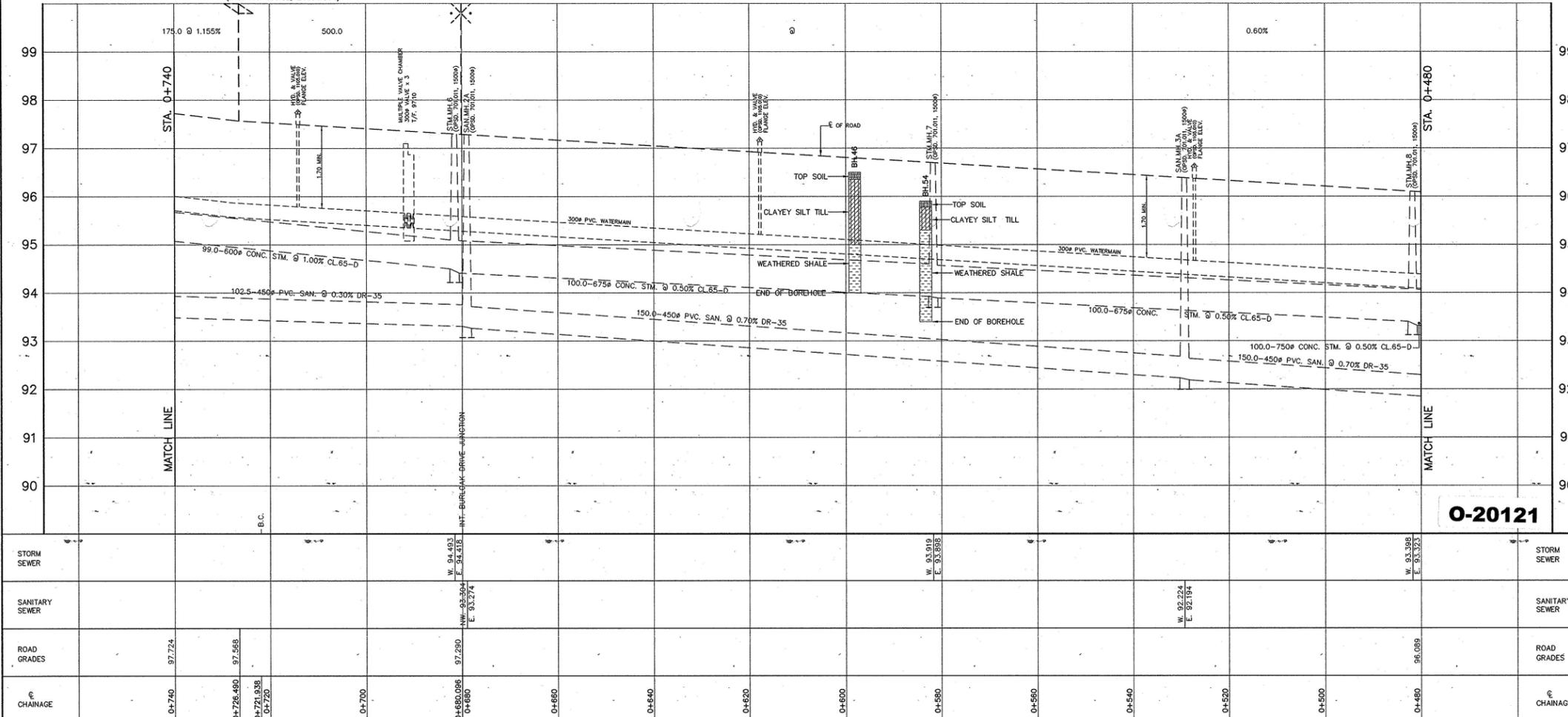
Within the context of the Town's current objectives, the following approach to incorporating climate change into servicing and drainage analysis is recommended at the EIR stage:

- Base-case assessments should be completed using climate-change-influenced rainfall based on scenario RCP 4.5 (representing a moderate scenario with global efforts to reduce emissions).
- Stress testing using climate-change-influenced rainfall based on scenario RCP 8.5 (representing the business-as-usual, high-emissions scenario) should be completed. A stress testing approach may be required when the Town is considering critical infrastructure decisions regarding long-lived infrastructure.



FOR GENERAL NOTES REFER TO DRAWING No. 1A

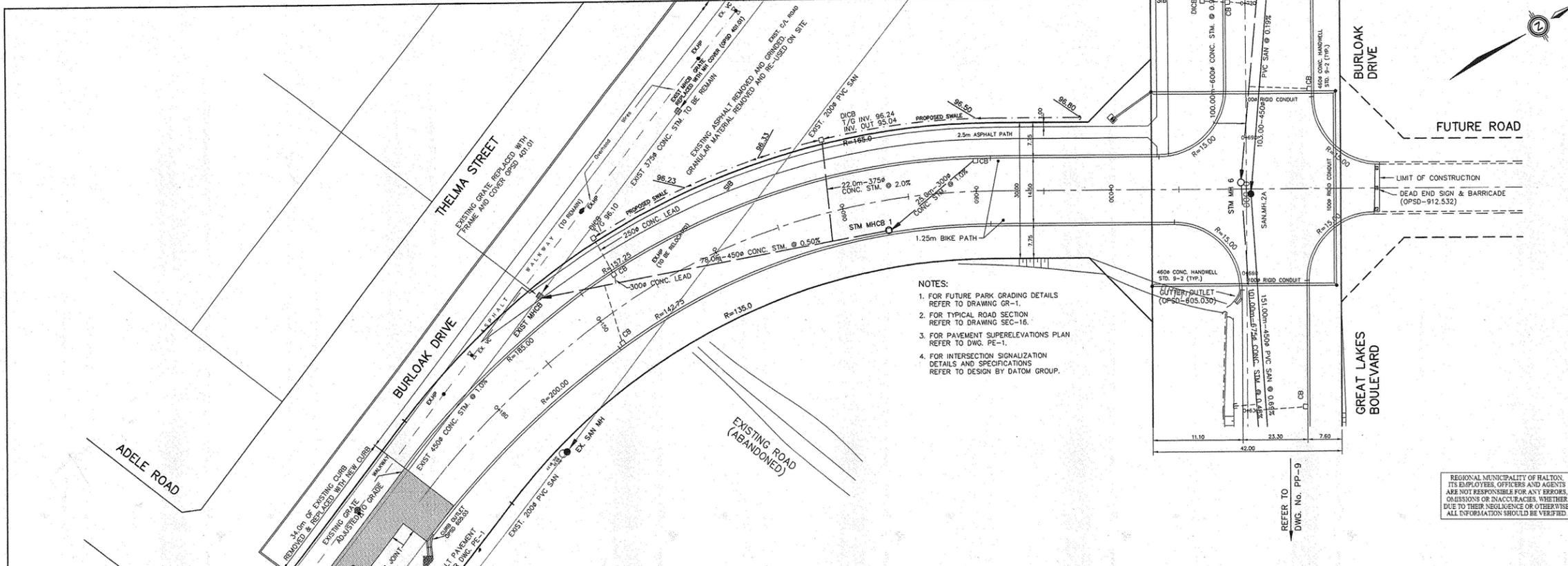
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BENCHMARK: 229  
DESCRIPTION - PLAQUE SET IN CONCRETE MONUMENT ON SOUTH SIDE OF LAKESHORE ROAD AT SOUTH END OF BURLOAK DRIVE, 25.8 m SOUTHWEST OF TOP OF HYDRANT ON THE NORTHWEST CORNER OF THE INTERSECTION, 1.0m NORTHEAST OF HYDRO POLE, 6.9 m SOUTHWEST OF THE CENTRE LINE OF LAKESHORE ROAD AND 3.8 m SOUTHWEST OF THE PRODUCTION OF THE CENTRE LINE OF BURLOAK DRIVE. HORIZONTAL CONTROL MONUMENT NO. 001653071. ELEVATION 79.994m

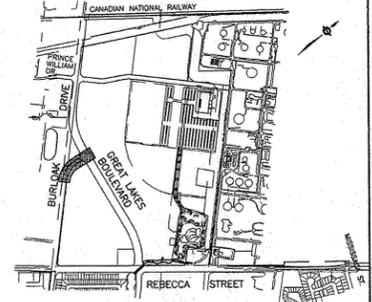
|   |      |  |      |
|---|------|--|------|
| 1. 14/04/14 R.H. AS CONSTRUCTED   |      | Revisions  |      |
| Date  | By   | Checked  | V.C. |
| Design  | F.A. | Checked  | F.A. |
| Drawn   | ACAD | Checked  | F.A. |
| Scale: 1:150  |      | References   |      |
| 20 Metres   |      | HOR. 1:500   |      |
| 2 Metres  |      | VER. 1:50  |      |
| Approvals   |      | Field Notes  |      |
| Municipal   |      | Ball <input type="checkbox"/> Hydro <input type="checkbox"/>   |      |
| APPROVED IN PRINCIPLE SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO TOWN OF OAKVILLE STANDARDS AND SPECIFICATIONS. |      | Gas <input type="checkbox"/> Cable <input type="checkbox"/>  |      |
| SIGNED: _____ DATE: _____   |      | Trat. <input type="checkbox"/> Water <input type="checkbox"/>  |      |
| Manager, Development Engineering - TOWN OF OAKVILLE   |      | Professional Engineer  |      |
| Regional  |      | DESIGN OF SANITARY AND WATER SERVICES APPROVED SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO HALTON REGION STANDARDS AND SPECIFICATIONS AND LOCATION APPROVAL FROM AREA MUNICIPALITY. |      |
| SIGNED: R. MACKENZIE DATE: Aug. 27/12   |      | APPROVED BY  |      |
| Legislative & Planning Services Dept. - REGION OF HALTON  |      | Consultant   |      |
| RAND ENGINEERING CORPORATION  |      | 5285 Solar Drive<br>Mississauga, ON<br>Canada, L4W 5B8<br>Tel: 905.625.9500  |      |
| Municipality  |      |  |      |
| THE REGIONAL MUNICIPALITY OF HALTON   |      |  |      |
| TOWN OF OAKVILLE  |      |  |      |
| DEPARTMENT OF PUBLIC WORKS  |      |  |      |
| GREAT LAKES BUSINESS PARK<br>PLAN & PROFILE   |      |  |      |
| GREAT LAKES BOULEVARD<br>(FROM 480m NORTH OF REBECCA ST.<br>TO 60m NORTH OF MICHIGAN DR.)                         |      |  |      |
| STA.0+480 TO STA.0+740 24T-08007/1635   |      |  |      |
| Municipal File No.  |      | Regional File No.  |      |
| SD-572  |      | DO-685   |      |
| Contract No.  |      | Drawing No.  |      |
| 10912   |      | 15   |      |

R:\10\10912\912 AsConstructed-saved as CAD2004\AsConstructed Submission - Halton Region\912-15(GREAT LAKES BLVD-3).dwg | Aug 11, 2014 - 5:44pm



- NOTES:
1. FOR FUTURE PARK GRADING DETAILS REFER TO DRAWING GR-1.
  2. FOR TYPICAL ROAD SECTION REFER TO DRAWING SEC-16.
  3. FOR PAVEMENT SUPERELEVATIONS PLAN REFER TO DWG. PE-1.
  4. FOR INTERSECTION SIGNALIZATION DETAILS AND SPECIFICATIONS REFER TO DESIGN BY DATUM GROUP.

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 DUE TO THEIR NEGLIGENCE OR OTHERWISE  
 ALL INFORMATION SHOULD BE VERIFIED

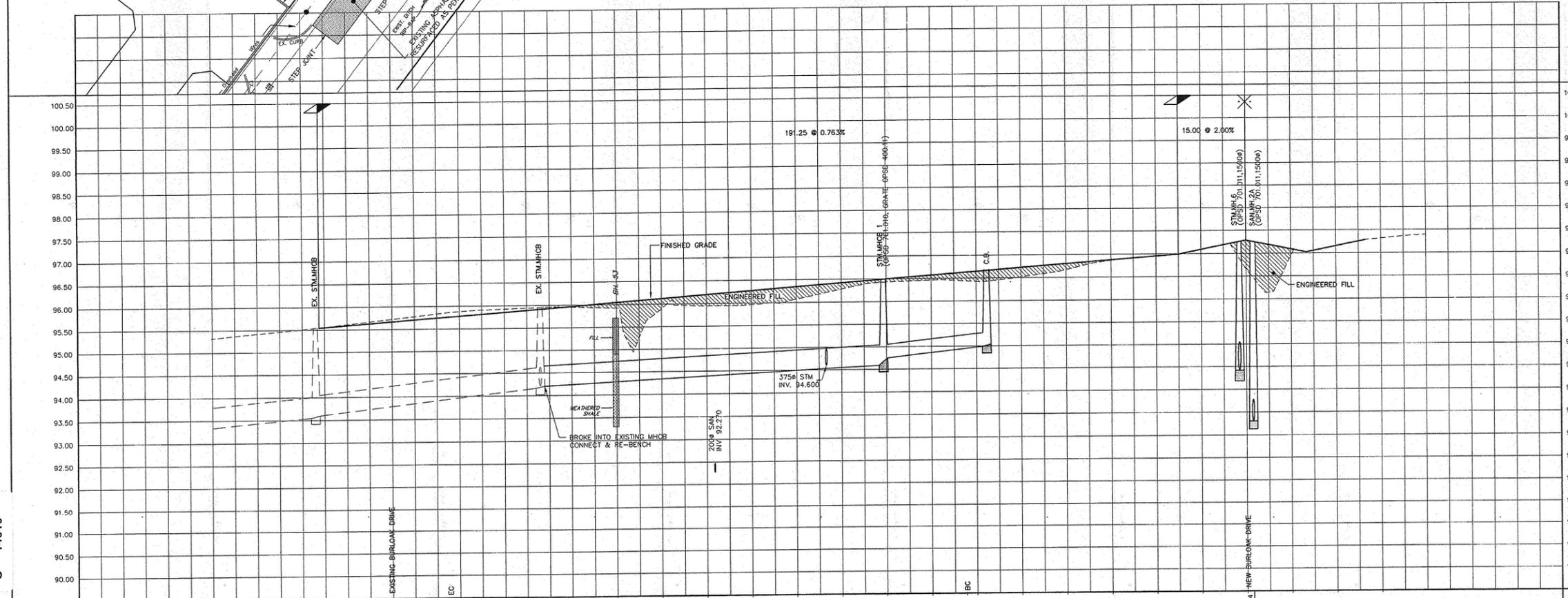


KEY PLAN SCALE N.T.S.

- NOTES
1. LOCATION AND ELEVATIONS OF EXISTING UTILITIES ARE NOT GUARANTEED. CONTRACTOR TO NOTIFY UTILITY COMPANY OR THE TOWN OF OAKVILLE 48 HOURS PRIOR TO COMMENCING ANY WORK.
  2. ALL EXISTING WATER BOXES, HYDRANTS AND VALVE CHAMBERS TOPS ADJUSTED ON FIELD TO SUIT PROP. ROAD AND BOULEVARD GRADES.
  3. ALL EX. DRIVEWAYS ADJUSTED TO SUIT PROP. ROAD GRADES, INCL. NEW BASE OF 300mm OF 20mm CRUSHED STONE, 50mm H.L.B AND 25mm H.L.3A CURB CUTS PROVIDED FOR ALL EX. DRIVEWAY.
  4. ALL EX. DRIVEWAYS AND ROAD CULVERTS REMOVED AND DISPOSED OFF SITE.
  5. IF ANY DRAINAGE PROBLEMS OR PONDING OCCUR ON EX. LOTS ALONG R.O.W. OF REBECCA ST. CATCHBASINS INSTALLED AS DIRECTED BY THE ENGINEER ON SITE AND CONNECTED TO PROP. STM SEWER WHEREVER POSSIBLE.
  6. ALL DISTURBED AREA OUTSIDE OF ROAD ALLOWANCE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF TOWN ENGINEER.
  7. SPECIAL CARE TAKEN AROUND EXISTING TREES DURING SIDEWALK CONSTRUCTION. IF NECESSARY SIDEWALK MEANDERED AROUND EXISTING TREES.

AS-CONSTRUCTED DECEMBER 2005

**BENCH MARK 229**  
 DESCRIPTION - PLAQUE SET IN CONCRETE MONUMENT ON SOUTH SIDE OF LAKESHORE ROAD AT SOUTH END OF BURLOAK DRIVE. 25.8 m SOUTH-EAST OF TOP OF HYDRANT ON THE NORTHWEST CORNER OF THE INTERSECTION, 1.0m NORTHEAST OF HYDRO POLE, 6.9 m SOUTHWEST OF THE CENTRE LINE OF LAKESHORE ROAD AND 3.8 m SOUTHWEST OF THE PRODUCTION OF THE CENTRE LINE OF BURLOAK DRIVE. HORIZONTAL CONTROL MONUMENT NO.001653071. ELEVATION 79.994m



| No. | Date     | By   | Revisions                               |
|-----|----------|------|---|
| 1   | 02/12/23 | F.T. | CB @ Sta. 0+090 RELOCATED TO Sta. 0+060 |
| 1   | 02/11/26 | F.T. | REMOVAL NOTES REVISED                   |

| Design | P.S. | Checked | P.S. | Date         |
|--------|------|---------|------|--------------|
| Drawn  |      | Checked |      | JANUARY 2002 |

| Scale:                       | References |
|------------------------------|------------|
| HOR. 1 : 500<br>VERT. 1 : 50 |            |

| Approvals  | Field Notes   |
|--|---|
| Municipal<br>APPROVED IN PRINCIPLE SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO TOWN OF OAKVILLE STANDARDS AND SPECIFICATIONS. | Ball <input type="checkbox"/> Hydro <input type="checkbox"/><br>Gas <input type="checkbox"/> Cable <input type="checkbox"/> |

SIGNED: \_\_\_\_\_ DATE: SEPT-16-02  
 Director of Public Works - TOWN OF OAKVILLE

**SCHAEFFERS**  
 CONSULTING ENGINEERS  
 64 Jettin Drive, Concord, Ontario L4K 3P3  
 Tel: (905) 738-6100  
 Fax: (905) 738-6875  
 E-mail: design@schaeffers.com

Municipality  
**THE REGIONAL MUNICIPALITY OF HALTON**  
**TOWN OF OAKVILLE**  
 DEPARTMENT OF PUBLIC WORKS

| CHAINAGE  | PROPOSED ELEVATION | STORM SEWER | SANITARY SEWER |
|-----------|--------------------|-------------|----------------|
| 0+230.000 |                    |             |                |
| 0+220.000 |                    |             |                |
| 0+210.000 |                    |             |                |
| 0+206.250 | 95.530             |             |                |
| 0+200.000 |                    |             |                |
| 0+190.000 |                    |             |                |
| 0+180.000 | 95.731             |             |                |
| 0+170.000 |                    |             |                |
| 0+160.000 |                    |             |                |
| 0+150.000 | 95.990             |             |                |
| 0+140.000 |                    |             |                |
| 0+130.000 |                    |             |                |
| 0+120.000 | 96.189             |             |                |
| 0+110.000 |                    |             |                |
| 0+100.000 |                    |             |                |
| 0+090.000 | 96.418             |             |                |
| 0+080.000 |                    |             |                |
| 0+070.000 |                    |             |                |
| 0+060.000 | 96.647             |             |                |
| 0+050.000 |                    |             |                |
| 0+040.000 |                    |             |                |
| 0+030.000 | 96.876             |             |                |
| 0+020.000 |                    |             |                |
| 0+015.000 | 96.990             |             |                |
| 0+010.000 |                    |             |                |
| 0+000.000 | 97.290             |             |                |

| Contract No. | Drawing No. |
|--------------|-------------|
| 2001-2309    | PP-14       |

O- 14010

# APPENDIX B

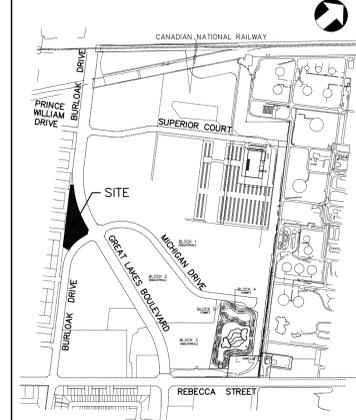
## Stormwater Management

- Watershed Parameters Design Sheet
  - Pre-Development Drainage Plan (D1)
  - Post-Development Drainage Plan (D2)
  - SWM Storage Design Sheet
  - Roof Storage and Release Rates
  - SWMHYMO Printouts
  - HydroFilter HF12 Design and Verification Statement
-

tp HYMO/OTTHYMO as per MTO Drainage Managment Manula Tabel A.9

$$tp = 4.63 * A^{0.422} * S^{-0.46} * (l/W)^{0.133}$$

| Catchment No.   | Area ha | D m  | L m | Sl m/m | tp (pre-dev) hr | la  | CN-Pre | CN-Post | XIMP | TIMP | IAper | IAimp |
|-----------------|---------|------|-----|--------|-----------------|-----|--------|---------|------|------|-------|-------|
| 101             | 0.7020  | 2.92 | 210 | 0.014  | 0.05            | 1.5 | 89     |         |      |      |       |       |
| 201 ROOF        | 0.2459  |      |     |        |                 | 1.5 |        | 98      | 85   | 95   | 2     |       |
| 202             | 0.2458  |      |     |        |                 | 1.5 |        | 98      | 85   | 95   | 2     |       |
| 203 UNCT to OGS | 0.0454  |      |     |        |                 | 1.5 |        | 98      | 85   | 95   | 2     |       |
| 204 UNCT        | 0.0173  |      |     |        |                 | 1.5 |        | 98      | 85   | 95   | 2     |       |
| 205 UNCT        | 0.1476  |      |     |        |                 | 1.5 |        | 80      | 20   | 25   |       | 5     |



KEY PLAN N.T.S.

TOPOGRAPHICAL INFORMATION IS TAKEN FROM:  
 PART OF LOT 35, CONCESSION 3  
 SOUTH OF DUNDAS STREET  
 (GEOGRAPHIC TOWNSHIP OF TRAFALGAR)  
 CITY OF BURLINGTON

ELEVATION NOTE:  
 ELEVATIONS ARE GEODETIC AND REFERRED TO THE CITY  
 OF BURLINGTON BENCHMARK 391 AND HAVING A GEODETIC  
 ELEVATION OF 91.233 METERS

- LEGEND
- 137.65 EXISTING ELEVATION
  - EXISTING CATCHBASIN
  - EXISTING STORM/SANITARY MANHOLE
  - 000 AREA #

**PRE-DEVELOPMENT**  
**BURLOAK OAKVILLE**  
**URBTECH ENGINEERING INC.**

Tp: HMM/OOT/HMO as per MTO Drainage Management Manual Tabel A.9  
 tp=4.63 \* A^0.422 \* S^0.46 \* (L/W)^0.133

| Catchment No. | Area ha | D m  | L m | SI m/m | tp (pre-dev) hr | CN-Pr |
|---------------|---------|------|-----|--------|-----------------|-------|
| 101           | 0.7020  | 2.92 | 210 | 0.014  | 0.05            | 89    |

THE PROPOSED WORKS ARE BASED ON THE TOPOGRAPHICAL SURVEY BY IBW SURVEYORS DATED APRIL 13, 2021, THE TOWN OF OAKVILLE & REGION OF HALTON RECORDS AND ARE NOT GUARANTEED TO BE CORRECT. THE CONTRACTOR MUST FIELD CHECK ALL THE INFORMATION PRIOR TO CONSTRUCTION.

THE LOCATION AND EXTENT OF ALL EXISTING UTILITIES ARE NOT NECESSARILY SHOWN ON THIS PLAN AND WHERE SHOWN, ARE TO BE CONSIDERED APPROXIMATE ONLY. ALL CONTRACTORS SHALL INFORM THEMSELVES OF THE EXACT LOCATION AND EXTENT OF ALL EXISTING SERVICES PRIOR TO THE START OF CONSTRUCTION, AND SHALL ASSUME ALL LIABILITIES FOR DAMAGE TO THEM OR DELAYS RESULTING FROM THEIR ACTUAL EXTENT AND LOCATION.

| Rev. # | Details               | Date       |
|--------|-----------------------|------------|
| 2.     | REVISED AS PER SP     | 2026.01.16 |
| 1.     | ISSUED FOR SUBMISSION | 2025.10.20 |

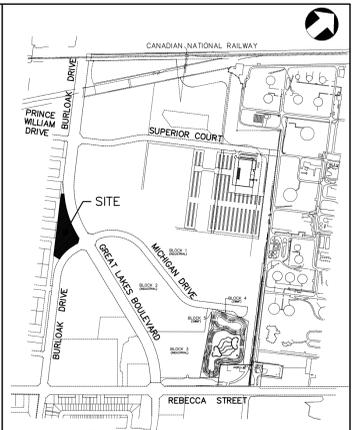
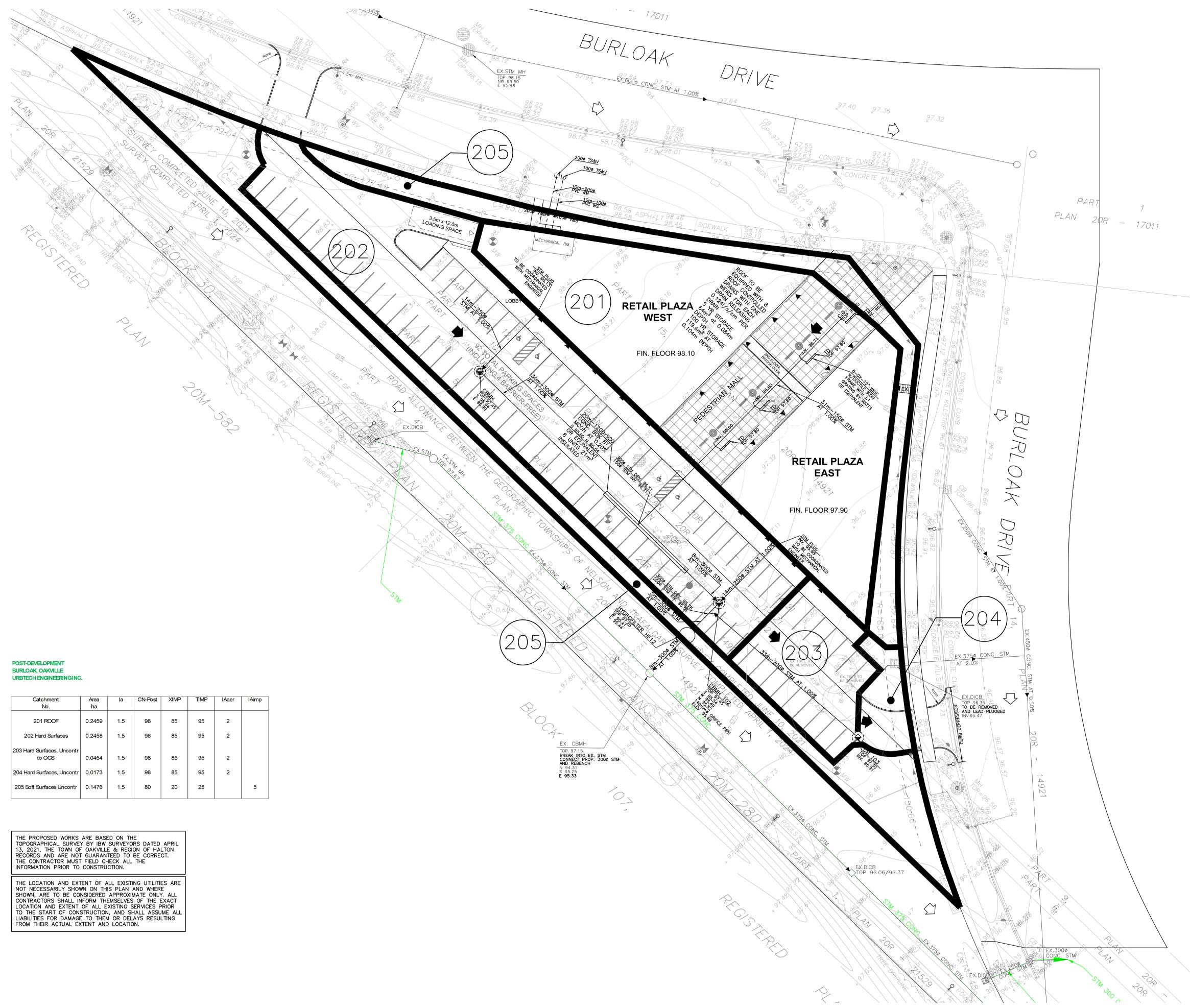
ANDRZEJ JAWORSKI, P. ENG.  
 CONSULTING ENGINEER

**Urbtech Engineering Inc.**  
 1200 Speers Road, Suite 8, Oakville, ON L6L 2X4  
 Telephone: 905 896 7364

**BURLOAK PLAZA**  
 ABDULLAH AL EYADEH  
 580 BURLOAK DRIVE  
 TOWN OF OAKVILLE

**PRE-DEVELOPMENT DRAINAGE PLAN**

|                 |                      |          |
|-----------------|----------------------|----------|
| SCALE 1:250     | PROJECT No. 24-484   | PLAN No. |
| DRAWN BY G.J.   | SITE PLAN No.        | D1       |
| CHECKED BY A.J. | XXXXXXXXXXXXXXXXXXXX |          |



KEY PLAN N.T.S.

TOPOGRAPHICAL INFORMATION IS TAKEN FROM:  
 PART OF LOT 35, CONCESSION 3  
 SOUTH OF DUNDAS STREET  
 (GEOGRAPHIC TOWNSHIP OF TRAFALGAR)  
 CITY OF BURLINGTON

ELEVATION NOTE:  
 ELEVATIONS ARE GEODETIC AND REFERRED TO THE CITY  
 OF BURLINGTON BENCHMARK 391 AND HAVING A GEODETIC  
 ELEVATION OF 91.233 METERS

- LEGEND
- 137.08 EXISTING ELEVATION
  - PROPOSED SINGLE CATCHBASIN
  - PROPOSED DOUBLE CATCHBASINS
  - EXISTING CATCHBASIN
  - PROPOSED STORM MANHOLE
  - PROPOSED SANITARY MANHOLE
  - EXISTING STORM/SANITARY MANHOLE
  - EXIST. OVERLAND FLOW
  - PROPOSED OVERLAND FLOW
  - 000 AREA #

POST-DEVELOPMENT  
 BURLOAK, OAKVILLE  
 URBTECH ENGINEERING INC.

| Catchment No.                     | Area ha | Ia  | CN-Post | XIMP | TIMP | I <sub>aper</sub> | I <sub>amp</sub> |
|-----------------------------------|---------|-----|---------|------|------|-------------------|------------------|
| 201 ROOF                          | 0.2459  | 1.5 | 98      | 85   | 95   | 2                 |                  |
| 202 Hard Surfaces                 | 0.2458  | 1.5 | 98      | 85   | 95   | 2                 |                  |
| 203 Hard Surfaces, Uncontr to OGS | 0.0454  | 1.5 | 98      | 85   | 95   | 2                 |                  |
| 204 Hard Surfaces, Uncontr        | 0.0173  | 1.5 | 98      | 85   | 95   | 2                 |                  |
| 205 Soft Surfaces Uncontr         | 0.1476  | 1.5 | 80      | 20   | 25   |                   | 5                |

THE PROPOSED WORKS ARE BASED ON THE TOPOGRAPHICAL SURVEY BY IBW SURVEYORS DATED APRIL 13, 2021, THE TOWN OF OAKVILLE & REGION OF HALTON RECORDS AND ARE NOT GUARANTEED TO BE CORRECT. THE CONTRACTOR MUST FIELD CHECK ALL THE INFORMATION PRIOR TO CONSTRUCTION.

THE LOCATION AND EXTENT OF ALL EXISTING UTILITIES ARE NOT NECESSARILY SHOWN ON THIS PLAN AND WHERE ALL SHOWN, ARE TO BE CONSIDERED APPROXIMATE ONLY. ALL CONTRACTORS SHALL INFORM THEMSELVES OF THE EXACT LOCATION AND EXTENT OF ALL EXISTING SERVICES PRIOR TO THE START OF CONSTRUCTION, AND SHALL ASSUME ALL LIABILITIES FOR DAMAGE TO THEM OR DELAYS RESULTING FROM THEIR ACTUAL EXTENT AND LOCATION.

| Rev. # | Details               | Date       |
|--------|-----------------------|------------|
| 2.     | REVISED AS PER SP     | 2026.01.16 |
| 1.     | ISSUED FOR SUBMISSION | 2025.10.20 |

PROFESSIONAL ENGINEER  
 JAN. 16, 2026  
 A. JAWORSKI  
 100108267  
 PROVINCE OF ONTARIO

ANDRZEJ JAWORSKI, P. ENG.  
 CONSULTING ENGINEER

**Urbtech Engineering Inc.**  
 1200 Speers Road, Suite 8, Oakville, ON L6L 2X4  
 Telephone: 905 896 7364

**BURLOAK PLAZA**  
 ABDULLAH AL EYADEH  
 580 BURLOAK DRIVE  
 TOWN OF OAKVILLE

**POST-DEVELOPMENT  
 DRAINAGE PLAN**

**SWM STORAGE DESIGN SHEET**

**BURLOCK PLAZA**

**URBTECH ENGINEERING INC.**

Orifice Diameter            140    mm  
 Orifice Area                0.0154    m<sup>2</sup>  
 Orifice Elev.                95.49    m  
 Orifice Coefficient        0.62

Date: 27-Oct-25  
 Prepared By: A.J.

| Elevation<br>m | Depth<br>at Orifice<br>m | Depth<br>at Weir<br>m | Depth<br>at Sillway<br>m | Orifice<br>Flow<br>m <sup>3</sup> /s | Weir<br>Flow<br>m <sup>3</sup> /s | Spillway<br>Flow<br>m <sup>3</sup> /s | Pond<br>Area<br>m <sup>2</sup> | Pond<br>Volume<br>m <sup>3</sup> | Total<br>Flow<br>m <sup>3</sup> /s | Emptying<br>Time<br>hr | Cumm.<br>Time<br>hr |
|----------------|--------------------------|-----------------------|--------------------------|--------------------------------------|-----------------------------------|---------------------------------------|--------------------------------|----------------------------------|------------------------------------|------------------------|---------------------|
| <b>95.90</b>   |                          |                       |                          |                                      |                                   |                                       |                                |                                  |                                    |                        |                     |
| 95.55          | 0.13                     |                       |                          | 0.015                                |                                   |                                       | 24                             | 0                                | 0.015                              |                        |                     |
| 95.65          | 0.23                     |                       |                          | 0.020                                |                                   |                                       | 24                             | 1                                | 0.020                              |                        |                     |
| 95.75          | 0.33                     |                       |                          | 0.024                                |                                   |                                       | 24                             | 3                                | 0.024                              |                        |                     |
| 95.85          | 0.43                     |                       |                          | 0.028                                |                                   |                                       | 24                             | 6                                | 0.028                              |                        |                     |
| 95.95          | 0.53                     |                       |                          | 0.031                                |                                   |                                       | 24                             | 8                                | 0.031                              |                        |                     |
| 96.05          | 0.63                     |                       |                          | 0.034                                |                                   |                                       | 24                             | 10                               | 0.034                              |                        |                     |
| 96.15          | 0.73                     |                       |                          | 0.036                                |                                   |                                       | 24                             | 13                               | 0.036                              |                        |                     |
| 96.25          | 0.83                     |                       |                          | 0.038                                |                                   |                                       | 24                             | 15                               | 0.038                              |                        |                     |
| 96.35          | 0.93                     |                       |                          | 0.041                                |                                   |                                       | 24                             | 18                               | 0.041                              |                        |                     |
| <b>96.49</b>   | 1.07                     |                       |                          | 0.044                                |                                   |                                       | 24                             | 25                               | 0.044                              |                        |                     |
| 96.80          | 1.38                     |                       |                          | 0.050                                |                                   |                                       | 24                             | 27                               | 0.050                              |                        |                     |
| 97.00          | 1.58                     |                       |                          | 0.053                                |                                   |                                       | 24                             | 29                               | 0.053                              |                        |                     |
| 97.20          | 1.78                     |                       |                          | 0.056                                |                                   |                                       | 24                             | 31                               | 0.056                              |                        |                     |
| 97.45          | 2.03                     |                       |                          | 0.060                                |                                   |                                       | 24                             | 35                               | 0.060                              |                        |                     |
| 97.65          | 2.23                     |                       |                          | 0.063                                |                                   |                                       | 24                             | 74                               | 0.063                              |                        |                     |

Project Name: Burloak Oakville

Project No.: 24-484

Area ID: Roof

|              |       |                |
|--------------|-------|----------------|
| RWL Release: | 0.124 | l/s/cm         |
| Roof Area:   | 2,459 | m <sup>2</sup> |
| No. of Weirs | 8     |                |
| No. of RWL:  | 8     |                |
| Roof Slope:  | 0.010 | m/m            |

#### Roof Storage and Release Rates

| Depth (mm) | Length (m) | Storage Area (m <sup>2</sup> ) | Volume (m <sup>3</sup> ) | Release (l/s) |
|------------|------------|--------------------------------|--------------------------|---------------|
| 10         | 1.0        | 32                             | 0.1                      | 1.0           |
| 15         | 1.5        | 72                             | 0.4                      | 1.5           |
| 20         | 2.0        | 128                            | 0.9                      | 2.0           |
| 25         | 2.5        | 200                            | 2                        | 2.5           |
| 30         | 3.0        | 288                            | 3                        | 3.0           |
| 35         | 3.5        | 392                            | 5                        | 3.5           |
| 40         | 4.0        | 512                            | 7                        | 4.0           |
| 45         | 4.5        | 648                            | 10                       | 4.5           |
| 50         | 5.0        | 800                            | 13                       | 5.0           |
| 55         | 5.5        | 968                            | 18                       | 5.5           |
| 60         | 6.0        | 1,152                          | 23                       | 6.0           |
| 65         | 6.5        | 1,352                          | 29                       | 6.4           |
| 70         | 7.0        | 1,568                          | 37                       | 6.9           |
| 75         | 7.5        | 1,800                          | 45                       | 7.4           |
| 80         | 8.0        | 2,048                          | 55                       | 7.9           |
| 85         | 8.5        | 2,312                          | 66                       | 8.4           |
| 90         | 9.0        | 2,592                          | 78                       | 8.9           |
| 95         | 9.5        | 2,888                          | 91                       | 9.4           |
| 100        | 10.0       | 3,200                          | 107                      | 9.9           |
| 105        | 10.5       | 3,528                          | 123                      | 10.4          |
| 110        | 11.0       | 3,872                          | 142                      | 10.9          |
| 115        | 11.5       | 4,232                          | 162                      | 11.4          |
| 120        | 12.0       | 4,608                          | 184                      | 11.9          |
| 125        | 12.5       | 5,000                          | 208                      | 12.4          |
| 130        | 13.0       | 5,408                          | 234                      | 12.9          |
| 135        | 13.5       | 5,832                          | 262                      | 13.4          |
| 140        | 14.0       | 6,272                          | 293                      | 13.9          |
| 145        | 14.5       | 6,728                          | 325                      | 14.4          |
| 150        | 15.0       | 7,200                          | 360                      | 14.9          |

```

00001> 2      Metric units
00002> *#*****
00003> *# Project Name: [Burloak Oakville,]      Project Number: [24-484]
00004> *# [Existing and Reservoir routing flows, 5yr and 100yr, 4hr Chicago]
00005> *# Date      : [August 14, 2025]
00006> *# Modeller   : [A.J.]
00007> *# Company    : Urbtech Engineering Inc.
00008> *# License #  : 3556752
00009> *#*****
00010> START      TZERO=[0.0]hrs or date, METOUT=[2], NSTORM=[1], NRUN=[1]
00011> *           ["D:\24-484 Burloak\SWMHymo\5 storm.stm"]
00012> *%-----|-----|
00013> READ STORM  STORM_FILENAME=["storm.001"]
00014> *%-----|-----|
00015> DESIGN NASHYD ID=[1], NHYD=["Existing "], DT=[2.0 ](min), AREA=[.702](ha),
00016> DWF=[0](cms), CN/C=[ 89], TP=[ 0.05 ](hrs),
00017> END=-1
00018> *%-----|-----|
00019> DESIGN STANDHYD ID=[2], NHYD=["201"], DT=[2.0]min, AREA=[0.2459](ha),
00020> XIMP=[0.85], TIMP=[0.95], DWF=[0.0](cms), LOSS=[2], CN=[98],
00021> SLOPE=[1.0](%)
00022> END=-1
00023> *%-----|-----|
00024> ROUTE RESERVOIR IDout=[3], NHYD=[301], IDin=[2],
00025> RDT=[2](min),
00026> TABLE of ( OUTFLOW-STORAGE ) values
00027> (cms) - (ha-m)
00028> [ 0.0 , 0.0 ]
00029> [ 0.001, 0.00001]
00030> [ 0.0025, 0.0002]
00031> [ 0.005, 0.0013]
00032> [ 0.0074, 0.0045]
00033> [ 0.0099, 0.0107]
00034> [ 0.0124, 0.0208]
00035> [ 0.0149, 0.0360]
00036> [ -1 , -1 ]
00037> *%-----|-----|
00038> DESIGN STANDHYD ID=[4], NHYD=["202"], DT=[2.0]min, AREA=[0.2458](ha),
00039> XIMP=[0.90], TIMP=[0.95], DWF=[0.0](cms), LOSS=[2], CN=[98],
00040> SLOPE=[1.0](%)
00041> END=-1
00042> *%-----|-----|
00043> ADD HYD      IDsum=[5], NHYD=[302], IDs to add=[3+4]
00044> *%-----|-----|
00045> ROUTE RESERVOIR IDout=[6], NHYD=[401], IDin=[5],
00046> RDT=[2](min),
00047> TABLE of ( OUTFLOW-STORAGE ) values
00048> (cms) - (ha-m)
00049> [ 0.0 , 0.0 ]
00050> [ 0.024, 0.0003]
00051> [ 0.031, 0.0008]
00052> [ 0.036, 0.0013]
00053> [ 0.041, 0.0018]
00054> [ 0.044, 0.0025]
00055> [ 0.056, 0.0031]
00056> [ 0.060, 0.0035]
00057> [ 0.063, 0.0074]
00058> [ -1 , -1 ]
00059> *%-----|-----|
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00061> XIMP=[0.90], TIMP=[0.95], DWF=[0.0](cms), LOSS=[2], CN=[98],
00062> SLOPE=[1.0](%)
00063> END=-1
00064> *%-----|-----|
00065> DESIGN STANDHYD ID=[8], NHYD=["204"], DT=[2.0]min, AREA=[0.1476](ha),
00066> XIMP=[0.20], TIMP=[0.25], DWF=[0.0](cms), LOSS=[2], CN=[80],
00067> SLOPE=[1.0](%)
00068> END=-1
00069> *%-----|-----|
00070> ADD HYD      IDsum=[9], NHYD=[302], IDs to add=[6+7+8]
00071> *%-----|-----|
00072> START      TZERO=[0.0]hrs or date, METOUT=[2], NSTORM=[1], NRUN=[2]
00073> *           ["D:\24-484 Burloak\SWMHymo\100 Storm.stm"]
00074> *%-----|-----|
00075> FINISH
00076>
00077>
00078>
00079>
00080>

```

```

00001> =====
00002>
00003> SSSSS  W  W  M  M  H  H  Y  Y  M  M  000      222      000      11      77777 =====
00004> S      W  W  W  MM MM  H  H  Y  Y  MM MM  0  0      2      0  0      11      7  7
00005> SSSSS  W  W  W  M  M  M  HHHHH  Y  M  M  M  0  0      2      0  0      11      7 Ver4.05.0
00006> S      W  W  M  M  H  H  Y  M  M  0  0      222      0  0      11      7 APR 2017
00007> SSSSS  W  W  M  M  H  H  Y  M  M  000      2      0  0      11      7 =====
00008> 2      0  0      11      7 # 3556752
00009> StormWater Management HYdrologic Model      222      000      11      7 =====
00010>
00011> *****
00012> ***** SWMHYMO Ver4.05.0 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016> *****
00017> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018> ***** Ottawa, Ontario: (613) 836-3884 *****
00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhymo@jfsa.com *****
00021> *****
00022>
00023> ++++++
00024> ++++++ Licensed user: Urbtech Engineering Inc. ++++++
00025> ++++++ Oakville SERIAL#:3556752 ++++++
00026> ++++++
00027>
00028> *****
00029> ***** ++++++ PROGRAM ARRAY DIMENSIONS ++++++ *****
00030> ***** Maximum value for ID numbers : 11 *****
00031> ***** Max. number of rainfall points: 105408 *****
00032> ***** Max. number of flow points : 105408 *****
00033> *****
00034>
00035>
00036> ***** SUMMARY OUTPUT *****
00037> *****
00038> * RUN DATE: 2025-10-20 TIME: 12:09:07 RUN COUNTER: 000005 *
00039> *****
00040> * Input file: D:\24-484 Burloak\SWMHymo\5-100RR.DAT *
00041> * Output file: D:\24-484 Burloak\SWMHymo\5-100RR.out *
00042> * Summary file: D:\24-484 Burloak\SWMHymo\5-100RR.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047> *****
00048>
00049>
00050> #*****
00051> # Project Name: [Burlock Oakville,] Project Number: [24-484]
00052> # [Existing and Reservoir routing flows, 5yr and 100yr, 4hr Chicago]
00053> # Date : [August 14, 2025]
00054> # Modeller : [A.J.]
00055> # Company : Urbtech Engineering Inc.
00056> # License # : 3556752
00057> #*****
00058> RUN#:COMMAND#
00059> R0001:C00001-----
00060> START
00061> [TZERO = .00 hrs on 0]
00062> [METOUT= 2 (1=imperial, 2=metric output)]
00063> [NSTORM= 1 ]
00064> [NRUN = 0001 ]
00065> R0001:C00002-----
00066> READ STORM
00067> Filename = storm.001
00068> Comment = 5 year
00069> [SDT=10.00:SDUR= 4.00:PTOT= 45.17]
00070> R0001:C00003-----DTmin-ID:NHYD-----AREAh-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00071> * DESIGN NASHYD 2.0 01:Existing .70 .134 No_date 1:20 25.41 .562 .000
00072> [CN= 89.0: N= 3.00: Tp= .05]
00073> R0001:C00004-----DTmin-ID:NHYD-----AREAh-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00074> * DESIGN STANDHYD 2.0 02:201 .25 .075 No_date 1:20 44.17 .978 .000
00075> [XIMP=.85:TIMP=.95]
00076> [SLP=1.00:DT= 2.00]
00077> [LOSS= 2 :CN= 98.0]
00078> R0001:C00005-----DTmin-ID:NHYD-----AREAh-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00079> ROUTE RESERVOIR -> 2.0 02:201 .25 .075 No_date 1:20 44.17 n/a .000
00080> out <= 2.0 03: 301 .25 .008 No_date 1:44 44.17 n/a .000

```

```

00081> {MxStoUsed=.6367E-02 m3}
00082> R0001:C00006-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00083> * DESIGN STANDHYD 2.0 04:20 2.25 .075 No_date 1:20 44.13 .977 .000
00084> [XIMP=.90:TIMP=.95]
00085> [SLP=1.00:DT= 2.00]
00086> [LOSS= 2 :CN= 98.0]
00087> R0001:C00007-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00088> ADD HYD 2.0 03: 301 .25 .008 No_date 1:44 44.17 n/a .000
00089> + 2.0 04:20 2.25 .075 No_date 1:20 44.13 n/a .000
00090> SUM= 2.0 05: 302 .49 .082 No_date 1:20 44.15 n/a .000
00091> R0001:C00008-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00092> ROUTE RESERVOIR -> 2.0 05: 302 .49 .082 No_date 1:20 44.15 n/a .000
00093> out <= 2.0 06: 401 .49 .046 No_date 1:22 44.15 n/a .000
00094> {MxStoUsed=.2618E-02 m3}
00095> R0001:C00009-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00096> * DESIGN STANDHYD 2.0 07:20 2.06 .019 No_date 1:20 44.13 .977 .000
00097> [XIMP=.90:TIMP=.95]
00098> [SLP=1.00:DT= 2.00]
00099> [LOSS= 2 :CN= 98.0]
00100> R0001:C00010-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00101> * DESIGN STANDHYD 2.0 08:20 2.15 .012 No_date 1:20 23.71 .525 .000
00102> [XIMP=.20:TIMP=.25]
00103> [SLP=1.00:DT= 2.00]
00104> [LOSS= 2 :CN= 80.0]
00105> R0001:C00011-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00106> ADD HYD 2.0 06: 401 .49 .046 No_date 1:22 44.15 n/a .000
00107> + 2.0 07:20 2.06 .019 No_date 1:20 44.13 n/a .000
00108> + 2.0 08:20 2.15 .012 No_date 1:20 23.71 n/a .000
00109> SUM= 2.0 09: 302 .70 .075 No_date 1:20 39.85 n/a .000
00110> ** END OF RUN : 1
00111>
00112> *****
00113>
00114>
00115>
00116>
00117>
00118> RUN#:COMMAND#
00119> R0002:C00001-----
00120> START
00121> [TZERO = .00 hrs on 0]
00122> [METOUT= 2 (1=imperial, 2=metric output)]
00123> [NSTORM= 1 ]
00124> [NRUN = 0002 ]
00125> #*****
00126> # Project Name: [Burlock Oakville,] Project Number: [24-484]
00127> # [Existing and Reservoir routing flows, 5yr and 100yr, 4hr Chicago]
00128> # Date : [August 14, 2025]
00129> # Modeller : [A.J.]
00130> # Company : Urbtech Engineering Inc.
00131> # License # : 3556752
00132> #*****
00133> R0002:C00002-----
00134> READ STORM
00135> Filename = storm.001
00136> Comment = 100 year
00137> [SDT=10.00:SDUR= 4.00:PTOT= 75.20]
00138> R0002:C00003-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00139> * DESIGN NASHYD 2.0 01:Existing .70 .292 No_date 1:20 51.69 .687 .000
00140> [CN= 89.0: N= 3.00: Tp= .05]
00141> R0002:C00004-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00142> * DESIGN STANDHYD 2.0 02:20 2.25 .133 No_date 1:20 74.20 .987 .000
00143> [XIMP=.85:TIMP=.95]
00144> [SLP=1.00:DT= 2.00]
00145> [LOSS= 2 :CN= 98.0]
00146> R0002:C00005-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00147> ROUTE RESERVOIR -> 2.0 02:20 2.25 .133 No_date 1:20 74.20 n/a .000
00148> out <= 2.0 03: 301 .25 .010 No_date 1:52 74.20 n/a .000
00149> {MxStoUsed=.1196E-01 m3}
00150> R0002:C00006-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00151> * DESIGN STANDHYD 2.0 04:20 2.25 .134 No_date 1:20 74.16 .986 .000
00152> [XIMP=.90:TIMP=.95]
00153> [SLP=1.00:DT= 2.00]
00154> [LOSS= 2 :CN= 98.0]
00155> R0002:C00007-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00156> ADD HYD 2.0 03: 301 .25 .010 No_date 1:52 74.20 n/a .000
00157> + 2.0 04:20 2.25 .134 No_date 1:20 74.16 n/a .000
00158> SUM= 2.0 05: 302 .49 .143 No_date 1:20 74.18 n/a .000
00159> R0002:C00008-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00160> ROUTE RESERVOIR -> 2.0 05: 302 .49 .143 No_date 1:20 74.18 n/a .000

```

```
00161> out <= 2.0 06: 401 .49 .062 No_date 1:24 74.18 n/a .000
00162> {MxStoUsed=.5604E-02 m3}
00163> R0002:C00009-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00164> * DESIGN STANDHYD 2.0 07:203 .06 .034 No_date 1:20 74.16 .986 .000
00165> [XIMP=.90:TIMP=.95]
00166> [SLP=1.00:DT= 2.00]
00167> [LOSS= 2 :CN= 98.0]
00168> R0002:C00010-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00169> * DESIGN STANDHYD 2.0 08:204 .15 .031 No_date 1:20 47.56 .632 .000
00170> [XIMP=.20:TIMP=.25]
00171> [SLP=1.00:DT= 2.00]
00172> [LOSS= 2 :CN= 80.0]
00173> R0002:C00011-----DTmin-ID:NHYD-----AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00174> ADD HYD 2.0 06: 401 .49 .062 No_date 1:24 74.18 n/a .000
00175> + 2.0 07:203 .06 .034 No_date 1:20 74.16 n/a .000
00176> + 2.0 08:204 .15 .031 No_date 1:20 47.56 n/a .000
00177> SUM= 2.0 09: 302 .70 .127 No_date 1:20 68.58 n/a .000
00178> R0002:C00002-----
00179> FINISH
00180> -----
00181> *****
00182> WARNINGS / ERRORS / NOTES
00183> -----
00184> R0001:C00003 DESIGN NASHYD
00185> *** WARNING: Time step is too large for value of TP. RV may be ok. Peak flow could be off.
00186> R0001:C00004 DESIGN STANDHYD
00187> *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
00188> R0001:C00006 DESIGN STANDHYD
00189> *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
00190> R0001:C00009 DESIGN STANDHYD
00191> *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
00192> R0001:C00010 DESIGN STANDHYD
00193> *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
00194> R0002:C00003 DESIGN NASHYD
00195> *** WARNING: Time step is too large for value of TP. RV may be ok. Peak flow could be off.
00196> R0002:C00004 DESIGN STANDHYD
00197> *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
00198> R0002:C00006 DESIGN STANDHYD
00199> *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
00200> R0002:C00009 DESIGN STANDHYD
00201> *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
00202> R0002:C00010 DESIGN STANDHYD
00203> *** WARNING: Storage Coefficient is smaller than DT! Use a smaller DT or a larger area.
00204> Simulation ended on 2025-10-20 at 12:09:10
00205> =====
00206>
```



## **Hydroworks Sizing Summary**

**580 Burlock Dr**

**Oakville**

**10-22-2025**

### **Recommended Size: HydroFilter HF12**

Hydroworks Sizing Program Version 5.8.5

**A HydroFilter HF12 is recommended to provide 80 % annual TSS removal based on a drainage area of .537 (ha) with an imperviousness of 95 % and Toronto Central, Ontario rainfall for the ETV particle size distribution.**

**The recommended HydroFilter HF12 treats 90 % of the annual runoff and provides 83 % annual TSS removal for the Toronto Central rainfall records and ETV particle size distribution.**

**This summary report provides the main parameters that were used for sizing. These parameters are shown on the summary tables and graphs provided in this report.**

**If you have any questions regarding this sizing summary please do not hesitate to contact Hydroworks at 888-290-7900 or email us at [support@hydroworks.com](mailto:support@hydroworks.com).**

The sizing program is for sizing purposes only and does not address any site specific parameters such as hydraulic gradeline, tailwater submergence, groundwater, soils bearing capacity, etc. Headloss calculations are not a hydraulic gradeline calculation since this requires a starting water level and an analysis of the entire system downstream of the HydroFilter .

## TSS Removal Sizing Summary

Hydroworks HydroFilter Sizing Program

File Product Units CAD Video Help

Main | Rainfall | Site | TSS PSD | TSS Load | Site Storage | By-Pass | CAD | Video | Other

Site Parameters  
 Area (ha)   
 Imperviousness (%)

Units  
 U.S.  
 Metric

Rainfall Station  
 Toronto Central  
 1982 To 1999

Ontario  
 Rainfall Timestep = 15 min.

Project Title  
 (2 lines) 580 Burlock Dr  
 Oakville

ETV Lab Testing Results  Post Treatment Recharge

HydroFilter Annual Sizing Results

Use HydroDome with HydroFilter  Yes

Number of Cartridges  **Estimate**

Annual TSS Removal (%)

Annual Flow Treatment (%)

Particle Size Distribution

| Size (um) | %  | SG   |
|-----------|----|------|
| 1         | 5  | 2.65 |
| 4         | 5  | 2.65 |
| 6         | 5  | 2.65 |
| 7         | 5  | 2.65 |
| 18        | 15 | 2.65 |
| 45        | 10 | 2.65 |
| 70        | 5  | 2.65 |
| 90        | 10 | 2.65 |
| 125       | 15 | 2.65 |
| 200       | 15 | 2.65 |

Note: Results vary significantly based on particle size distribution

**Simulate**

## TSS Particle Size Distribution

Hydroworks HydroFilter Sizing Program

File Product Units CAD Video Help

Main | Rainfall | Site | TSS PSD | TSS Load | Site Storage | By-Pass | CAD | Video | Other

TSS Particle Size Distribution

| Size (um) | %  | SG   |
|-----------|----|------|
| 1         | 5  | 2.65 |
| 4         | 5  | 2.65 |
| 6         | 5  | 2.65 |
| 7         | 5  | 2.65 |
| 18        | 15 | 2.65 |
| 45        | 10 | 2.65 |
| 70        | 5  | 2.65 |
| 90        | 10 | 2.65 |
| 125       | 15 | 2.65 |
| 200       | 15 | 2.65 |
| 400       | 5  | 2.65 |
| 850       | 5  | 2.65 |
| *         |    |      |

Notes:

- To change data just click a cell and type in the new value(s)
- To add a row just go to the bottom of the table and start typing.
- To delete a row, select the row by clicking on the first pointer column, then press delete
- To sort the table click on one of the column headings

TSS Distributions

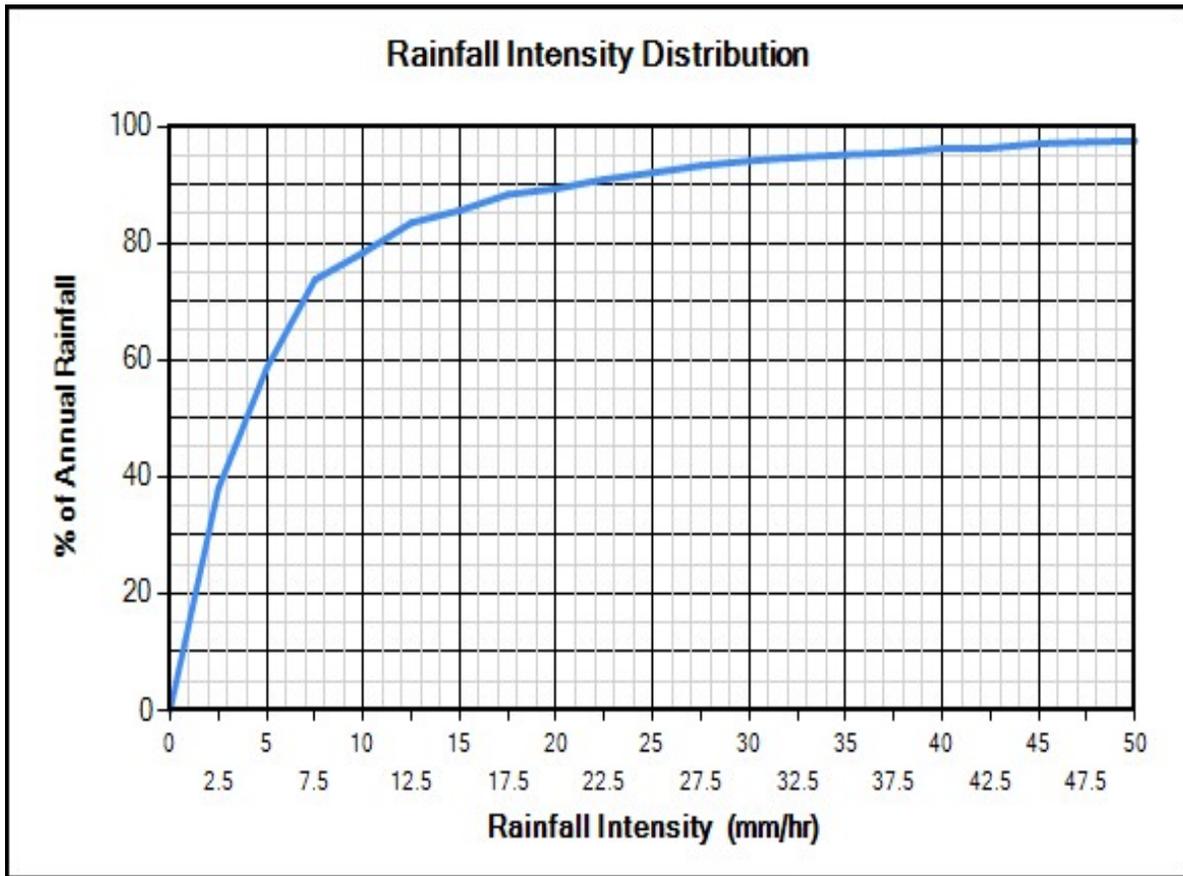
- ETV Canada
- Standard HDS Design
- Alden Laboratory
- OK110
- Toronto
- Ontario Fine
- ETV Canada (Calgary)
- Calgary Forebay
- Kitchener
- User Defined

**Clear**

You must select a particle size distribution for TSS to simulate TSS removal

Water Temp (C)

Rainfall Station - Toronto Central, Ontario(1982 To 1999)



Site Physical Characteristics

Hydroworks HydroFilter Sizing Program

File Product Units CAD Video Help

Main Rainfall Site TSS PSD TSS Load Site Storage By-Pass CAD Video Other

**Catchment Parameters**

Width (m)  Imperv. Mannings n  Maintenance Frequency (months)

Perv Mannings n

Slope (%)  Imp. Depress. Storage (mm)

Perv. Depress. Storage (mm)

**Daily Evaporation (mm/day)**

| Jan | Feb | Mar | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov | Dec |
|-----|-----|-----|------|------|------|------|------|------|------|-----|-----|
| 0   | 0   | 0   | 2.54 | 2.54 | 3.81 | 3.81 | 3.81 | 2.54 | 2.54 | 0   | 0   |

**Infiltration**

Max. Infiltration Rate (mm/hr)

Min. Infiltration Rate (mm/hr)

Infiltration Decay Rate (1/s)

Infiltration Regen. Rate (1/s)

**Catch Basins**

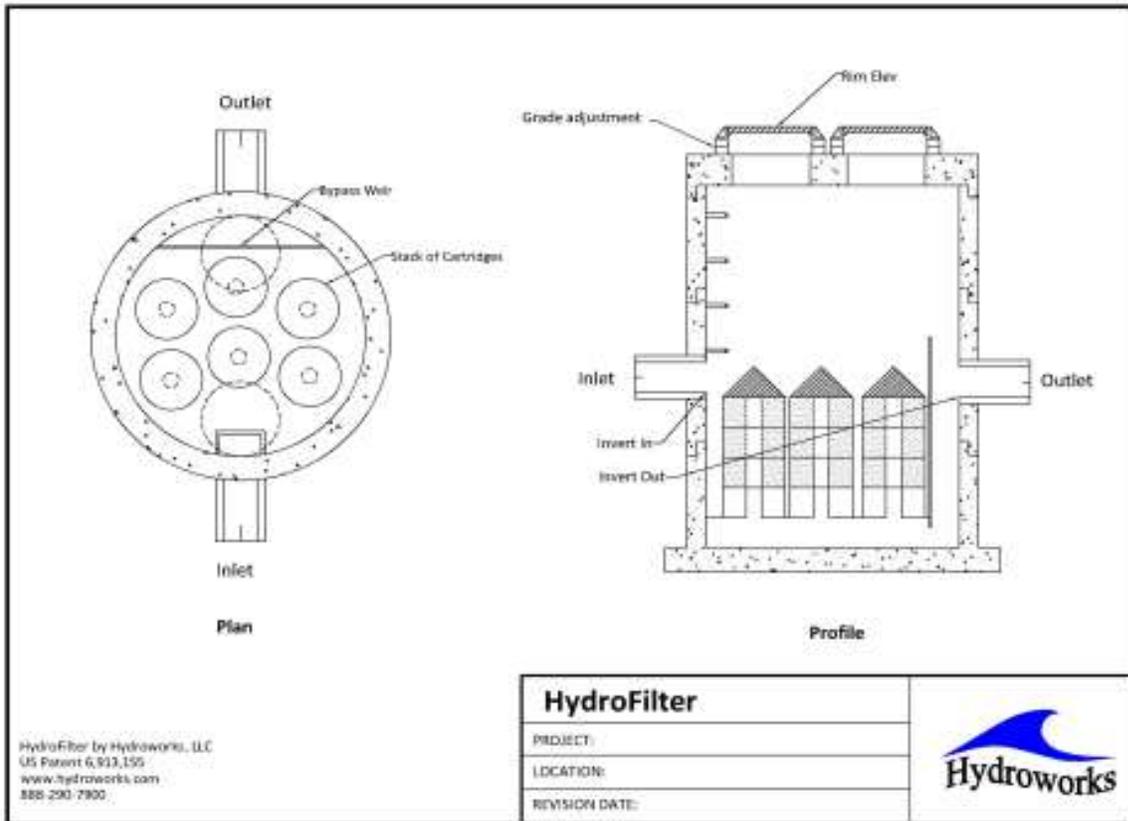
# of Catch basins

**Constant Baseflow**

Roof Runoff (m3/s)

Resets all parameters excluding input catchment width.

## Generic HF12 CAD Drawing



## TSS Buildup And Washoff

Hydroworks HydroFilter Sizing Program

File Product Units CAD Video Help

Main Rainfall Site TSS PSD TSS Load Site Storage By-Pass CAD Video Other

**TSS Buildup**

Power Linear  
 Exponential  
 Michaelis-Menton  
 No Buildup Required

**TSS Washoff**

Power-Exponential  
 Rating Curve (no upper limit)  
 Rating Curve (limited to buildup)  
 Event Mean Concentration

**Street Sweeping**

Efficiency (%)   
 Start Month   
 Stop Month   
 Frequency (days)   
 Available Fraction

**Soil Erosion**

Add Erosion to TSS

**TSS Buildup Parameters**

Limit (kg/ha)   
 Coeff (kg/ha)   
 Exponent

**TSS Washoff Parameters**

Coefficient   
 Exponent

**TSS Buildup**

Based on Area  
 Based on Curb Length

## Upstream Quantity Storage

The screenshot shows the 'Hydroworks HydroFilter Sizing Program' window. The 'Site' tab is selected in the top navigation bar. A table titled 'Quantity Control Storage' is displayed with the following data:

|   | Storage (m3) | Discharge (m3/s) |
|---|--------------|------------------|
|   | 0            | 0                |
|   | 26           | 0.046            |
| ▶ | 56           | 0.062            |
| * |              |                  |

A 'Clear' button is located at the bottom right of the window.

## Other Parameters

The screenshot shows the 'Hydroworks HydroFilter Sizing Program' window with the 'Other' tab selected in the top navigation bar. The main content area is currently empty.

**Flagged Issues**

**None**

**Hydroworks Sizing Program - Version 5.8.5**

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**1-800-290-7900**

**[www.hydroworks.com](http://www.hydroworks.com)**

# Verification Statement



## Hydroworks HydroFilter HF2i Registration number: (V-2024-02-01) Date of issue: 2024-February-22

|                        |   |  |
|------------------------|---|--|
| <b>Technology type</b> | Stormwater Filtration Device  |  |
| <b>Application</b>     | Technology to treat stormwater and facilitate its infiltration into the ground. |  |
| <b>Company</b>         | Hydroworks, LLC.  |  |
| <b>Address</b>         | 257 Cox St., Roselle, NJ 07203 USA  | <b>Phone</b> +1-888-290-7900   |
| <b>Website</b>         | <a href="https://hydroworks.com">https://hydroworks.com</a>                     | <b>E-mail</b> <a href="mailto:gbryant@hydroworks.com">gbryant@hydroworks.com</a> |

### Verified Performance Claims for the HydroFilter HF2i

The Hydroworks HydroFilter HF2i was tested by Alden Research Laboratory, Holden, Massachusetts, USA in 2020. The performance test results were verified by the Sir Sandford Fleming College of Applied Arts and Technology's Centre for Advancement of Water and Wastewater Technologies (CAWT) following the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol. The following performance claims were verified:

**Sediment Removal:** The Hydroworks HydroFilter HF2i (two-cartridge 'dry' filter system) removed at least 84.6% of cumulative TSS, based on a 95% confidence level, with a particle size distribution of 1-1000  $\mu\text{m}$  and an inlet test sediment concentration of 200 mg/L at a flow rate of 1.58 L/s (0.79 L/s per cartridge) based on 20 runs performed under controlled conditions during laboratory testing.

**Maximum Treatment Flow Rate (MTFR):** The Hydroworks HydroFilter two cartridge filter system has an MTFR of 25 gpm (0.06 cfs; 94.6 lpm) and an effective filtration treatment area (EFTA) of 12.57  $\text{ft}^2$  (1.17  $\text{m}^2$ ) (loading rate = 2.0 gpm/ $\text{ft}^2$ , 81.5 lpm/ $\text{m}^2$ ).

**Hydraulic Losses:** The maximum driving head, which was recorded at the end of run 20, was 1.96 ft (60 cm), which correlates to 0.08 ft (2.4 cm) below bypass.

## Technology Application

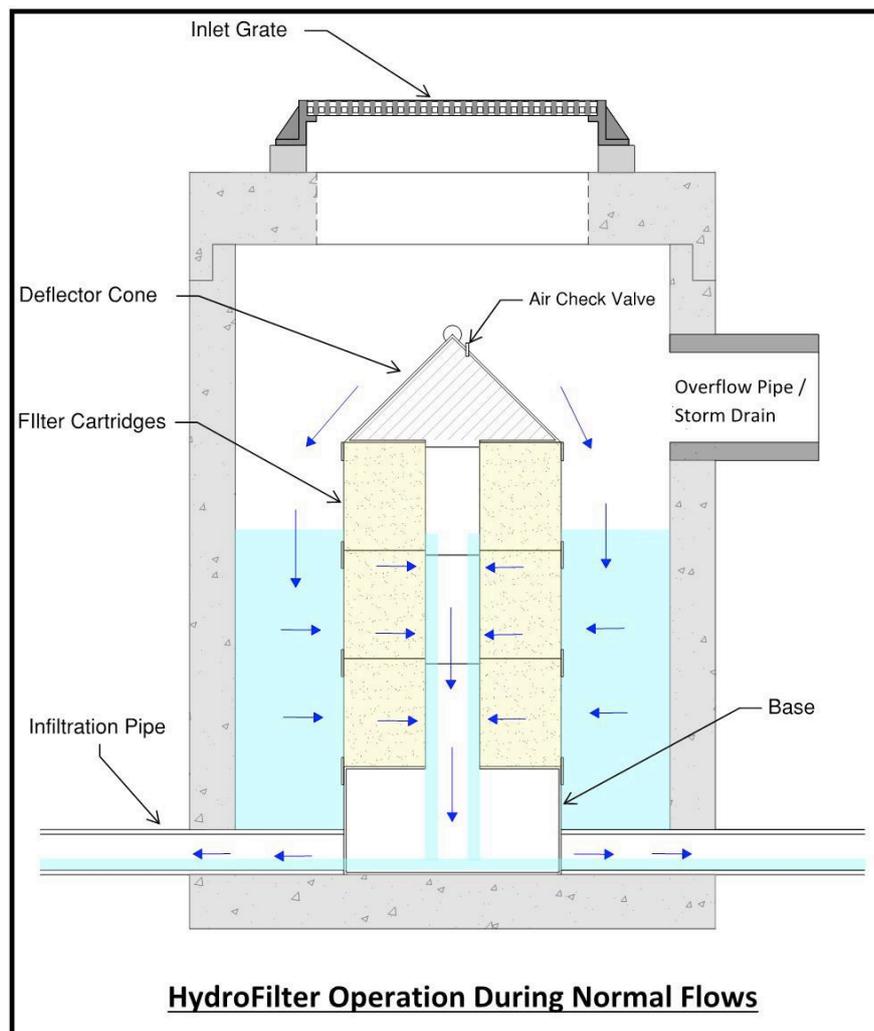
HydroFilter is a stormwater management device designed to both treat stormwater and facilitate its infiltration into the ground. The infiltration portion of HydroFilter is a removable component, which allows the HydroFilter to serve as either solely a filter or a filter with recharge capability for maintenance of the hydrologic cycle (i.e., groundwater/aquifer recharging and flood risk mitigation). This verification is specific to total suspended solids (TSS) removal.

## Technology Description

Under normal or low flows, water enters the HydroFilter through a grate or horizontal inlet pipe. Incoming water builds up around the filters and creates a pressure head to drive water radially into the filter cartridges from the outside through to the centre of the cartridge. There is a 6" (150 mm) diameter opening in the centre that is contiguous through the centre of each cartridge. Water reaching the centre of each cartridge falls by gravity into the base plug and is transported out of the structure by a standard storm drain and/or recharge pipes into the surrounding soil.

A solid high deflection cone 24" (61 cm) diameter by approximately 12" (30.5 cm) height with a check valve is located on top of the top filter cartridge to prevent incoming water from entering the 6" (15.2 cm) diameter opening, while still allowing air to escape from the centre of the cartridges as water enters the filters. High flows are bypassed through a high pipe in the HydroFilter.

A schematic of the Hydroworks HydroFilter is shown in Figure 1.



**Figure 1: Schematic of the Hydroworks HydroFilter**

**Description of Test Procedure**

Performance testing of the Hydroworks HydroFilter HF2i by Alden Laboratories was based on a “dry” filter, where the discharge point is below the cartridges such that it operates without the benefit of pre-treatment in a permanent pool. This differs from the “wet” configuration, which uses a weir wall to create a pre-treatment pool around the cartridges and allows for discharge above the cartridges by the head differential created by the weir wall.

The tested treatment filter (HF2i) was comprised of two (2) 24” (61 cm)-diameter x 12” (30.5 cm) high stacked interlocking filter cartridges installed inside a 3-ft diameter tank. Each cartridge contained a proprietary filter media. The inner and outer flow surfaces of the cartridges were perforated. The filter assembly was installed on a 24” (61 cm) diameter by 12” (30.5 cm) high base pedestal, which was sealed to the tank floor.

Water was transported into the tank by means of an 8” (20.3 cm) diameter inlet pipe, which discharged onto a sloped inlet containing a 24” (61 cm) storm grate. The flow was deflected around the annular space between the filter and tank, by the cone on top of the filters, and was transported radially through the cartridges.

A 6” (15.2 cm) centre opening transported the treated flow down into the base pedestal and into a 6” (15.2 cm) outlet pipe located at the bottom of the tank. The pipe was sealed to the pedestal and tank wall. A 6” (15.2 cm) bypass pipe was installed with the invert elevation at 3.04 ft (0.93 m). The pipe was connected to a tee in the outlet pipe upstream of the sampling point.

The annular area around the base pedestal (3.93 ft<sup>2</sup>, 0.36m<sup>2</sup>) was designed as a settling area for larger particles. A series of anti-scour pads were installed at the height of the pedestal to protect the captured sediment from scour.

**Verification Results**

A Verification Plan for the Hydroworks HydroFilter HF2i was prepared to guide the verification process based on the requirements of ISO 14034:2016 and the VerifiGlobal Performance Verification Protocol.

The CAWT verified the performance test data and other information pertaining to the Hydroworks HydroFilter HF2i based on performance testing conducted at Alden Labs, which followed the requirements outlined in the “*New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device, January 25, 2013*”. The intent of this protocol is to ensure that filtration manufactured treatment devices (MTDs) are tested under controlled conditions in a consistent, verifiable manner.

The HydroFilter HF2i technology performance claims verified by the CAWT are as follows:

|   |  |
|---|--|
| <b>Sediment Removal</b>                   | The Hydroworks HydroFilter HF2i (two-cartridge ‘dry’ filter system) removed at least 84.6% of cumulative TSS, based on a 95% confidence level, with a particle size distribution of 1-1000 µm and an inlet test sediment concentration of 200 mg/L at a flow rate of 1.58 L/s (0.79 L/s per cartridge) based on 20 runs performed under controlled conditions during laboratory testing. |
| <b>Maximum Treatment Flow Rate (MTFR)</b> | The Hydroworks HydroFilter two cartridge filter system has an MTFR of 25 gpm (0.06 cfs, 94.6 lpm) and an effective filtration treatment area (EFTA) of 12.57 ft <sup>2</sup> (1.17 m <sup>2</sup> ) (loading rate = 2.0 gpm/ft <sup>2</sup> , 81.5 lpm/m <sup>2</sup> ).   |
| <b>Hydraulic Losses</b>                   | The maximum driving head, which was recorded at the end of run 20, was 1.96 ft (60 cm), which correlates to 0.08 ft (2.4 cm) below bypass.   |

Removal efficiency is based on the ability of the filtration MTD to reduce the influent TSS concentration. TSS removal efficiency was established by the Effluent Sampling Test Method. As indicated in Table 1, the test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution (PSD) specified in

the “New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device, January 25, 2013”. The protocol requires that the three-sample average of the test sediment PSD meet the specified PSD. The allowable tolerance of 2% variation from the specified PSD curve was met at each discrete particle size tested and the d50 was finer than 75 µm.

**Table 1 – Test Sediment Particle Size Distribution**

| Particle Size (Microns)  | Target Minimum % Less Than* |
|--|-----------------------------|
| 1,000  | 100                         |
| 500  | 95                          |
| 250  | 90                          |
| 150  | 75                          |
| 100  | 60                          |
| 75   | 50                          |
| 50   | 45                          |
| 20   | 35                          |
| 8  | 20                          |
| 5  | 10                          |
| 2  | 5                           |
| <p><i>*A measured value may be lower than a target minimum % less than value by up to two percentage points (e.g., at least 3% of the particles must be less than 2 microns in size [target is 5%]), provided the measured d50 value does not exceed 75 microns.</i></p> |                             |

Laboratory testing of filters for TSS removal requires the use of a consistent PSD, which permits direct comparisons of filter products and a benchmark for filter design. The prescribed NJDEP PSD for filter testing (commonly referred to as the NJDEP PSD), is used by NJDEP for laboratory testing of both separators and filters.<sup>1</sup>

Figure 2 provides a comparison of average test sediment PSD to the PSD specified by NJDEP, indicating that the test sediment used for the removal test met the above-mentioned requirements. The median particle size (D<sub>50</sub>) was 60 µm. In addition, samples from test sediment batches used for each run met the specified PSD within the required tolerance thresholds.

The capacity of the device to remove sediment was quantified at the 100% MTR of 25 gpm (94.6 lpm) for 2 filter cartridges based on the Effluent Sampling Test Method. This method involved calculating the TSS concentration of the injected sediment, based on the mass injected and the volume of flow during the test period, and sampling the effluent leaving HydroFilter for each test run and calculating the average cumulative TSS removal efficiency.

The target influent total sediment concentration was 200 mg/L (+/-20 mg/L) for all tests. The allowed Coefficient of Variance (COV) for the measured samples was 0.10. The temperature of the supply water was below 26.7°C (80°F).

Five (5) time-stamped effluent samples and three (3) background samples of the supply water were collected from the end of the outlet pipe during each run. At the conclusion of each run, two (2) volume-based, evenly-spaced effluent samples were collected from the pipe during drawdown.

Table 2 provides the percent removal of cumulative TSS by the Hydroworks HydroFilter HF2i.

<sup>1</sup> Note: The NJDEP PSD is the same as the PSD specified for testing oil/grit separators under the “Procedure for Laboratory Testing of Oil/Grit Separators” (TRCA, 2014), which some jurisdictions in Canada call the Canadian ETV PSD.

Figure 2 – Average particle size distribution (PSD) of the 1-1000 micron test sediment used for the sediment removal test compared to the specified PSD (NJDEP specifications)

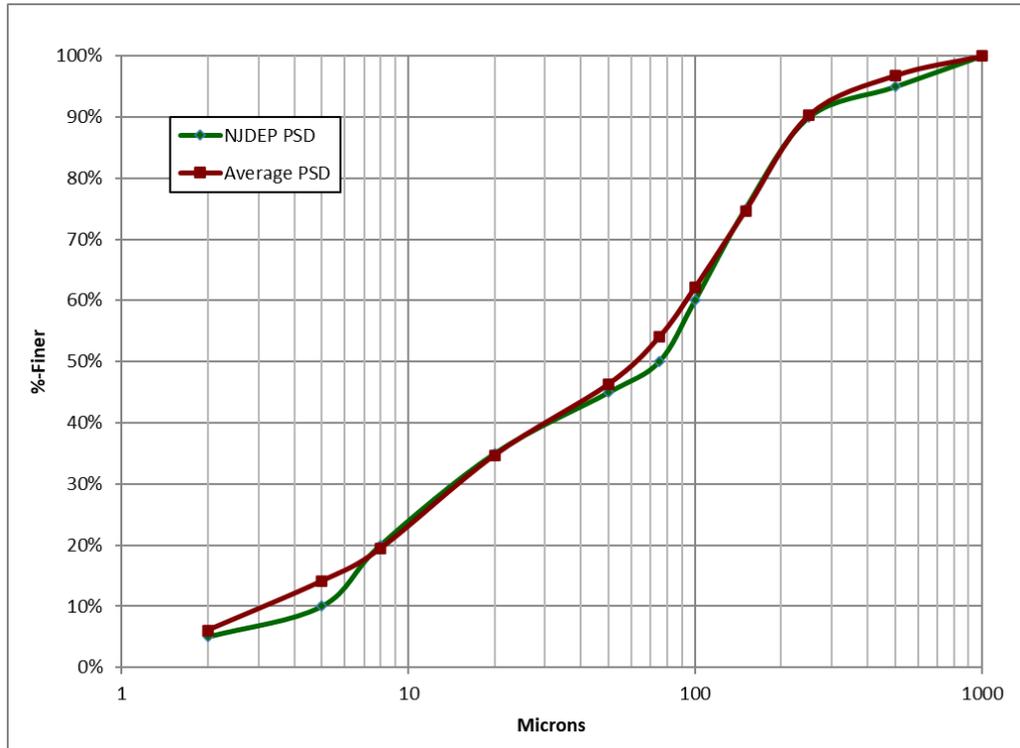


Table 2 – Removal efficiency summary (Source: Alden Report No.: 1182HF2i-R1)

| Run # | Average Influent Concentration | Average Adjusted Effluent Concentration | Average Adjusted Drawdown Concentration | Influent Volume | Effluent Volume | Drawdown Volume | Removal Efficiency | Cumulative Average |
|-------|--------------------------------|---|---|-----------------|-----------------|-----------------|--------------------|--------------------|
|       | mg/L                           | mg/L                                    | mg/L                                    | L               | L               | L               |                    |                    |
| 1     | 203                            | 27.6                                    | 19.3                                    | 3353            | 3253            | 100             | 86.5%              | 86.5%              |
| 2     | 202                            | 28.8                                    | 16.6                                    | 3350            | 3238            | 113             | 86.0%              | 86.2%              |
| 3     | 202                            | 31.4                                    | 23.1                                    | 3352            | 3226            | 126             | 84.6%              | 85.7%              |
| 4     | 200                            | 46.4                                    | 21.7                                    | 3364            | 3229            | 135             | 77.3%              | 83.6%              |
| 5     | 203                            | 35.1                                    | 22.0                                    | 3360            | 3216            | 144             | 83.0%              | 83.5%              |
| 6     | 200                            | 24.2                                    | 13.9                                    | 3361            | 3211            | 150             | 88.1%              | 84.2%              |
| 7     | 202                            | 22.9                                    | 16.5                                    | 3356            | 3199            | 157             | 88.8%              | 84.9%              |
| 8     | 202                            | 30.7                                    | 22.6                                    | 3357            | 3193            | 164             | 85.0%              | 84.9%              |
| 9     | 203                            | 33.0                                    | 17.6                                    | 3547            | 3375            | 171             | 84.1%              | 84.8%              |
| 10    | 200                            | 24.7                                    | 15.6                                    | 3548            | 3369            | 178             | 87.9%              | 85.1%              |
| 11    | 203                            | 24.7                                    | 15.8                                    | 3538            | 3356            | 182             | 88.0%              | 85.4%              |
| 12    | 201                            | 26.8                                    | 21.0                                    | 3561            | 3374            | 187             | 86.8%              | 85.5%              |
| 13    | 202                            | 35.7                                    | 17.9                                    | 3543            | 3351            | 192             | 82.8%              | 85.3%              |
| 14    | 203                            | 31.0                                    | 18.2                                    | 3545            | 3348            | 196             | 85.1%              | 85.3%              |
| 15    | 201                            | 26.2                                    | 19.7                                    | 3547            | 3348            | 199             | 87.1%              | 85.4%              |
| 16    | 202                            | 37.4                                    | 19.1                                    | 3554            | 3349            | 205             | 82.0%              | 85.2%              |
| 17    | 202                            | 27.6                                    | 13.8                                    | 3557            | 3351            | 206             | 86.7%              | 85.3%              |
| 18    | 201                            | 27.5                                    | 22.4                                    | 3553            | 3342            | 211             | 86.5%              | 85.3%              |
| 19    | 202                            | 32.6                                    | 18.0                                    | 3545            | 3333            | 212             | 84.3%              | 85.3%              |
| 20    | 202                            | 27.4                                    | 23.7                                    | 3548            | 3333            | 215             | 86.5%              | 85.3%              |



Scour testing was done after the sediment removal tests based on the sediment collected in the sump. Subsequent tests with and without the scour pads indicated acceptable scour (average TSS <2mg/l) in both cases, suggesting that the anti-scour pads have minimal impact on preventing sediment scour. HydroFilter can be used online based on current regulatory standards as long as the maximum conveyance rate of the drainage system does not exceed the maximum conveyance rate used for scour testing (*“New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device”, NJDEP, 2023*).

**Quality Assurance**

A number of Quality Assurance (QA)/Quality Control (QC) measures are documented in the *“New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device, January 25, 2013”* to ensure results are accurate and precise, and that tests conducted by multiple vendors of the same category of technology are employing the same test method. The QA/QC measures include the use of certified laboratories, established test methods, calibration of equipment, tolerance limits for results variation, data checks during testing, and stringent documentation requirements.

The verifier, the CAWT, has confirmed that quality assurance requirements were addressed throughout the HydroFilter performance testing process and in the generation of performance test results. This includes reviewing all data sheets and data downloads, as well as overall management of the test system, quality control and data integrity. QA/QC parameters reviewed and validated by the verifier are summarized in Table 3, including the acceptance criteria for particle size distribution, solids concentration in test water, water temperature, flow measurement equipment, flow rate variation, head measurement equipment, sediment feed, sediment moisture content, and sample analysis.

**Table 3 - Validation of QA/QC Procedures**

| QC Parameter                       | Acceptance Criteria   |
|------------------------------------|---|
| Particle Size Distribution         | Analyzed by a certified laboratory (GeoTesting Express) in accordance with ASTM D422-63(2007)e1.<br><br>The particle size utilized for testing was the NJDEP particle size distribution (Table 1). The allowable tolerance of 2% variation from the specified PSD curve was met at each discrete particle size tested and the d50 was finer than 75 µm. |
| Solids concentration in test water | Total suspended solids (TSS) concentration of test water (background TSS) of less than 20 mg/L.<br><br>TSS analyzed in accordance with ASTM: D3977-97 (re-approval 2019).   |
| Water temperature                  | Temperature of water less than 26.7°C (80°F)  |
| Flow measurement equipment         | Equipment calibration reports submitted to confirm that reported flow rate match actual flow rate.<br><br>Flow rates from calibrated flow instruments recorded at no longer than 60 second intervals over the duration of the test.   |
| Head measurement equipment         | The water level recorded at a minimum of five-minute intervals.<br><br>The minimum tolerance of the standpipe was within +/- 0.125 inches (0.32 cm).  |



|                           |   |
|---------------------------|---|
| Sediment feed             | TSS concentration target = 200 mg/L with a tolerance limit of $\pm 20$ mg/L. The allowed Coefficient of Variance (COV) for the measured samples was 0.10. |
| Sediment moisture content | Determined by ASTM D4959-07 “ <i>Standard Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating</i> ”.                      |
| Sample analysis           | Conducted by qualified laboratories using standard methods and meeting the requirements of ISO.   |

**9. Verification Summary**

In summary, the HydroFilter HF2i is a viable technology that, when sized appropriately, can be used to filter sediment from stormwater runoff.

Verification of performance claims for the Hydroworks HydroFilter was conducted by the CAWT based on independent third-party performance test results provided by Alden Research Laboratory, as well as additional information provided by Hydroworks on the operation of the technology. The verification follows the requirements outlined in the HydroFilter Verification Plan, which is based on the ISO 14034 ETV standard. The verified performance claims are provided in Table 4.

**Table 4 - Verified Performance Claims for the HydroFilter HF2i**

| Parameter               | Verified Claim  | Accuracy  |
|-------------------------|---|---|
| <b>Sediment Removal</b> | During the sediment removal efficiency test, the HydroFilter HF2i (two-cartridge ‘dry’ filter system) removed at least 84.6% of cumulative TSS, based on a 95% confidence level, with a particle size distribution of 1-1000 $\mu\text{m}$ and an inlet test sediment concentration of 200 mg/L at a flow rate of 1.58 L/s (0.79 L/s per cartridge) based on 20 runs performed under controlled conditions during laboratory testing. | <p>Sediment removal characteristics were quantified at the maximum treatment flow rate (MTFR) of 25 gallons per minute (gpm) (94.6 liters per minute (lpm)), with a particle size distribution (PSD) gradation of 1-1000 micron fractions. The target influent total sediment concentration was 200 mg/L (<math>\pm 20</math> mg/L) for all tests. The allowed Coefficient of Variance (COV) for the measured samples was 0.10. The temperature of the supply water was below 26.7 °C (80 °F).</p> <p>Five (5) time-stamped effluent samples and three (3) background samples of the supply water were collected from the end of the outlet pipe during each run. At the conclusion of each run, two (2) volume-based evenly-spaced effluent samples were collected from the pipe during drawdown.</p> <p>Collected samples were analyzed for Total Suspended Solids (TSS) concentration. The average cumulative TSS removal efficiencies were calculated using the injected influent sediment concentrations.</p> <p>Performance testing of the Hydroworks HydroFilter HF2i by Alden Laboratories was based on a “dry” filter, where the discharge point is below the cartridges such that it operates without the benefit of pre-treatment in a permanent pool. This differs from the “wet” configuration, which uses a weir wall to create a pre-treatment pool around the cartridges and allows for discharge above the cartridges by the head differential created by the weir wall.</p> |

**Hydroworks HydroFilter HF2i  
Verification Statement**



|  |   |   |
|--|---|---|
| <p><b>Maximum Treatment Flow Rate (MTFR)</b></p> | <p>The HydroFilter two cartridge filter system has an MTFR of 25 gpm (0.06 cfs, 94.6 lpm) and an effective filtration treatment area (EFTA) of 12.57 ft<sup>2</sup> (1.17 m<sup>2</sup>) (loading rate = 2.0 gpm/ft<sup>2</sup>, 81.5 lpm/m<sup>2</sup>).</p> | <p>Flow rates from calibrated flow instruments were recorded at no longer than 60 second intervals over the duration of the test.</p> <p>Instrument calibration reports were submitted with the final technical report.</p> <p>The accuracy of the flow measurement is ±1%.</p> |
| <p><b>Hydraulic Losses</b></p>                   | <p>The maximum driving head, which was recorded at the end of run 20, was 1.96 ft (60 cm), which correlates to 0.08 ft (2.4 cm) below bypass.</p>   | <p>Accuracy of the readings was 0.3 mm.</p>   |



**What is ISO 14034?**

The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively. The International Organization for Standardization (ISO) standard for environmental technology verification (ETV) is ISO 14034, which was published in November 2016.

**Benefits of ETV**

ETV contributes to protection and conservation of the environment by promoting and facilitating market uptake of innovative environmental technologies, especially those that perform better than relevant alternatives. ETV is particularly applicable to those environmental technologies whose innovative features or performance cannot be fully assessed using existing standards. Through the provision of objective evidence, ETV provides an independent and impartial confirmation of the performance of an environmental technology based on reliable test data. ETV aims to strengthen the credibility of new, innovative technologies by supporting informed decision-making among interested parties.

|   |   |
|---|---|
| For more information on the HydroFilter technology, contact:  | For more information on VerifiGlobal, contact:  |
| Hydroworks LLC.<br>257 Cox St., Roselle, NJ 07203 USA<br>T: +1-888-290-7900<br>E: gbryant@hydroworks.com<br>W: https://hydroworks.com           | VerifiGlobal c/o ETA-Danmark A/S<br>Göteborg Plads 1, DK-2150 Nordhaven<br>T: +45 7224 5900<br>E: info@verifiglobal.com<br>W: www.verifiglobal.com  |
| Signed for Hydroworks:<br><br><br><br>Graham Bryant<br>Owner | Signed for VerifiGlobal:<br><br><br>Thomas Bruun<br>Managing Director<br><br><br>John Neate<br>Managing Director |

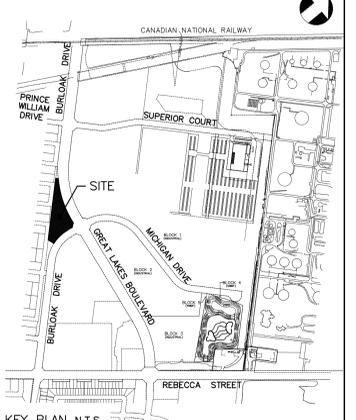
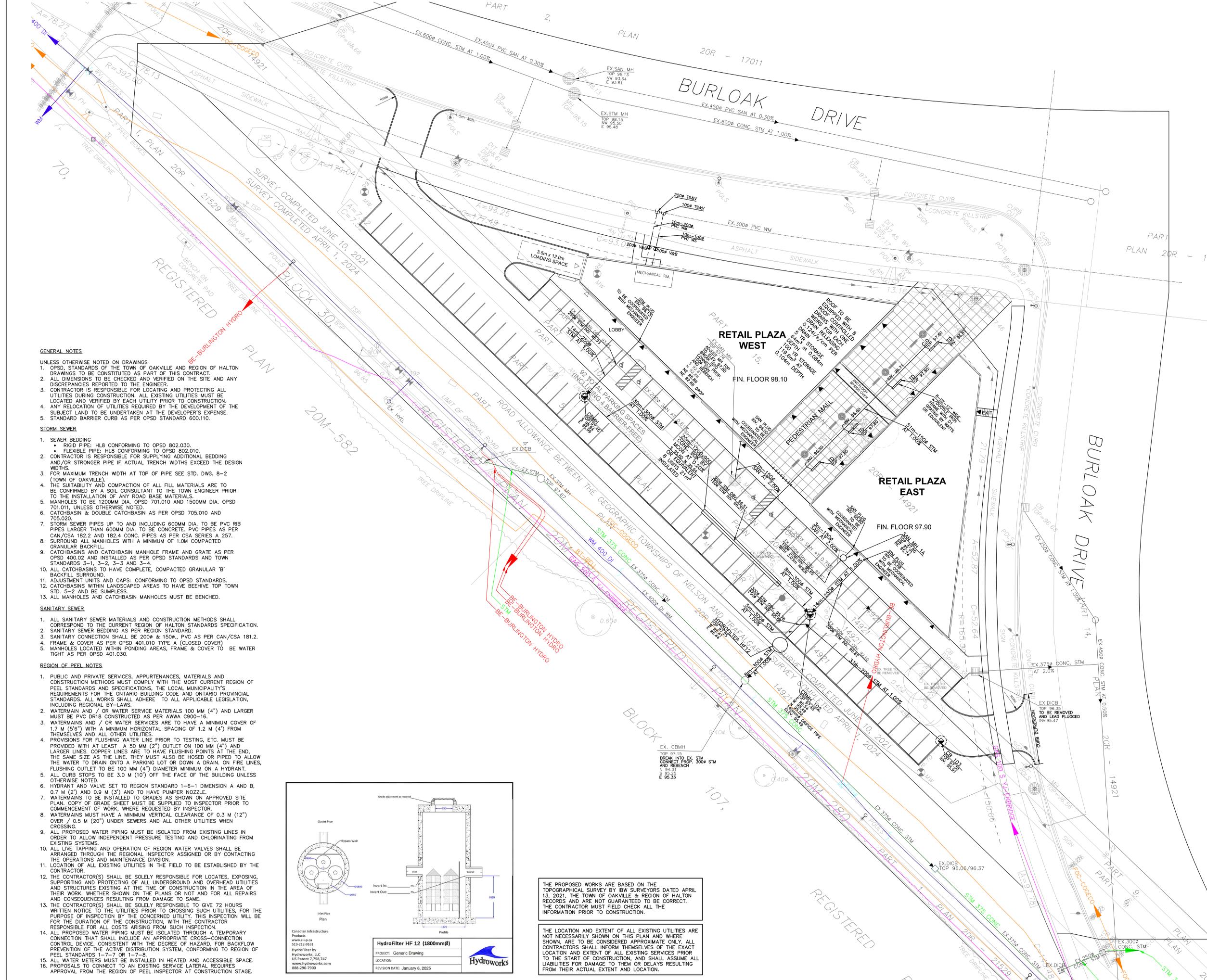
**NOTICE:** Verifications are based on an evaluation of technology performance under specific, predetermined operational conditions and parameters and the appropriate quality assurance procedures. VerifiGlobal and the Verification Expert, the CAWT, make no expressed or implied warranties as to the performance of the technology and do not certify that a technology will always operate as verified. The end user is solely responsible for complying with any and all applicable regulatory requirements. Mention of commercial product names does not imply endorsement.

VerifiGlobal and the Verification Expert, the CAWT, provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

# APPENDIX C

## Drawings

- Site Servicing Plan (S1)
  - Site Grading Plan (G1)
  - Sediment Control Plan (SED1)
-



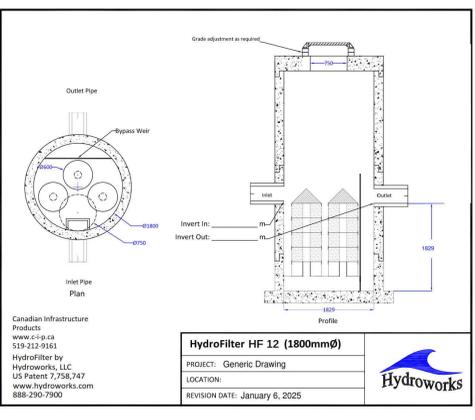
KEY PLAN n.t.s.  
 TOPOGRAPHICAL INFORMATION IS TAKEN FROM:  
 PART OF LOT 35, CONCESSION 3  
 SOUTH OF DUNDAS STREET  
 (GEOGRAPHIC TOWNSHIP OF TRAFALGAR)  
 CITY OF BURLINGTON

ELEVATION NOTE:  
 ELEVATIONS ARE GEODETIC AND REFERRED TO THE CITY  
 OF BURLINGTON BENCHMARK 391 AND HAVING A GEODETIC  
 ELEVATION OF 91.233 METERS

- LEGEND**
- PROPOSED STORM
  - PROPOSED SANITARY
  - PROPOSED HYDRANT
  - ⊕ PROPOSED VALVE & BOX
  - PROPOSED WATERMAIN
  - PROPOSED SAMESIDE CONNECTION
  - ▣ PROPOSED SINGLE CATCHBASIN
  - ▣ PROPOSED DOUBLE CATCHBASIN
  - ⊕ PROPOSED WATER METER w/ BACKFLOW PREVENTOR
  - ▨ STORM SEWER INSULATION AS PER DETAIL ON THIS PLAN

- GENERAL NOTES**
- UNLESS OTHERWISE NOTED ON DRAWINGS
  - OPSD STANDARDS OF THE TOWN OF OAKVILLE AND REGION OF HALTON DRAWINGS TO BE CONSTITUTED AS PART OF THIS CONTRACT.
  - ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE SITE AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
  - CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. ALL EXISTING UTILITIES MUST BE LOCATED AND VERIFIED BY EACH UTILITY PRIOR TO CONSTRUCTION. ANY RELOCATION OF UTILITIES REQUIRED BY THE DEVELOPER OF THE SUBJECT LAND TO BE UNDERTAKEN AT THE DEVELOPER'S EXPENSE.
  - STANDARD BARRIER CURB AS PER OPSD STANDARD 600.110.
- STORM SEWER**
- SEWER BEDDING
    - RIGID PIPE: HL8 CONFORMING TO OPSD 802.030.
    - FLEXIBLE PIPE: HL8 CONFORMING TO OPSD 802.010.
  - CONTRACTOR IS RESPONSIBLE FOR SUPPLYING ADDITIONAL BEDDING AND/OR STRONGER PIPE IF ACTUAL TRENCH WIDTHS EXCEED THE DESIGN WIDTHS.
  - FOR MAXIMUM TRENCH WIDTH AT TOP OF PIPE SEE STD. DWG. 8-2 (TOWN OF OAKVILLE).
  - THE STABILITY AND COMPACTION OF ALL FILL MATERIALS ARE TO BE CONFIRMED BY A SOIL CONSULTANT TO THE TOWN ENGINEER PRIOR TO THE INSTALLATION OF ANY ROAD BASE MATERIALS.
  - MANHOLES TO BE 1200MM DIA. OPSD 701.010 AND 1500MM DIA. OPSD 701.011, UNLESS OTHERWISE NOTED.
  - CATCHBASIN & DOUBLE CATCHBASIN AS PER OPSD 705.010 AND 705.020.
  - STORM SEWER PIPES UP TO AND INCLUDING 600MM DIA. TO BE PVC RIB PIPES LARGER THAN 600MM DIA. TO BE CONCRETE. PVC PIPES AS PER CAN/CSA 182.2 AND 182.4 CONC. PIPES AS PER CSA SERIES A 257.
  - SURROUND ALL MANHOLES WITH A MINIMUM OF 1.0M COMPACTED GRANULAR BACKFILL.
  - CATCHBASIN AND CATCHBASIN MANHOLE FRAME AND GRATE AS PER OPSD 400.02 AND INSTALLED AS PER OPSD STANDARDS AND TOWN STANDARDS 3-1, 3-2, 3-3 AND 3-4.
  - ALL CATCHBASINS TO HAVE COMPLETE, COMPACTED GRANULAR 'B' BACKFILL SURROUND.
  - ADJUSTMENT UNITS AND CAPS: CONFORMING TO OPSD STANDARDS.
  - CATCHBASINS WITHIN LANDSCAPED AREAS TO HAVE BEEHIVE TOP TOWN STD. 5-2 AND BE SUMPLESS.
  - ALL MANHOLES AND CATCHBASIN MANHOLES MUST BE BENCHED.
- SANITARY SEWER**
- ALL SANITARY SEWER MATERIALS AND CONSTRUCTION METHODS SHALL CORRESPOND TO THE CURRENT REGION OF HALTON STANDARDS SPECIFICATION.
  - SANITARY SEWER BEDDING AS PER REGION STANDARD.
  - SANITARY CONNECTION SHALL BE 200# & 150# PVC AS PER CAN/CSA 181.2.
  - FRAME & COVER AS PER OPSD 401.010. TYVEK COVERED.
  - MANHOLES LOCATED WITHIN PONDING AREAS, FRAME & COVER TO BE WATER TIGHT AS PER OPSD 401.030.

- REGION OF PEEL NOTES**
- PUBLIC AND PRIVATE SERVICES, APPURTENANCES, MATERIALS AND CONSTRUCTION METHODS MUST COMPLY WITH THE MOST CURRENT REGION OF PEEL STANDARDS AND SPECIFICATIONS. THE LOCAL MUNICIPALITY REQUIREMENTS FOR THE ONTARIO BUILDING CODE AND ONTARIO PROVINCIAL STANDARDS. ALL WORKS SHALL ADHERE TO ALL APPLICABLE LEGISLATION, INCLUDING REGIONAL BY-LAWS.
  - WATERMAIN AND / OR WATER SERVICE MATERIALS 100 MM (4") AND LARGER MUST BE PVC DR18 CONSTRUCTED AS PER AWWA C900-16.
  - WATERMANS AND / OR WATER SERVICES ARE TO HAVE A MINIMUM COVER OF 1.7 M (5'6") WITH A MINIMUM HORIZONTAL SPACING OF 1.2 M (4") FROM THEMSELVES AND ALL OTHER UTILITIES.
  - PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED WITH AT LEAST A 50 MM (2") OUTLET ON 100 MM (4") AND LARGER LINES. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. THEY MUST ALSO BE HOSED OR PIPED TO ALLOW THE WATER TO DRAIN ONTO A PARKING LOT OR DOWN A DRAIN. ON FIRE LINES, FLUSHING OUTLET TO BE 100 MM (4") DIAMETER MINIMUM ON A HYDRANT.
  - ALL CURB STOPS TO BE 3.0 M (10') OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED.
  - HYDRANT AND VALVE SET TO REGION STANDARD 1-6-1 DIMENSION A AND B, 0.7 M (2') AND 0.9 M (3') AND TO HAVE PUMPER NOZZLE.
  - WATERMANS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED SITE PLAN. COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHERE REQUESTED BY INSPECTOR.
  - WATERMANS MUST HAVE A MINIMUM VERTICAL CLEARANCE OF 0.3 M (12") OVER / 0.5 M (20") UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING.
  - ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM EXISTING SYSTEMS.
  - ALL LIVE TAPPING AND OPERATION OF REGION WATER VALVES SHALL BE ARRANGED THROUGH THE REGIONAL INSPECTOR ASSIGNED OR BY CONTACTING THE OPERATIONS AND MAINTENANCE DIVISION.
  - LOCATION OF ALL EXISTING UTILITIES IN THE FIELD TO BE ESTABLISHED BY THE CONTRACTOR.
  - THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE FOR LOCATES, EXPOSING, SUPPORTING AND PROTECTING OF ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF THEIR WORK, WHETHER SHOWN ON THE PLANS OR NOT AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
  - THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO THE UTILITIES PRIOR TO CROSSING SUCH UTILITIES. FOR THE PURPOSE OF INSPECTION BY THE CONCERNED UTILITY. THIS INSPECTION WILL BE FOR THE DURATION OF THE CONSTRUCTION, WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTION.
  - ALL PROPOSED WATER PIPING MUST BE ISOLATED THROUGH A TEMPORARY CONNECTION THAT SHALL INCLUDE AN APPROPRIATE CROSS-CONNECTION CONTROL DEVICE, CONSISTENT WITH THE DEGREE OF HAZARD, FOR BACKFLOW PREVENTION OF THE ACTIVE DISTRIBUTION SYSTEM, CONFORMING TO REGION OF PEEL STANDARDS 1-7-7 OR 1-7-8.
  - ALL WATER METERS MUST BE INSTALLED IN HEATED AND ACCESSIBLE SPACE.
  - PROPOSALS TO CONNECT TO AN EXISTING SERVICE LATERAL REQUIRES APPROVAL FROM THE REGION OF PEEL INSPECTOR AT CONSTRUCTION STAGE.



THE PROPOSED WORKS ARE BASED ON THE TOPOGRAPHICAL SURVEY BY IBW SURVEYORS DATED APRIL 13, 2021, THE TOWN OF OAKVILLE & REGION OF HALTON RECORDS AND ARE NOT GUARANTEED TO BE CORRECT. THE CONTRACTOR MUST FIELD CHECK ALL THE INFORMATION PRIOR TO CONSTRUCTION.

THE LOCATION AND EXTENT OF ALL EXISTING UTILITIES ARE NOT NECESSARILY SHOWN ON THIS PLAN AND WHERE SHOWN, ARE TO BE CONSIDERED APPROXIMATE ONLY. ALL CONTRACTORS SHALL INFORM THEMSELVES OF THE EXACT LOCATION AND EXTENT OF ALL EXISTING SERVICES PRIOR TO THE START OF CONSTRUCTION, AND SHALL ASSUME ALL LIABILITIES FOR DAMAGE TO THEM OR DELAYS RESULTING FROM THEIR ACTUAL EXTENT AND LOCATION.

| Rev. # | Details               | Date       |
|--------|-----------------------|------------|
| 2.     | REVISED AS PER SP     | 2026.01.16 |
| 1.     | ISSUED FOR SUBMISSION | 2025.10.20 |

LICENSED PROFESSIONAL ENGINEER  
 AN. 16, 2026  
 A. JAWORSKI  
 10010267  
 PROVINCE OF ONTARIO

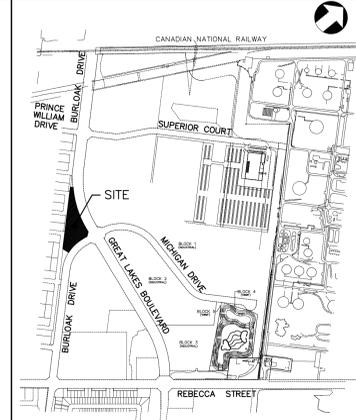
ANDRZEJ JAWORSKI, P. ENG.  
 CONSULTING ENGINEER

**Urbtech Engineering Inc.**  
 1200 Spence Road, Suite 8, Oakville, ON L6L 2X4  
 Telephone: 905 896 7364

**BURLOAK PLAZA**  
 ABDULLAH AL EYADEH  
 580 BURLOAK DRIVE  
 TOWN OF OAKVILLE

**SITE SERVICING PLAN**

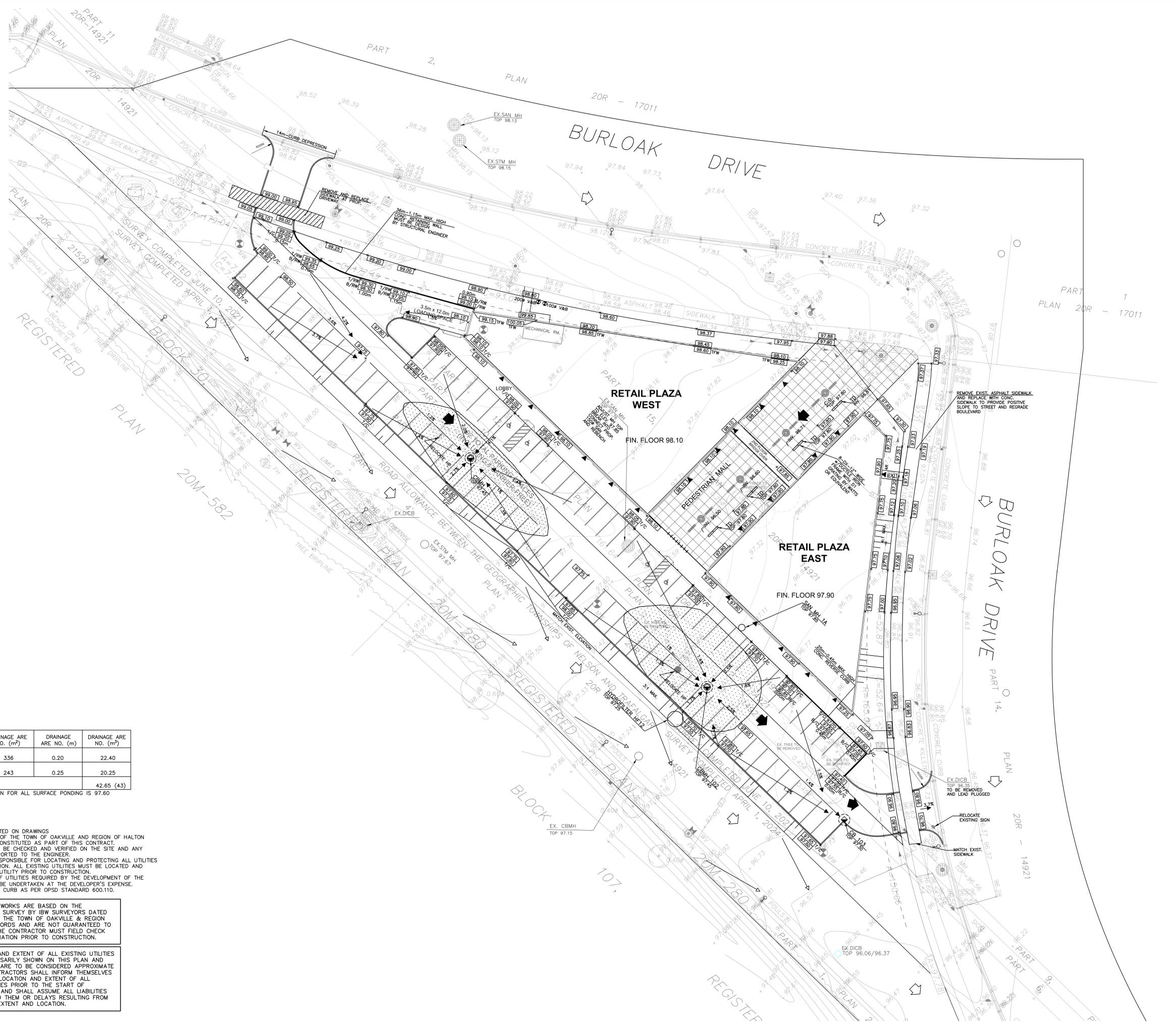
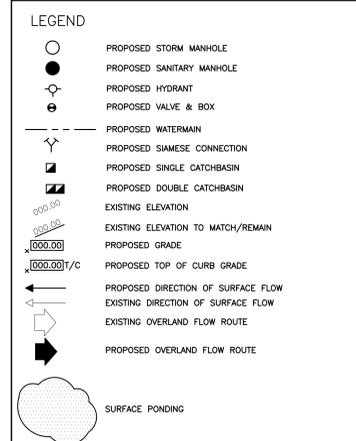
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|------------------|----------------------|----------|
| SCALE: 1:250     | PROJECT No. 24-484   | PLAN No. |
| DRAWN BY: G.J.   | SITE PLAN No.        | S1       |
| CHECKED BY: A.J. | XXXXXXXXXXXXXXXXXXXX |          |



KEY PLAN N.T.S.

TOPOGRAPHICAL INFORMATION IS TAKEN FROM:  
 PART OF LOT 35, CONCESSION 3  
 SOUTH OF DUNDAS STREET  
 (GEOGRAPHIC TOWNSHIP OF TRAFALGAR)  
 CITY OF BURLINGTON

ELEVATION NOTE:  
 ELEVATIONS ARE GEODETIC AND REFERRED TO THE CITY  
 OF BURLINGTON BENCHMARK 391 AND HAVING A GEODETIC  
 ELEVATION OF 91.233 METERS



PONDING TABLE

| DRAINAGE AREA NO. | DRAINAGE ARE NO. (m <sup>2</sup> ) | DRAINAGE ARE NO. (m) | DRAINAGE ARE NO. (m <sup>2</sup> ) |
|-------------------|------------------------------------|----------------------|------------------------------------|
| 102               | 336                                | 0.20                 | 22.40                              |
| 101               | 243                                | 0.25                 | 20.25                              |
| TOTAL STORAGE     |                                    |                      | 42.65 (43)                         |

THE SPILL ELEVATION FOR ALL SURFACE PONDING IS 97.60

- GENERAL NOTES
- UNLESS OTHERWISE NOTED ON DRAWINGS
  - OPSD, STANDARDS OF THE TOWN OF OAKVILLE AND REGION OF HALTON DRAWINGS TO BE CONSTITUTED AS PART OF THIS CONTRACT.
  - ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE SITE AND ANY DISCREPANCIES REPORTED TO THE ENGINEER.
  - CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES DURING CONSTRUCTION. ALL EXISTING UTILITIES MUST BE LOCATED AND VERIFIED BY EACH UTILITY PRIOR TO CONSTRUCTION.
  - ANY RELOCATION OF UTILITIES REQUIRED BY THE DEVELOPMENT OF THE SUBJECT LAND TO BE UNDERTAKEN AT THE DEVELOPER'S EXPENSE.
  - STANDARD BARRIER CURB AS PER OPSD STANDARD 600.110.

THE PROPOSED WORKS ARE BASED ON THE TOPOGRAPHICAL SURVEY BY IAW SURVEYORS DATED APRIL 13, 2021, THE TOWN OF OAKVILLE & REGION OF HALTON RECORDS AND ARE NOT GUARANTEED TO BE CORRECT. THE CONTRACTOR MUST FIELD CHECK ALL THE INFORMATION PRIOR TO CONSTRUCTION.

THE LOCATION AND EXTENT OF ALL EXISTING UTILITIES ARE NOT NECESSARILY SHOWN ON THIS PLAN AND WHERE SHOWN, ARE TO BE CONSIDERED APPROXIMATE ONLY. ALL CONTRACTORS SHALL INFORM THEMSELVES OF THE EXACT LOCATION AND EXTENT OF ALL EXISTING SERVICES PRIOR TO THE START OF CONSTRUCTION, AND SHALL ASSUME ALL LIABILITIES FOR DAMAGE TO THEM OR DELAYS RESULTING FROM THEIR ACTUAL EXTENT AND LOCATION.

|        |                       |            |
|--------|-----------------------|------------|
| 2.     | REVISED AS PER SP     | 2026.01.16 |
| 1.     | ISSUED FOR SUBMISSION | 2025.10.20 |
| Rev. # | Details               | Date       |

ANDRZEJ JAWORSKI, P. ENG.  
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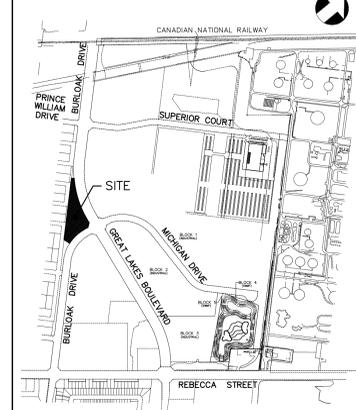
**BURLOAK PLAZA**  
 ABDULLAH AL AYADEH  
 580 BURLOAK DRIVE  
 TOWN OF OAKVILLE

**SITE GRADING PLAN**

|            |       |                      |        |          |    |
|------------|-------|----------------------|--------|----------|----|
| SCALE      | 1:250 | PROJECT No.          | 24-484 | PLAN No. |    |
| DRAWN BY   | G.J.  | SITE PLAN No.        |        |          | G1 |
| CHECKED BY | A.J.  | XXXXXXXXXXXXXXXXXXXX |        |          |    |

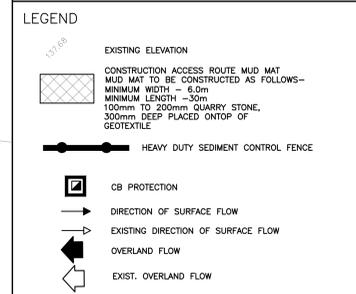
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THE LOCATION AND EXTENT OF ALL EXISTING UTILITIES ARE NOT NECESSARILY SHOWN ON THIS PLAN AND WHERE SHOWN, ARE TO BE CONSIDERED APPROXIMATE ONLY. ALL CONTRACTORS SHALL INFORM THEMSELVES OF THE EXACT LOCATION AND EXTENT OF ALL EXISTING SERVICES PRIOR TO THE START OF CONSTRUCTION, AND SHALL ASSUME ALL LIABILITIES FOR DAMAGE TO THEM OR DELAYS RESULTING FROM THEIR ACTUAL EXTENT AND LOCATION.



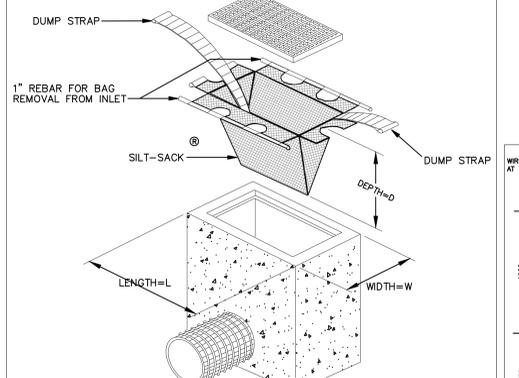
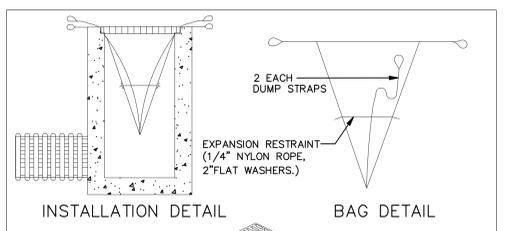
TOPOGRAPHICAL INFORMATION IS TAKEN FROM: PART OF LOT 35, CONCESSION 3 SOUTH OF DUNDAS STREET (GEOGRAPHIC TOWNSHIP OF TRAFALGAR) CITY OF BURLINGTON

ELEVATION NOTE: ELEVATIONS ARE GEODETIC AND REFERRED TO THE CITY OF BURLINGTON BENCHMARK 391 AND HAVING A GEODETIC ELEVATION OF 91.233 METERS

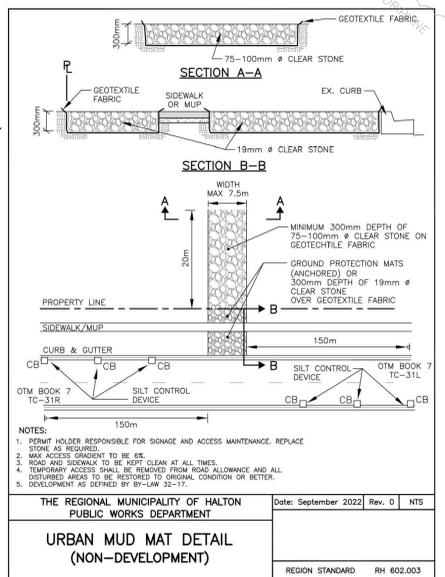


**SEDIMENT AND EROSION CONTROL**

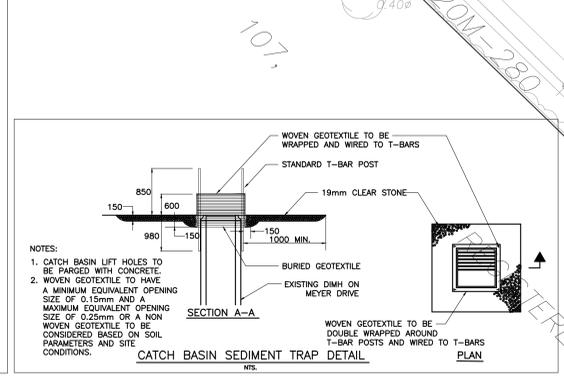
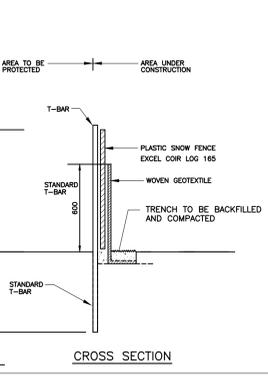
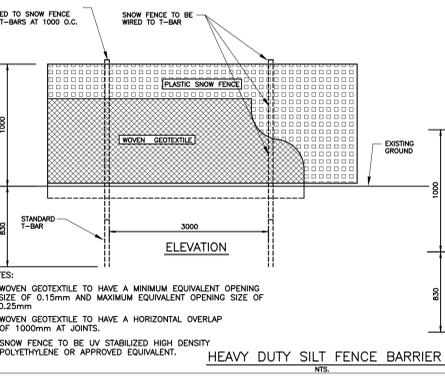
- ALL SEDIMENT CONTROL FENCING IS TO BE ERRECTED PRIOR TO THE COMMENCEMENT OF ANY SITE GRADING OPERATIONS.
- ALL ROADSIDE CATCHBASINS TO HAVE SEDIMENT PROTECTION INSTALLED IMMEDIATELY AFTER CATCHBASIN INSTALLATION. SEDIMENT PROTECTION BARRIER TO BE MAINTAINED ON A REGULAR BASIS OR TO THE SATISFACTION OF THE TOWN OF OAKVILLE.
- THE TOPSOIL STRIPPED FROM THE SITE SHALL BE STOCKPILED ON THE UNDEVELOPED AREA AND PROTECTED WITH SEDIMENT FENCE.
- ALL EROSION AND SEDIMENT CONTROL MEASURE ARE TO BE REGULARLY INSPECTED AND MAINTAINED, AS REQUIRED, TO THE SATISFACTION OF THE TOWN OF OAKVILLE.
- THE SEDIMENT DEVICES, MUST BE REPAIRED, CLEANED AND/OR REPLACED IF NECESSARY OR AS DIRECTED BY THE ENGINEER.
- THE ACCUMULATED SEDIMENT IN CATCHBASIN MUST BE REMOVED, WHEN NECESSARY. DURING ALL CONSTRUCTION PHASES, MUD TRACKING CONTROL, CONSISTING OF FLUSHING AND SWEEPING ROADS, IS TO BE PROVIDED FOR ALL ROADS, AS WARRANTED.
- ALL THE SEDIMENT CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL ALL CONSTRUCTION, GRADING TOPSOILING AND SODDING IS COMPLETED.
- WHEN ALL CONSTRUCTION, GRADING AND SODDING IS COMPLETED THE SEDIMENT CONTROL DEVICES SHALL BE REMOVED AND THE DISTURBED AREAS SHALL BE REINSTATED.
- SILTATION CONTROL WILL BE INSTALLED AND MAINTAINED DURING CONSTRUCTION IN EXISTING CATCHBASIN WITHIN THE PROPERTY.
- ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED ACCORDING TO THE APPROVED PLANS PRIOR TO COMMENCEMENT OF ANY EARTH MOVING WORK ON THE SITE AND SHALL REMAIN IN PLACE UNTIL ALL DISTURBED AREAS ARE STABILIZED WITH THE INTENDED GROUND COVER.
- EROSION AND SEDIMENT CONTROLS SHALL BE INSPECTED BY THE BUILDER/DEVELOPER:
  - WEEKLY
  - BEFORE AND AFTER ANY PREDICTED RAINFALL EVENT
  - FOLLOWING AN UNPREDICTED RAINFALL EVENT
  - DAILY, DURING EXTENDED DURATION RAINFALL EVENTS
  - AFTER SIGNIFICANT SNOW MELT EVENTS
- EROSION AND SEDIMENT CONTROLS SHALL BE MAINTAINED IN PROPER WORKING ORDER AT ALL TIMES. DAMAGED OR CLOGGED DEVICES SHALL BE REPAIRED WITHIN 48 HOURS.
- WHERE A SITE REQUIRES DEWATERING AND WHERE THE EXPELLED WATER CAN BE FREELY RELEASED TO A SUITABLE RECEIVER, THE EXPELLED WATER SHALL BE TREATED TO CAPTURE SUSPENDED PARTICLES GREATER THAN 40 MICRON IN SIZE. THE CAPTURED SEDIMENT SHALL BE DISPOSED OF PROPERLY PER MOEC GUIDELINES. THE CLEAN EXPELLED WATER SHALL FREELY RELEASE TO A SUITABLE RECEIVER THAT DOES NOT CREATE DOWNSTREAM ISSUES INCLUDING BUT NOT LIMITED TO EROSION, FLOODING -NUISANCE OR OTHERWISE, INTERFERENCE ISSUES, ETC.



- NOTE:
- SILT-SACK DEVICE TO BE INSTALLED AS PER MANUFACTURERS SPECIFICATIONS.
  - SILT-SACK TO BE REGULAR-FLOW TYPE.
  - SILT-SACK DEPTH (D) TO BE 1.0m (3'). LENGTH & WIDTH (LxW) TO BE AS REQUIRED TO FIT SINGLE/DOUBLE CATCH BASINS.
  - THIS CATCHBASIN SEDIMENT CONTROL TO BE INSTALLED ON ALL CATCHBASIN AND INSPECTED MONTHLY. THIS DEVICES SHALL BE REMOVED IN WINTER TO DRAIN DURING THAWS.



THE REGIONAL MUNICIPALITY OF HALTON PUBLIC WORKS DEPARTMENT Date: September 2022 Rev. 0 NTS REGION STANDARD RH 602.003



- NOTE:
- CATCH BASIN LIFT HOLES TO BE PARGED WITH CONCRETE
  - WOVEN GEOTEXTILE TO HAVE A MINIMUM EQUIVALENT OPENING SIZE OF 0.15mm AND A MAXIMUM EQUIVALENT OPENING SIZE OF 0.25mm OR A NON WOVEN GEOTEXTILE TO BE CONSIDERED BASED ON SOIL PARAMETERS AND SITE CONDITIONS.

|        |                       |            |
|--------|-----------------------|------------|
| 2.     | REVISED AS PER SP     | 2026.01.16 |
| 1.     | ISSUED FOR SUBMISSION | 2025.10.20 |
| Rev. # | Details               | Date       |



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**BURLOAK PLAZA**  
ABDULLAH AL EYADEH  
580 BURLOAK DRIVE  
TOWN OF OAKVILLE

**SEDIMENT CONTROL PLAN**

|            |       |               |        |          |      |
|------------|-------|---------------|--------|----------|------|
| SCALE      | 1:250 | PROJECT No.   | 24-484 | PLAN No. |      |
| DRAWN BY   | G.J.  | SITE PLAN No. |        |          |      |
| CHECKED BY | A.J.  |               |        |          | SED1 |

# APPENDIX D

## Sanitary Sewer

- Design Criteria
  - Sanitary Sewer Analysis (SA-1)
  - Sanitary Drainage Design Sheet
-

charge wastewater main greater than 450mm dia.

- c. Individual studies shall be made on a case-by-case basis for special commercial establishments, major commercial areas, special industrial areas, and major industrial areas (e.g. hospitals etc.).

TABLE 3.1 POPULATION FOR RESIDENTIAL

| Type of Development  | Equivalent Population Density (Person/Hectare) |
|--|--|
| Single Family  | 95   |
| Semi-detached duplex and 4-plex  | 165  |
| Street Townhouse, Intensification Area Townhouse, or Back-to-back            | 260  |
| Stacked Townhouses<br>Low/Mid-Rise Apartments outside Strategic Growth Areas | 420  |
| Apartments – Intensification Areas   | 600  |
| Apartments within MTSA, Urban Growth Areas                                   | 2000   |

Litres per capita per day shall use the Residential Average Dry Weather Flow (L/cap/d) under Wastewater Flow Criteria for System Components section in the latest published Development Charges Update Water/Wastewater Technical Report\*

TABLE 3-2 COMMERCIAL, INDUSTRIAL, AND COMMUNITY DRY WEATHER FLOW

| Type of Development    | Equivalent Population Density (persons/hectare) |
|------------------------|---|
| Light Commercial Areas | 90  |
| Community Services     | 40  |
| Light Industrial Areas | 125   |
| Hospitals              | 4 persons per bed                               |

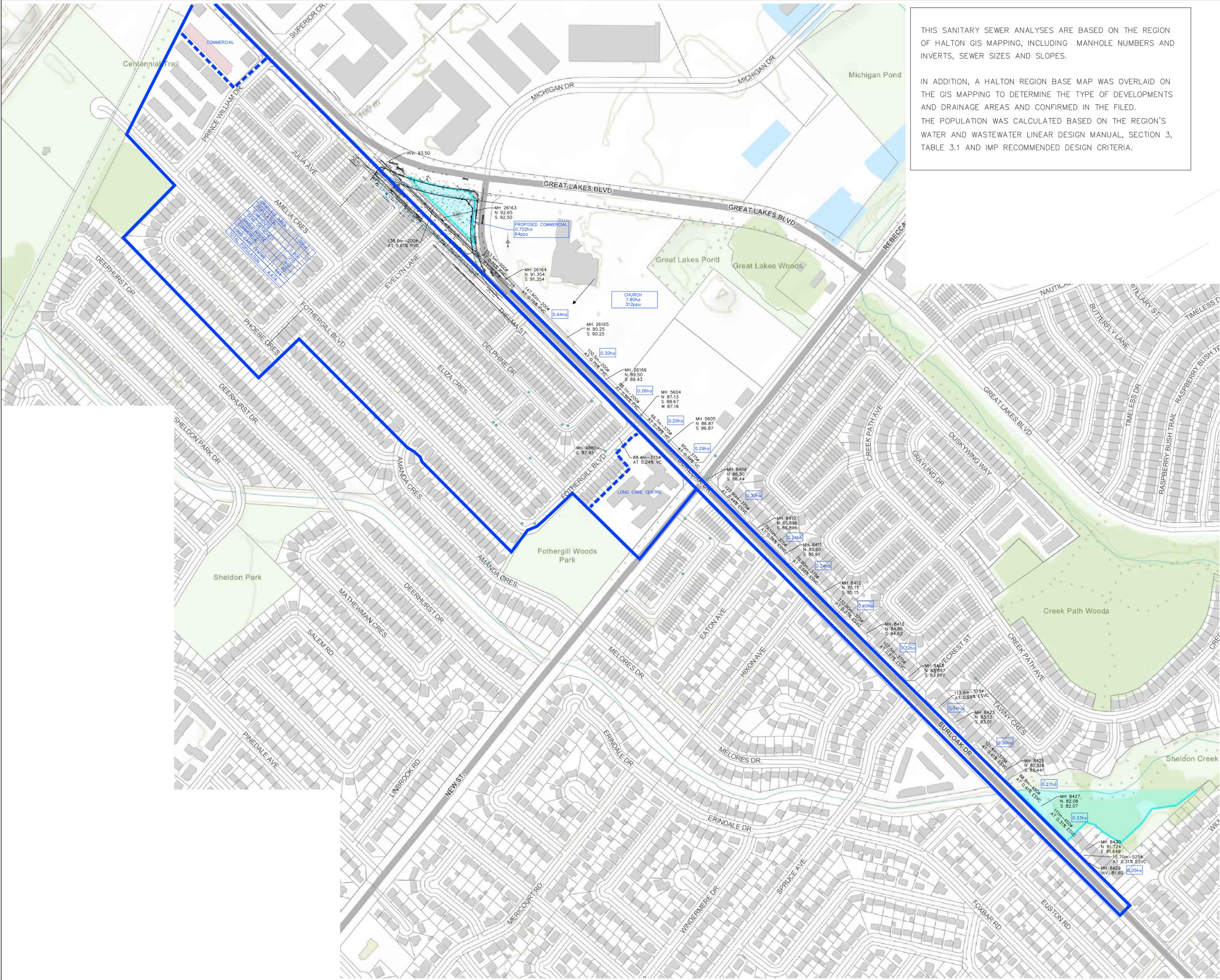
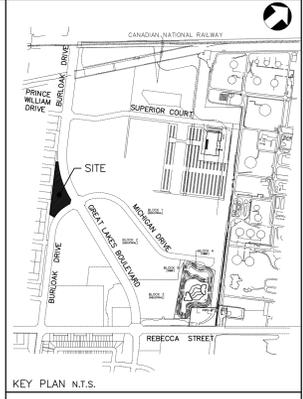
### 3.2.3. Peak Wastewater Flow Factor

For all tributary area land use mixes, the peaking factor shall be calculated using the modified Harmon Formula as follows:

| Treatment Design Criteria                 |   |  |   |
|---|---|--|---|
| Average Day Flow Parameter                | Current – 2022 DC Background Study (L/capita/day) | Recommended Design Criteria (L/capita/day) | Comment   |
| Residential                               | 360   | 320  | Reduction of 11%  |
| Blended ICI                               | 310   | 260  | Blended ICI with a Reduction of 16%   |
| Industrial                                | 405   |  |   |
| Commercial                                | 245   |  |   |
| Institutional                             | 305   |  |   |
| Pumping Station and Mains Design Criteria |   |  |   |
| Dry Weather Flow Parameter                | Current – 2022 DC Background Study                | Recommended Design Criteria                | Comments  |
| Residential                               | 215 L/capita/day                                  | 215  | Unchanged from 2017 DC/2022 DC, updated from B&V Analysis – per capita rate is below the industry average<br>The Region was granted MECP relief for the 215 L/cap/d |
| Blended ICI                               | 185 L/emp/day                                     | 185  | Unchanged from 2017 DC/2022 DC, updated from B&V Analysis – per capita rate is below the industry average   |
| Industrial                                | 240 L/emp/day                                     |  |   |
| Commercial                                | 145 L/emp/day                                     |  |   |
| Institutional                             | 180 L/emp/day                                     |  |   |
| I&I Allowance                             | 0.286 L/s/ha                                      | 0.28 L/s/ha                                | Reduction of 2% to keep in line with MECP Standards   |
| Peak Hour Demand Factor                   | Harmon Formula                                    | Harmon Formula                             | Unchanged   |

THIS SANITARY SEWER ANALYSES ARE BASED ON THE REGION OF HALTON GIS MAPPING, INCLUDING MANHOLE NUMBERS AND INVERTS, SEWER SIZES AND SLOPES.

IN ADDITION, A HALTON REGION BASE MAP WAS OVERLAID ON THE GIS MAPPING TO DETERMINE THE TYPE OF DEVELOPMENTS AND DRAINAGE AREAS AND CONFIRMED IN THE FILED. THE POPULATION WAS CALCULATED BASED ON THE REGION'S WATER AND WASTEWATER LINEAR DESIGN MANUAL, SECTION 3, TABLE 3.1 AND IMP RECOMMENDED DESIGN CRITERIA.



| Rev. # | Details               | Date       |
|--------|-----------------------|------------|
| 1.     | ISSUED FOR SUBMISSION | 2025.10.20 |

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**BURLOAK PLAZA**  
 ABDULLAH AL EYADEH  
 580 BURLOAK DRIVE  
 TOWN OF OAKVILLE

**SANITARY SEWER ANALYSIS**

|                 |                      |          |
|-----------------|----------------------|----------|
| SCALE 2000      | PROJECT No. 24-484   | PLAN No. |
| DRAWN BY G.J.   | SITE PLAN No.        | SA-1     |
| CHECKED BY A.J. | XXXXXXXXXXXXXXXXXXXX |          |



# APPENDIX E

## Water Supply

- Design Criteria
  - Hydrant Flow Test Report
  - FUS Calculation
-

- d. Water Supply for Public Fire Protection Fire Underwriters Survey (FUS) Published by CGI Risk Management Services (formerly the Insurers' Advisory Organization Inc.
- e. Proposing pressure reducing valves to ensure pressures are within standard operating limits, and
- f. Adjusting zone boundaries to ensure pressures are within standard operating limits.

2.2.4. Individual hydraulic and capacity studies may be required for development areas.

### 2.3. Equivalent Population

- 2.3.1. In designing watermains greater than 300 mm dia., populations are to be derived from the latest version of Halton Region's Best Planning Estimates and Average Day Service Demands are to be as per the Design Criteria established by the later of the Halton Water & Wastewater Master Plan or the Development Charges Water/Wastewater Technical Report.
- 2.3.2. In designing watermains 300 mm dia. and less, populations are to be derived from either of the following information, whichever is more stringent.
  - a. Unit count and housing type for residential\*; building floor area for non-residential\*
  - b. Where unit count and housing type is not available, equivalent population densities listed in Table 2-1.

\*Person per Unit or m<sup>2</sup> per Employee are as per the latest published Development Charges Background Study

TABLE 2-1 EQUIVALENT POPULATION DENSITY

| Type of Development   | Equivalent Population Density<br>(Person/Hectare) |
|---|---|
| Single Family   | 95  |
| Semi-detached duplex and 4-plex   | 165   |
| Street Townhouse, Intensification Area<br>Townhouse, or Back-to-Back            | 260   |
| Stacked Townhouses<br>Low/Mid-Rise Apartments outside Strategic<br>Growth Areas | 420   |
| Apartments – Intensification Areas  | 600   |
| Apartments within MTSA, Urban Growth Areas                                      | 2000  |
| Light Commercial Areas  | 90  |
| Community Services  | 40  |
| Light Industrial Areas  | 125   |
| Hospitals   | 4 Persons/Bed Non-standard *                      |

\*Litres per capita per day shall use the Residential Average Day Water Design Criteria (L/cap/d) under Water Demand Criteria section in the latest published Development Charges Update Water/Wastewater Technical Report

## 2.4. Design Factors

- 2.4.1. In designing watermains greater than 300 mm dia., design factors are to be as per the Design Criteria established in the later of Halton Water & Wastewater Master Plan or Development Charges Water/Wastewater Technical Report.
- 2.4.2. In designing watermains 300 mm dia. and less, the following are the design factors for water distribution systems:
- Average Daily Demand = Equivalent Population X Litres per capita per day\* (see Table 2-1)
  - Maximum Daily Demand Peaking Factor = 2.25
  - Maximum Hourly Demand Peaking Factor: See Table 2-2

TABLE 2-2 MAXIMUM HOURLY DEMAND PEAKING FACTOR

| Type of Development | Maximum Hourly Demand Peaking Factor |
|---------------------|--------------------------------------|
| Residential         | 4.00                                 |
| Industrial          | 2.25                                 |
| Commercial          | 2.25                                 |
| Community Services  | 2.25                                 |

## 2.5. Hydraulic Design

### 2.5.1. Pipe Design Flow

- Hazen Williams equation may be used as follows:

$$Q = 0.84918 * C * A * R^{0.63} * S^{0.54}$$

|                  |   |  |
|------------------|---|--|
| where,           | = | design flow (m <sup>3</sup> /sec)        |
| Q                |   |  |
| C                | = | coefficient of roughness                 |
| R                | = | hydraulic radius (m)                     |
| S                | = | slope of energy grade line (m/m)         |
| A                | = | sectional area of flow (m <sup>2</sup> ) |
| 1 m <sup>3</sup> | = | 1,000 litres                             |



**Bruce Fire Engineering Ltd.**

400 Applewood Crescent, Suite 100  
Vaughan, Ontario  
L4K 0C3

Phone: 905 482 4678

Fax: 905 581 3203

Toll Free Phone/Fax: 1 800 260 0187



Email: [artem@brucefire.ca](mailto:artem@brucefire.ca)

## HYDRANT FLOW TEST REPORT

**TEST DATE:** Aug 8, 2025.

**TIME:** 11:00 am

**LOCATION:** 580 Burloak Dr, Burlington, ON L7L 6W5

**TESTED BY:** Artem Matthew – Bruce Fire Engineering

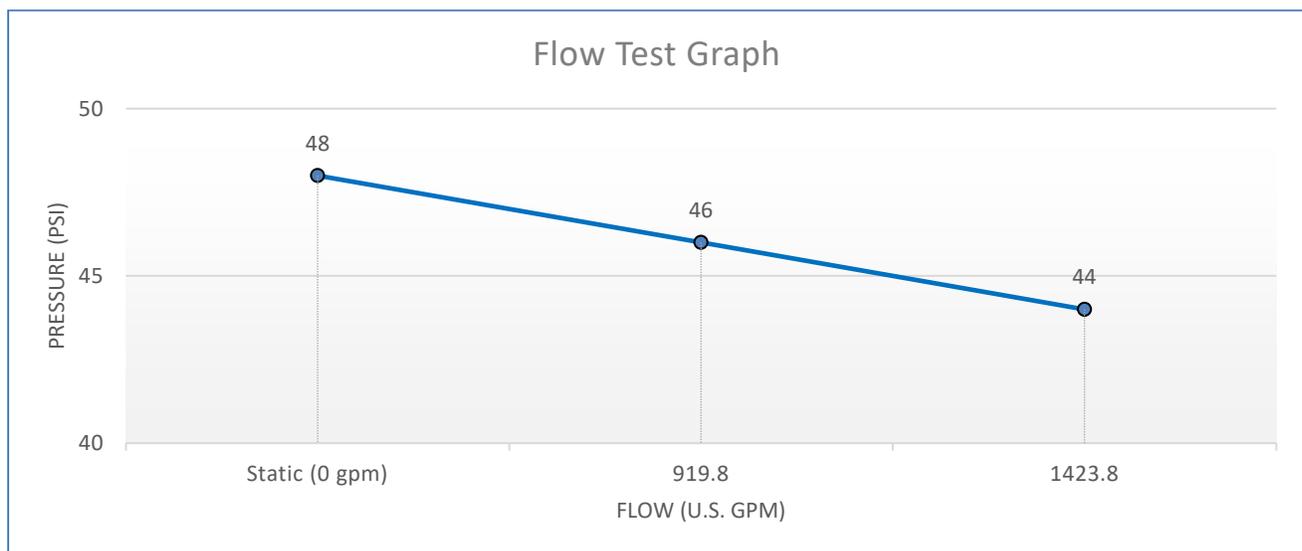
**TEST RESULTS:**

|                       |    |
|-----------------------|----|
| STATIC PRESSURE (psi) | 48 |
|-----------------------|----|

| TEST NO. | NO. OF NOZZLES | NOZZLE DIAMETER (inch) | DISCHARGE COEFFICIENT | RESIDUAL PRESSURE (psi) | PITOT PRESSURE (psi) | DISCHARGE (gpm) |
|----------|----------------|------------------------|-----------------------|-------------------------|----------------------|-----------------|
| 1        | 1              | 2½"                    | 0.9                   | 46                      | 30                   | 919.8           |
| 2        | 2              | 2½"                    | 0.9                   | 44                      | 18/18                | 1423.8          |

Flow test done as per NFPA 291 recommendations.

Calculated Flow 4070 gpm @ 20 psi



### AREA MAP

580 Burloak Dr



# FUS FIRE FLOW CALCULATION

URBTECH ENGINEERING INC

FILE No: 24-484

Date: 2025-10-22

580 Burloak Ave. Oakville

$$F_1 = 220(C)(A)^{0.5}$$

## Inputs

No. 1 Types of Construction

C =  (Select one from list)

**Note:** Ordinary Construction Type 3

No.2 Gross Floor Area

A =  Input gross area (m<sup>2</sup>)

**Note:** Total above ground area = 3,221.00 m<sup>2</sup>

3,221.00 m<sup>2</sup>

F<sub>1</sub> =

F<sub>(rounded)</sub> =

**Note:** F1 rounded.

No. 3 Charge/Credit based on fire hazard

Charge/Credit =  (Select one from list)

**Note:** free Burning

Combustible

Group A Division 2 - combustible

F =

No. 4 Charge/Credit based on Sprinkler System

Charge/Credit =  (Select one from list)

**Note:** sprinkler system

F =

No. 5 Charge/Credit based on Exposure

Charge(North) =  (Select one from list)

**Note:** 52m to existing building

Charge (South) =  (Select one from list)

**Note:** 140m to existing building

Charge (East) =  (Select one from list)

**Note:** 58m to existing building

Charge (West) =  (Select one from list)

**Note:** 43m to existing building

Total Charge/Credit =

F =

## FUS REQUIRED FIRE FLOW

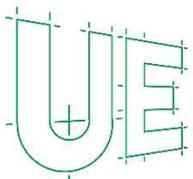
F =

**Note:** The fire flow shall not exceed 45,000 L/min nor be less than 2,000 L/min.

F<sub>(rounded)</sub> =  L/min

= 183 l/s

F =  USGPM



**Urbtech Engineering Inc.**

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Telephone (905) 896 7364