S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

1376 & 1382 Plains Road East

Preliminary

FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

Project Location:

1376 & 1382 Plains Road East

Prepared For:

2731119 Ontario Inc.

Date: February 2026

SLA File No: 25090

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1.0 INTRODUCTION AND BACKGROUND

1.1 Overview

S. Llewellyn & Associates Limited has been retained by 1000555724 Ontario Inc., 2731119 Ontario Inc., and Manor Care Homes Inc. to amend the 1997 City of Burlington Official Plan and Zoning By-law 2020, as amended, to permit the redevelopment of a 0.27 ha site, known municipally as 1376 and 1382 Plains Road East in the City of Burlington. The proposed development includes a 25-storey mixed-use building with 283 residential units and 400 square metres of retail on the ground floor, with a total gross building floor area of 19,549 square metres. A total of 58 parking spaces and 156 bicycle parking spaces are proposed. Refer to Figure 1.0 for the location plan.

The property is currently comprised of two existing commercial buildings with an asphalt parking lot surrounding them. The proposed development is bounded by Plains Road East to the north, commercial lands to the east and west, and CN rail tracks to the south. In addition, there is a municipal laneway directly adjacent to the subject lands to the east, west, and south. The proposed development is located within the Downtown Burlington Urban Growth Centre / Burlington GO MTSA in the City of Burlington.

As part of the development works, it is proposed to provide private sanitary and water services connecting to the existing municipal 250mmø sanitary sewer on Plains Road East, as well as the 400mmø watermain located on the north side of Plains Road East. In addition, a private stormwater management tank is proposed within the underground parking structure.

To facilitate the proposed development, it is also proposed to decommission the existing municipal storm sewer system within the laneway that traverses the south and west limits of the subject site. South of the subject site, the municipal storm sewer is located within the limits of the municipally owned laneway. At the southwest corner, where the storm sewer changes direction, it falls within the limits of the subject site within an easement that is dedicated to the City of Burlington. The intent of the storm sewer disconnection is to remove the storm sewer south of the subject site and, along the west side, relocate the sewer so that it is located outside the limits of the subject site and fully within the municipal laneway. Two storm sewer connections to the municipal storm sewer on Plains Road East are now proposed at the east and west sides of the subject site.

This Functional Servicing and Stormwater Management Report provides information on the proposed servicing, grading, and stormwater management scheme for the development and is submitted in support of the Zoning By-Law Amendment application filed with the City of Burlington.

Please refer to the preliminary engineering plans prepared by S. Llewellyn & Associates Limited and the site plan prepared by WZMH Architects for additional information.

1.2 Background Information

The following documents were referenced in the preparation of this report:

Ref. 1: MOE Stormwater Management Practices Planning and Design Manual, Ministry of Environment (March 2003).

Ref. 2: Erosion & Sediment Control Guidelines for Urban Construction (December 2006).

Ref. 3: City of Burlington Standard Drawings (City of Burlington, March 2014)

Ref. 4: Halton Region Water and Wastewater Linear Design Manual (Halton Region, 2024)

Ref. 5: Low Impact Development Stormwater Management Planning and Design Guide (Credit Valley Conservation Authority / Toronto and Region Conservation Authority, 2010)

Ref. 6: Stormwater Management Design Guidelines (City of Burlington, May 2021)



Figure 1.0 – Location Plan

2.0 STORM DRAINAGE & STORMWATER MANAGEMENT

The following stormwater management (SWM) criteria will be applied to the site, in accordance with the City of Burlington requirements:

2.1 Stormwater Management Criteria

Quantity Control

The proposed post-development discharge rates from the site will be controlled to the 5-year existing condition discharge rate for all storm events up to and including the 100-year storm. The existing condition site is considered to consist of a maximum of 36% impervious area, in accordance with the current City of Burlington Stormwater Management Design Guidelines.

Quality Control

The stormwater runoff from the proposed condition site must meet Level 1 (Enhanced) stormwater quality control (80% TSS removal, 90% average annual runoff treatment).

Water Balance

It is recommended to retain/infiltrate the first 5mm on site.

2.2 Existing Conditions

In the existing condition, the proposed development has a total area of 0.27 ha and consists of two commercial buildings with associated concrete and asphalt parking areas. The site is bounded by Plains Road East to the north, existing commercial lands to the east and west, and CN lands to the south. In addition, a municipal laneway bounds the site to the east, west, and south.

The site topography directs storm runoff overland from north to south, where it is captured and conveyed by the existing catchbasins and storm sewers within the municipal laneway, ultimately outletting to the Plains Road East storm sewer system to the northwest of the subject site. External commercial lands to the east and west of the municipal laneway also contribute overland sheet flow, which is captured by catchbasin manholes within the municipal laneway.

The existing emergency overland flow route for the site is northerly toward Plains Road East, through the driveway entrance on the adjacent commercial lands to the west (1364 Plains Road East). During storm events where the capacity of the existing laneway sewers is exceeded or the sewers are blocked, stormwater would pond within the municipal laneway, subject site, and adjacent properties to an elevation of approximately 99.28± m. This elevation corresponds approximately to the spill point along the southwest property line between 1372 and 1364 Plains Road East. From this point the overland flow is conveyed to Plains Road East through the low entrance on 1364 Plains Road East.

There is an existing 375mmø storm sewer along Plains Road East fronting the site the flows west. Just west of the site, this sewer transitions to a 750mmø storm sewer. The storm sewer system outlets to a tributary that us ultimately conveyed into the Hager–Rambo diversion channel. Within the municipal laneway, storm sewers ranging from 300 mm to 450mmø connect to the Plains Road East system. A portion of this municipal sewer crosses the southwest corner of the subject site within an easement, where it changes direction from west to north.

Two catchment areas, Catchments 101 and 102, have been identified under existing conditions. Catchment 101 represents the existing condition drainage from the entire site, which is captured by catchbasins within the municipal laneway and conveyed through the laneway storm sewers to the 750 mmø storm sewer on Plains Road East. Catchment 102 represents the external drainage area captured and conveyed to the municipal laneway storm sewer system. Refer to Table 2.1 and the Pre-Development Storm Drainage Area Plan Appendix A for further details.

Hydrologic analyses of Catchments 101 and 102 were completed using the SWMHYMO modeling program developed by J.F. Sabourin & Associates for the City of Burlington 2-year to 100-year design storm events. A summary of the results is provided in Table 2.2, with detailed SWMHYMO input and output data included in Appendix A.

Table 2.1 – Existing Condition Catchment Areas

Catchment ID	Description	Area (ha)	% Impervious	Runoff Coeff. (C)
101	Ex. overland drainage from subject site to municipal laneway storm sewers	0.27	91% (Actual)	0.85 (Actual)
			36%[1]	0.50[1]
102	Ex. overland drainage from external lands to municipal laneway storm sewers	0.50	87%	0.84
Total to ex. municipal laneway storm sewer system		**0.76**	**88%**	**0.84**

[1] Maximum permissible % impervious and runoff coefficient to be used to determine allowable release discharge rates is 36% and 0.50 respectively (As per City of Burlington Stormwater Management Guidelines). These values do not represent actual onsite conditions.

Table 2.2 – Existing Condition Site Discharge

Storm Event	Catchment 101 Discharge (m^3/s) (City specified max pre-development % Imperv.)	Catchment 101 Discharge (m^3/s) (Actual)	Catchment 102 Discharge (m^3/s)	Total Discharge to Municipal Laneway Sewers (101 (Actual)+102) (m^3/s)
2-year	0.030	0.055	0.093	0.147
5-year	**0.044**	0.071	0.123	0.194
10-year	0.054	0.082	0.143	0.225
25-year	0.068	0.097	0.169	0.266
50-year	0.077	0.107	0.188	0.295
100-year	0.087	0.117	0.208	0.325

2.3 Proposed Conditions

In the proposed condition, the development consists of a 25-storey mixed-use building with 283 residential units, 428 square metres of ground-floor retail and a total of 58 parking spaces within a 1 level underground parking structure.

Stormwater discharge from the site will be captured and conveyed via a private storm sewer system within the underground parking structure to a proposed 450mmø storm sewer within the municipal laneway. The private storm sewer system will be designed and constructed in accordance with the City of Burlington standards.

The storm sewer outlet is proposed to connect to a new manhole within the municipal laneway, located just upstream of the existing catchbasin manhole in the gutter line on Plains Road East. From the Ex. CBMH7, a 750mmø storm sewer conveys flows to a downstream box culvert that outlets stormwater to the south.

Minor Flows

The majority of the subject site will be covered by the proposed building roof. This clean roof runoff will be captured and conveyed through the internal mechanical storm system within the underground parking structure to the proposed stormwater management tank. Drainage from the remaining portions of the site not covered by the roof will be collected via area drains or trench drains located above the underground parking structure and conveyed to the stormwater management vault.

A 100mmø orifice pipe is proposed within the stormwater management vault to control stormwater discharge to the allowable release rate. This controlled flow will ultimately be conveyed to the proposed 450mmø storm sewer within the municipal laneway, which connects to the Plains Road East storm sewer system.

Major & Emergency Flows

The major overland flow route within the municipal laneway will continue to spill to Plains Road east at the same elevation as it does under existing conditions. Currently, when the capacity of the storm sewers within the laneway is exceeded, stormwater would pond within the municipal laneway, subject site, and adjacent properties to an elevation of approximately 99.28± m. This elevation corresponds approximately to the spill point along the southwest property line between 1372 and 1364 Plains Road East. From this point the overland flow is conveyed to Plains Road East through the low entrance on 1364 Plains Road East.

Although it is proposed to decommission the southerly connection between the east and west legs of the municipal laneway, the spill elevation at which major overland flow begins to discharge to Plains Road East is proposed to remain unchanged. To maintain the existing spill elevation of 99.28 m, it is proposed to slightly modify the gutter line grades on Plains Road East to create a new low point at CBMH4. This new low point on Plains Road East allows the existing easterly entrance to the municipal laneway to be lowered with a new spill elevation to Plains Road East of 99.28 m. Therefore, although the east portion of the municipal laneway is proposed to be disconnected from the west side (where major overland flow was previously conveyed), easterly flows will still spill to Plains Road East at the same elevation as the existing condition (99.28 m). The westerly portion of the municipal laneway will continue to follow the existing major overland flow route.

All entry doors to the proposed building have been designed to be above the spill elevation of 99.35 ± m at all locations.

Major flows from the subject site are designed to be captured by area drains or trench drains and conveyed through the internal mechanical storm system within the underground parking structure to the stormwater management vault, where flows will be controlled to the allowable release rate. In the event that the stormwater management vault outlet becomes blocked, or during a storm event exceeding the 100-year design storm, an overflow area drain is proposed above the stormwater management vault to direct emergency flows overland toward Plains Road East.

External Flows

Overland drainage from the external commercial lands to the east and west of the municipal laneway that currently flows to the existing catchbasin manholes within the laneway will continue to be accommodated under the proposed condition. The catchbasin located directly southwest of the subject site is proposed to be relocated so that the associated storm sewer is entirely within the municipal laneway and no longer crosses into the subject site. Minor regrading is proposed in the vicinity of the relocated catchbasin to ensure that existing drainage patterns for the municipal laneway and the external lands to the west are maintained.

Ex. CBMH4 located southeast of the subject site is proposed to remain. However, its outlet pipe will be removed and replaced so that it connects directly to the storm sewer on Plains Road East. This approach ensures that, despite the closure of the southerly portion of the municipal laneway, drainage from the municipal laneway and external lands to the east continues to be adequately captured and conveyed.

Catchment Areas

Four (4) catchment areas—Catchments 201, 202, 203, and 204—have been identified under the proposed condition for stormwater management purposes.

Catchment 201 represents the controlled drainage from the majority of the subject site. Runoff from this area will be captured by roof drains, area drains, and trench drains, and controlled by a 100 mm diameter orifice pipe and a 90 m^3 stormwater storage vault located within the underground parking structure.

Catchment 202 represents uncontrolled drainage from exterior portions of the subject site located outside the limits of the underground parking structure. It is not feasible to capture runoff from these areas, as they are located in areas where the proposed grade transitions to existing conditions and the storm drainage cannot be directed back toward the site.

Catchment 203 represents the external drainage area encompassing the eastern portion of the municipal laneway and adjacent commercial lands. Runoff from this area will continue to be captured by the existing catchbasin manhole at the southeast corner of the subject site. Flows collected at this manhole will be conveyed north directly to Plains Road East.

Catchment 204 represents the external drainage area encompassing the western portion of the municipal laneway and adjacent commercial lands. Runoff from this area will be captured by the proposed CB1.1 at the southwest corner of the subject site. Flows from this CB will be conveyed north to the existing catchbasin manhole within the gutter line of Plains Road East, consistent with existing conditions.

Refer to Table 2.3 and the Post-Development Storm Drainage Area Plan in Appendix A for additional details.

Table 2.3 – Existing Condition Catchment Areas

Catchment ID	Description	Area (ha)	Percent Impervious	Runoff Coefficient
201	Controlled drainage to prop. 450mmø storm sewer within municipal laneway	0.23	100%	0.95
202	Uncontrolled drainage to prop. municipal Laneway sewers	0.04	54%	0.60
203	Ex. uncontrolled external catchment to municipal laneway sewers (east)	0.38	90%	0.85
204	Ex. uncontrolled external catchment to municipal laneway sewers (west)	0.12	85%	0.90
	Total	**0.77**	**91%**	**0.87**

2.4 Water Quantity Control

It is proposed to apply quantity control measures to Catchment 201 by installing a 100mmø orifice pipe between the stormwater management tank and MH3 (HydroStorm HS4). This orifice will restrict discharge from the site to the allowable 5-year pre-development discharge rate.

With the implementation of on-site quantity control for Catchment 201, stormwater storage is required for storm events up to and including the 100-year event. To provide the required storage, a cast-in-place stormwater storage vault with a total volume of 90 m³ is proposed within the underground parking structure.

The stormwater management vault will consist of an upper and a lower chamber. The upper chamber will drain by gravity through the 100 mm diameter orifice pipe, and storm sewers within the underground parking structure will discharge directly into this upper chamber. Once the stormwater volume exceeds the 25 m³ storage capacity of the upper chamber, flows will spill over a weir wall into the lower chamber, which provides 65 m³ of additional storage. Stormwater collected in the lower chamber will be pumped back to the upper chamber at a rate equal to the gravity discharge through the orifice pipe to the municipal storm sewer system.

Details of the proposed stormwater management tank are provided on the Grading and Servicing Plans. The discharge rate for the 100 mm diameter orifice pipe was calculated using the Bentley CulvertMaster program. The resulting stage–storage discharge relationships are summarized in Table 2.4 and included in Appendix A for reference.

Table 2.4 – Proposed Condition Stage-Storage Discharge (Catchment 201)

Elevation (m)	Storage (m^3)	Discharge (m^3/s)	Comments
97.65	0	0.0000	Bottom of Chamber/Orifice Invert
98.15	14	0.0173	0.50m Deep (Upper Chamber)
98.55	25	0.0243	Top of Weir (Upper Chamber)
95.70	25	0.0243	Bottom of Lower Chamber
96.20	41	0.0243	0.50m Deep (Lower Chamber)
96.70	56	0.0243	1.00m Deep (Lower Chamber)
97.20	72	0.0243	1.50m Deep (Lower Chamber)
97.40	78	0.0243	1.70m Deep (Lower Chamber)
98.55	80	0.0243	Top of Weir
98.85	90	0.0284	Top of Tank

The maximum discharge rates for Catchments 201, 202, 203 & 204 were calculated using SWMHYMO hydrologic modelling program developed by J.F. Sabourin & Associates for the 2-year to 100-year City of Burlington 6-hour Chicago Design Storm. The proposed discharge rates and storage volumes are summarized in Tables 2.5, 2.6 and 2.7, with details provided in Appendix B.

Table 2.5 – Proposed Development Site Stormwater Discharge to Plains Road East

Storm Event	201 (Controlled) (m^3/s)[1]	202 (UnControlled) (m^3/s)[1]	Total Discharge (Site) (m^3/s)[2]	Allowable Discharge (m^3/s)[3]
2-Year	0.024	0.006	0.029	0.044
5-Year	0.024	0.008	0.032	0.044
10-Year	0.024	0.009	0.034	0.044
25-Year	0.024	0.011	0.036	0.044
50-Year	0.024	0.013	0.037	0.044
100-Year	0.024	0.014	0.039	0.044

[1] Based on SWMHYMO Output. Refer to Appendix B for details.
[2] SWMHYMO ADDHYD (Catchment 201 Controlled + Catchment 202 UnControlled)
[3] Refer to Table 2.2.

Table 2.6 – Proposed Development Site Stormwater Storage Volumes

Storm Event	Required Storage Catchment 201 (m^3)[1]	Ponding Elevation
2-Year	25	98.55
5-Year	33	95.95
10-Year	40	96.17
25-Year	50	96.50
50-Year	58	96.76
100-Year	66	97.03

[1] Based on SWMHYMO Output. Refer to Appendix B for details.

Table 2.7 – Proposed Condition External Stormwater Discharge to Plains Road East

Storm Event	203 (UnControlled) (m^3/s)[1]	204 (UnControlled) (m^3/s)[1]	Total Discharge (External) (m^3/s)[2]
2-Year	0.073	0.023	0.095
5-Year	0.096	0.030	0.126
10-Year	0.112	0.035	0.147
25-Year	0.132	0.041	0.173
50-Year	0.147	0.045	0.192
100-Year	0.161	0.050	0.211

[1] Based on SWMHYMO Output. Refer to Appendix B for details.
[2] SWMHYMO ADDHYD (Catchment 203 + Catchment 204)

This analysis determined the following:

- The proposed condition discharge rates for the development (Catchment 201 & 202) will not exceed the 5-year allowable pre-development flow rates from the site .
- The installation of a 100mmø orifice pipe for catchment 201 will provide adequate stormwater quantity control on-site.
- $90m^3$ of stormwater storage is provided for Catchment 201 in a cast-in-place stormwater vault within the underground parking structure, while only $66m^3$ of stormwater storage is required during the 100-year storm event.

Storm Sewer Capacity Assessment

As part of the development application, it is proposed to close out the southerly portion of the municipal laneway. By closing this portion of the laneway, it is necessary to disconnect the existing municipal storm sewer within the laneway, which previously conveyed all flows to Ex. CBMH7 on Plains Road. It is now proposed that the municipal laneway have two storm sewer connections to Plains Road: a new connection through the east entrance to CBMH4 and the existing connection through the west entrance to CBMH7.

The existing storm sewer system fronting the proposed development along the south side of Plains Road East has been analyzed to confirm it has the capacity to accommodate storm flows from the new connection at the east entrance. External drainage areas E1–E4 on drawing C103 were derived from the existing drawings provided by City of Burlington staff, available topographic information and LIDAR terrain data sourced from the Ontario GeoHub website. Based on the analysis, it has been determined that the existing storm system on the south side of Plains Road East, up to the 750 mm diameter storm sewer at Ex. CBMH7, does not have sufficient capacity to convey the minor storm flows currently being directed to it under existing conditions.

Therefore, it is proposed to remove and replace the existing 375 mmø storm sewers on the south side of Plains Road East between the new connection at CBMH4 and the downstream Ex. CBMH7 with 600 mmø storm sewers to ensure the system has capacity to convey the 5-year minor storm flows.

The cumulative discharge toward Ex. CBMH7 from the upstream drainage areas has been calculated as 0.375 m^3/s. The existing 750 mmø storm sewer at 0.76% has a capacity of 1.012 m^3/s. As a result, the existing storm sewer system downstream of Ex. CBMH7 is expected to operate at approximately 37% capacity due to flows from the south side Plains Road East storm sewers. The storm sewer capacity assessment was not continued past Ex. CBMH7, as no changes to the existing system are proposed downstream as part of this development application. Refer to the storm sewer design sheet and the Storm Drainage Area Plan in Appendix A for details.

2.5 Water Quality Control

The proposed development is required to achieve an "Enhanced" (80% TSS removal) level of water quality protection. To meet this criterion, discharge from Catchment 201 will be treated by a HydroStorm HS4 oil/grit separator, prior to discharge to the 450mmø storm sewer within the municipal laneway.

The HydroStorm sizing software was used to determine the required size of oil/grit separator for the site. Based on this analysis, a HydroStorm HS4 unit was selected, which is capable of treating approximately 97% of the annual runoff and achieving 71% annual TSS removal, based on Hamilton Royal Botanical Gardens rainfall records and the ETV particle size distribution. Further details of the HydroStorm unit sizing are provided in Appendix C. The HydroStorm unit is certified by the ETV Canada for a 50% TSS removal credit.

It should be noted that the majority of the subject site consists of roof-covered areas and landscaped walkways, which generate runoff considered to be clean and typically do not require water quality treatment. However, following discussions with City staff, best efforts are proposed to treat the small portion of the site (approximately 120 m^2) that generates runoff from the driveway, which is considered "dirty" runoff. Given the limited available hydraulic head within the gravity portion of the proposed stormwater management tank, the HydroStorm unit was determined to be the most suitable treatment device, as it does not require upstream head to operate effectively. Accordingly, although the HydroStorm unit is only accredited with a 50% TSS removal credit, it is the opinion of S. Llewellyn & Associates that this level of treatment is appropriate, given the very small contributing area of dirty runoff.

The HydroStorm unit will require regular inspection and maintenance in accordance with the manufacturer's specifications to ensure proper operation. The manufacturer's maintenance manual for the oil/grit separator is included in Appendix C.

2.6 Water Balance

As per City of Burlington Guidelines, the minimum runoff retention is 5.0 mm depth across the site area. In using the 5.0 mm infiltration depth for the 0.27 ha area that encompasses the development, the Runoff Volume Control Target (RVCT) can be calculated as follows:

Runoff Volume Control Target (RVCT)

= *Runoff Depth * Area*

= 5.0 mm * 0.001 m/mm * 0.27 ha * 10,000 m^2/ha

= 13.5 m^3

Irrigation Cistern (Within Stormwater Management Tank)

= 14 m^3

Clean runoff from the rooftop of proposed building will be captured and conveyed to the irrigation cistern within the P1 parking level. The 14m^3 cistern will be hydraulically connected to the stormwater storage tank with a 2.3m high weir wall. This will allow any overflow from the irrigation cistern to spill into the stormwater storage vault and be conveyed through the outlet. Based on this information the site has been designed to achieve the City of Burlington's water balance targets.

2.7 Sediment and Erosion Control

In order to minimize erosion during the grading and site servicing period of construction, the following measures will be implemented:

- Install silt fencing along the outer boundary of the low end of the site to ensure that sediment does not migrate to the adjacent properties;
- Install sediment control (silt sacks) in the proposed catchbasins and area drains as well as the nearby existing catchbasins to ensure that no untreated runoff enters the existing conveyance system;
- Install a mud mat at the proposed construction entrance (off Plains Road East) to reduce mud tracking and sediment leaving the site via construction traffic;
- Stabilize all disturbed or landscaped areas with hydro seeding/sodding to minimize the opportunity for erosion;
- Dust control measures to prevent off site transport of fugitive dust emissions shall include one or more of the following;
    - Controlled drop height: unload truck beds and loader or excavator buckets slowly and at the lowest possible heights.

- High winds restriction: where feasible, avoid or reduce earthmoving activities when local sustained wind speeds are in excess of 50km/hr.

- Wet suppression – apply water to disturbed soil surfaces, backfill material, soil stockpiles and other dust generating operations as necessary and appropriate.

- Soil retention – stabilize disturbed or exposed soil surface areas where construction is complete, in areas that will be inactive for more than 30 days, or while vegetation is being established.

- Chemical stabilization – apply chemical stabilizer such as calcium chloride using manufacturer's recommended application rates.

To ensure and document the effectiveness of the erosion and sediment control structures, an appropriate inspection and maintenance program is necessary. The program will include the following activities:

- Inspection of the erosion and sediment controls (e.g. silt fences, sediment traps, outlets, vegetation, etc.) with follow up reports to the governing municipality; and

- The developer and/or their contractor shall be responsible for any costs incurred during the remediation of problem areas.

For details on the proposed erosion and sediment control for the proposed site, see the Sediment and Erosion Control Plan included in the engineering drawings.

3.0 SANITARY SEWER SERVICING

3.1 Existing Conditions

There is an existing 250 mm diameter sanitary sewer along the south side of Plains Road East, fronting the proposed site. This sewer flows east and ultimately discharges to the Burlington Skyway Wastewater Treatment Plant.

3.2 Sanitary Demand

Sanitary discharge from the proposed site has been estimated in accordance with the Ontario Building Code (OBC) and Section 3.2, "Design Flow," of the 2024 Regional Municipality of Halton Water and Wastewater Linear Design Manual. The residential occupancy is an apartment building comprising one-, two-, and three-bedroom units. The commercial occupancy is assumed to be office use.

Table 3.1 summarizes the development population and Table 3.2 summarizes the sanitary sewer discharge rates from the proposed site.

Table 3.1-Proposed Development Population

Occupancy Type	No. of Beds [A]	Gross Floor Area (m^2) [A]	Population Density [B]	Population
Residential	353	---	2 per/bed	706
Commercial	---	400	3.7m^2/per Person	108
			Total Population [C]:	**814**

[A] Information from site plan prepared by WZMH Architects.,

[B] Residential population density per OBC 3.1.17.1.1(b); commercial population density as per OBC Table 3.1.17.1 (5).

[C] Total population = Number of Beds x Population Density

Table 3.2-Proposed Sanitary Sewer Discharge

Site Area (ha)	Population (Residential) [A]	Population (Commericial) [A]	Avg. Demand (Residential) [B] (l/s)	Avg. Demand (Commercial) [B] (l/s)	Peak Factor [C]	Infiltration [D] (l/s)	Peak Flow [E] (l/s)
0.27	706	108	1.76	0.23	3.74	0.08	**7.52**

[A] From Table 3.1.

[B] Based on a unit sewage flow of 215 l/cap/d (residential) & 185 l/emp/d (Employment) (as per 2022 Development Charges Background Study for Water, Wastewater, Roads & General Services Development Charges).

[C] Based on the modified Harmon Formula (as per section 3.2.3 of the Regional Municipality of Halton Water and Wastewater Linear Design Manual). Peak Factor, M = k_{av} x (1 + [14 / (4+$P^{0.5}$)]), where P is in thousands

[D] Based on an infiltration rate of 0.286 l/ha/s (as per 2022 Development Charges Background Study for Water, Wastewater, Roads & General Services Development Charges).

[E] Peak Flow = (Avg. Demand x Peak Factor) + Infiltration

Based on Tables 3.1 & 3.2 above, the estimated sanitary demand for the development is **7.52 l/s.**

3.3 Proposed Sanitary Servicing

The proposed site will be serviced by a 250mmø sanitary service, designed and constructed in accordance with City of Burlington and Region of Halton standards. Flows from the proposed service will discharge to the existing manhole that connects to the existing 250 mm diameter sanitary sewer along the south side of Plains Road East, fronting the site.

The proposed 250mmø sanitary service will be installed at a minimum grade of 2.0%. At this grade, the service has an estimated capacity of 0.084 m^3/s (84 L/s). Accordingly, the proposed sanitary service is adequately sized to service the proposed development.

4.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING

4.1 Existing Conditions

The existing municipal water distribution system includes a 100mmø watermain along the south side of Plains Road East and a 400mmø watermain along the north side of Plains Road East. The nearest municipal fire hydrants are located west of Helena Street on the north side of Plains Road East and fronting 1400 Plains Road East, east of the site, on the south side of Plains Road East. These hydrants are spaced approximately 200 m apart.

4.2 Domestic Water Demand

Water demand for the site was estimated in accordance with the 2024 Halton Region Water and Wastewater Linear Design Manual. Tables 4.1 and 4.2 summarize the domestic water demand requirements for the Average Daily, Maximum Daily and Maximum Hourly demand scenarios.

Table 4.1-Post-Development Domestic Water Demand (Residential Units)

Population [A]	Average Daily Demand [B] (l/s)	Max. Daily Peaking Factor [C]	Max. Hourly Peaking Factor [D]	**Max. Daily Demand [E] (l/s)**	**Max. Hourly Demand [F] (l/s)**
706 persons	2.17	2.25	4.00	**4.88**	**8.68**

[A] From Table 3.1.
[B] Average Daily Demand = 265 l/cap/day x population (as per 2022 Development Charges Background Study for Water, Wastewater, Roads & General Services Development Charges).
[C] Max. Daily Peaking Factor = 2.25 (refer to sentence 2.4.2 in Ref.4)
[D] Max. Hourly Peaking Factor = 4.00 (refer to Table 2-2 in Ref. 4)
[E] Max. Daily Demand = Average Daily Demand x Max. Daily Peaking Factor
[F] Max. Hourly Demand = Average Daily Demand x Max. Hourly Peaking Factor

Table 4.2-Post-Development Domestic Water Demand (Commercial Units)

Population[A]	Average Daily Demand [B] (l/s)	Max. Daily Peaking Factor [C]	Max. Hourly Peaking Factor [D]	**Max. Daily Demand [E] (l/s)**	**Max. Hourly Demand [F] (l/s)**
108	0.28	2.25	2.25	**0.63**	**0.63**

[A] From Table 3.1.
[B] Average Daily Demand = 225 l/emp/day x population (as per 2022 Development Charges Background Study for Water, Wastewater, Roads & General Services Development Charges).
[C] Max. Daily Peaking Factor = 2.25 (refer to sentence 2.4.2 in Ref.4)
[D] Max. Hourly Peaking Factor = 2.25 (refer to Table 2-2 in Ref. 4)
[E] Max. Daily Demand = Average Daily Demand x Max. Daily Peaking Factor
[F] Max. Hourly Demand = Average Daily Demand x Max. Hourly Peaking Factor

4.3 Fire Flow Demand

Fire flow demands for development are governed by a number of guidelines and criteria, such as the Water Supply for Public Fire Protection (Fire Underwriters Survey, 2020), Ontario Building Code (OBC), and various codes and standards published by the National Fire Protection Association (NFPA). Since the FUS criteria provides adjustment for sprinklered buildings (OBC does not), the FUS method was used to determine the fire flow demand for the proposed development.

The condominium building will be constructed of non-combustible construction (C=0.8), with limited combustible occupancy (-15% correction) and sprinkler system (-50% correction). Exposure corrections are based on the following:

North Face: 0% correction (30m+)
South Face: 0% correction (30m+)
East Face: 15% correction (10.1m to 20m)
West Face: 20% correction (3.1m to 10m)

It is estimated that the required fire flow for the proposed development will be **150 l/s**. See Fire Flow Demand Requirements in Appendix D for calculations and details.

The nearest existing municipal fire hydrants are located west of Helena Street on the north side of Plains Road East and fronting 1400 Plains Road East, east of the site, on the south side of Plains Road East. These hydrants are spaced approximately 200 m apart.

As the existing hydrants do not meet the required 90 m separation from the building face adjacent to a street (per Sentence 3.2.5.5 of the 2024 Ontario Building Code), and the current spacing of the municipal hydrants does not provide sufficient coverage for the existing buildings in the area in accordance with the Halton Region Water and Wastewater Linear Design Manual, an additional municipal hydrant is proposed adjacent to the site, within the municipal right-of-way fronting Plains Road East. This will satisfy the requirements of the proposed development and improve hydrant coverage for existing buildings in the area.

A hydrant flow test could not be completed prior to submission, as the hydrant testing season is currently closed. A hydrant flow test will be performed in the spring, once the testing season reopens, to confirm the performance of the existing water distribution system.

4.4 Proposed Water Servicing

Proposed water servicing for the site includes a 200mmø watermain connection to the existing 400mmø watermain on the north side of Plains Road East. At the property line, the 200mmø watermain will split to provide a 200mmø fire service, a 150mmø domestic service and a 100mmø commercial service to the proposed building.

Although existing fire hydrants are located along Plains Road East, they do not meet the required 90 m separation from the proposed building face adjacent to a street in accordance with OBC Section 3.2.5.7. To satisfy this requirement for the subject site, a new municipal hydrant is proposed along Plains Road East. All proposed watermains and services will be designed and constructed in accordance with City of Burlington and Region of Halton standards.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the information provided herein, it is concluded that the proposed development at 484 Plains Road East can be constructed to meet the requirements of the City of Burlington and Region of Halton. Therefore, it is recommended that:

- The development be graded and serviced in accordance with the Grading & Erosion Control Plan and the Site Servicing Plan prepared by S. Llewellyn & Associates Limited;
- A 100mmø orifice pipe be installed as per the Site Servicing Plan and this report to achieve effective stormwater quantity control;
- A cast-in-place storage vault be installed within the underground parking as per the Site Servicing Plan and this report to provide adequate stormwater storage;
- A HydroStorm HS4 Oil/Grit unit, or approved equivalent, be installed as per the Site Servicing Plan and this report to provide effective stormwater quality control;
- Erosion and sediment controls be installed as described in this report and shown on the Grading & Erosion Control Plan prepared by S. Llewellyn & Associates Limited;
- The proposed sanitary and water servicing system be installed as per the Site Servicing Plan, and this report to adequately service the proposed development.

We trust the information enclosed herein is satisfactory. Should you have any questions pleased do not hesitate to contact our office.

Prepared by:

S. LLEWELLYN & ASSOCIATES LIMITED



S. DeGrow, C.E.T.

S. Frankovich, P. Eng.

APPENDIX A

STORMWATER QUANTITY CONTROL INFORMATION

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PLAINS ROAD EAST

ALLEYWAY

LANE

LANE

CANADIAN NATIONAL RAILWAYS
RAILWAY LANDS AS SHOWN ON REGISTERED PLAN No. 99

EX. RAILWAY TRACK

EX. 2 STOREY BRICK BUILDING No. 1376 DS=99.80

EX. 2 STOREY VINYL SIDED BUILDING No. 1382 DS=100.09

EX. 1 STOREY CONCRETE BLOCK BUILDING DS=99.22

EX. 2 STOREY CONCRETE BLOCK BUILDING No. 1400

EX. 100mmø WTM (APPROX. LOCATION)

EX. 375mmø STM @ 0.50% (APPROX. LOCATION)

EX. 750mmø STM @ 0.76% (APPROX. LOCATION)

EX. 300mmø STM @ 0.59% (APPROX. LOCATION)

EX. 250mmø SAN. @ 0.30% (APPROX. LOCATION)

EX. 250mmø CB LEAD (APPROX. LOCATION)

EX. CB T/G 99.27

EX. CBMH T/G 99.40 E. INV. 96.105

EX. CBMH T/G 99.31 W. INV. 97.805

EX. CBMH T/G 99.30 N. INV. 97.326 S. INV. 97.446 E. INV. 97.416 W. INV. 97.356

EX. CBMH T/G 98.62 N. INV. 97.556 E. INV. 97.606

EX. CBMH T/G 98.77 E. INV. 97.753 W. INV. 97.718

EX. CBMH T/G 98.92 E. INV. 97.804 W. INV. 97.904

EX. CB T/G 98.95

EX. CB T/G 99.36

EX. MH T/G 99.38 E. INV. 97.424 S. INV. 97.364

EX. MH T/G 99.36

EX. MH W. INV. 97.665

EX. GASMAIN

EX. WHY

EX. OHW

EX. BCI

EX. BACK OF CONCRETE CURB

EX. CONCRETE SIDEWALK

EX. EDGE OF ASPHALT

EX. CHAIN LINK FENCE

EX. PARKING METER

EX. COVERED ENTRANCE

EX. ASPHALT DRIVEWAY

EX. WOOD PORCH

EX. STEPS

EX. WOOD SHED

EX. GAS SERVICE (APPROX. LOCATION)

EX. SANITARY LATERAL (APPROX. LOCATION)

EX. WATER SERVICE (APPROX. LOCATION)

EX. HYDRO/TELE/CABLE SERVICE (APPROX. LOCATION)

101
0.27
36
0.50

MAXIMUM PERMISSIBLE % IMPERVIOUS (AS PER CITY OF BURLINGTON STORMWATER MANAGEMENT GUIDELINES)

MAXIMUM PERMISSIBLE RUNOFF COEFFICIENT (AS PER CITY OF BURLINGTON STORMWATER MANAGEMENT GUIDELINES)

102
0.50
87
0.84

NORTH

LEGEND

- DRAINAGE BOUNDARY
- PERVIOUS AREA
- 201 / 0.39 / 11 / 0.32 — DRAINAGE AREA I.D. / DRAINAGE AREA (ha) / PERCENT IMPERVIOUS / RUNOFF COEFFICENT

PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

SCALE: 1:500

PROJECT: 1376 & 1382 PLAINS ROAD EAST
PROJECT No.: 25090

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

Tel. (905) 631-6978
Website: www.sla.on.ca
email: info@sla.on.ca

3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

1/21/2026 9:23:20 AM - Steven DeGrow

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PLAINS ROAD EAST

ALLEYWAY

LANE

LANE

CANADIAN NATIONAL RAILWAYS
RAILWAY LANDS AS SHOWN ON REGISTERED PLAN No. 99

CN RAIL CORRIDOR

202
0.04
54
0.60

204
0.12
85
0.90

201
0.23
100
0.95

203
0.38
90
0.85

LEGEND

- DRAINAGE BOUNDARY
- PERVIOUS AREA
- 201 / 0.39 / 11 / 0.32 — DRAINAGE AREA I.D. / DRAINAGE AREA (ha) / PERCENT IMPERVIOUS / RUNOFF COEFFICENT

POST-DEVELOPMENT STORM DRAINAGE AREA PLAN

SCALE: 1:500

PROJECT: 1376 & 1382 PLAINS ROAD EAST
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3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

1/21/2026 9:29:50 AM - Steven DeGrow

1376 1382 Plains Road East
Burlington, Ontario

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

STAGE-STORAGE-DISCHARGE CALCULATIONS

Outlet Device No. 1 (Quantity)

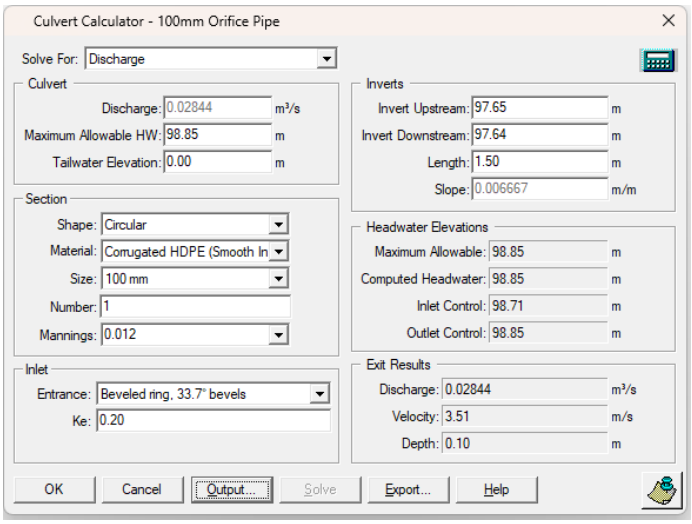
Type:	Circular Orifice Pipe
Diameter (mm)	**100**
Area (m^2)	0.00785
Invert Elev. (m)	97.65
C/L Elev. (m)	97.70
Disch. Coeff. (C_d)	0.8
Discharge (Q) =	Culvert Master
Number of Orifices:	1

		SWM Pond Volumes				Outlet No. 1		Total Discharge
	Elevation m	Area m^2	Tank Incremental Volume	Cumulative Volume m^3	Active Storage Volume m^3	H m	Discharge m^3/s	Discharge m^3/s
Bottom of Upper Chamber	97.65	28	0	0	0	0.000	0.0000	0.0000
0.25m Deep Upper Chamber	97.90	28	7	7	7	0.250	0.0108	0.0108
0.50m Deep Upper Chamber	98.15	28	7	14	14	0.500	0.0173	0.0173
0.75m Deep Upper Chamber	98.40	28	7	21	21	0.750	0.0219	0.0219
Top of Weir	98.55	28	4	25	25	0.900	0.0243	0.0243
Bottom of Lower Chamber	95.70	31	0	25	25	0.900	0.0243	0.0243
0.50m Deep Lower Chamber	96.20	31	16	41	41	0.900	0.0243	0.0243
1.0m Deep Lower Chamber	96.70	31	16	56	56	0.900	0.0243	0.0243
1.5m Deep Lower Chamber	97.20	31	16	72	72	0.900	0.0243	0.0243
1.70m Deep Lower Chamber	97.40	31	6	78	78	0.900	0.0243	0.0243
Top of Weir	98.55	2	3	80	80	0.900	0.0243	0.0243
Top of Tank	98.85	31	9	90	90	1.200	0.0284	0.0284

Rating Table Report
100mm Orifice Pipe

Range Data:			
	Minimum	Maximum	Increment
Allowable HW E	97.65	98.85	0.05 m

HW Elev. (m)	Discharge (m³/s)
97.65	0.00000
97.70	0.00123
97.75	0.00415
97.80	0.00699
97.85	0.00904
97.90	0.01081
97.95	0.01236
98.00	0.01375
98.05	0.01501
98.10	0.01618
98.15	0.01726
98.20	0.01829
98.25	0.01926
98.30	0.02018
98.35	0.02107
98.40	0.02192
98.45	0.02273
98.50	0.02352
98.55	0.02428
98.60	0.02502
98.65	0.02574
98.70	0.02644
98.75	0.02712
98.80	0.02779
98.85	0.02844



Project No. 25090
Sheet No. 1
Checked by:
Computed by: LVF
Date: February 15, 2026

CITY OF BURLINGTON

STORM SEWER DESIGN - 5 YEAR

Project: 1376 & 1382 Plains Rd E

$$i = \frac{A}{(T+B)^C}$$

Vmin=0.90m/s
Vmax=3.65m/s

5-YEAR
A= 802.01
B= 5.00
C= 0.764
n= 0.013

Area No.	Street Name	From MH	To MH	Area [ha]	C	A*C	Cumulative A*C	Time of Conc. [min]	Intensity [mm/hr]	Qpeak [m³/s]	Additional Flows * [m³/s]	Total Qpeak [m³/s]	Pipe Characteristcs					Travel Time [min]	Fraction Full [%]	Remarks
													Diameter [mm]	Slope [%]	Length [m]	Capacity [m³/s]	Velocity [m/s]			
E1	140 Plains Rd E	EX. CBMH1	EX. CBMH2	0.81	0.91	0.74	0.74	10.00	101.31	0.207		0.207								
E2	Plains Rd	EX. CBMH1	EX. CBMH2	0.09	0.71	0.06	0.80	10.00	101.31	0.225		0.225	375	0.37%	55.5	0.111	0.98	0.95	203%	
								10.95												
E3	Plains Rd	EX. CBMH2	CBMH4	0.02	0.77	0.02	0.82	10.95	96.68	0.219		0.219	375	0.37%	13.0	0.111	0.98	0.22	197%	
								11.17												
A1	Laneway 1	Ex. CBMH4	CBMH4	0.40	0.85	0.34	0.34	10.00	101.31	0.096		0.096	375	0.40%	55.5	0.116	1.01	0.91	83%	
								10.91												
E4	Plains Rd	CBMH4	EX. CBMH3	0.03	0.90	0.03	1.18	11.17	95.66	0.314		0.314	600	0.50%	21.5	0.454	1.55	0.23	69%	Proposed Sewer upgrade from 375 to 600 for capacity
								11.40												
E5	Plains Rd	EX. CBMH3	EX. CBMH7	0.05	0.82	0.04	1.22	11.40	94.63	0.322		0.322	600	0.50%	36.5	0.454	1.55	0.39	71%	Proposed Sewer upgrade from 375 to 600 for capacity
								11.79												
A2	Laneway 2	CB1.1	MH1	0.15	0.90	0.14	0.14	10.00	101.31	0.038		0.038	375	0.40%	35.0	0.116	1.01	0.57	33%	
								10.57												
A3	Subject Site	MH2	MH1	0.23	0.95	0.22	0.22	10.00			0.024	0.024	300	0.50%	4.0	0.071	0.98	0.07	34%	Controlled discharge from SWMHYMO model added as additional flow (0.024 m^3s)
								10.07												
	Laneway	MH1	EX. CBMH7	0.00	0.95	0.00	0.14	10.57	98.44	0.037	0.024	0.061	375	0.40%	7.0	0.116	1.01	0.11	53%	Controlled discharge from SWMHYMO model for Catchment A3 added as additional flow (0.024 m^3s)
								10.69												
	Plains Rd	EX. CBMH7	Ex. Downstream System	0.00	0.00	0.00	1.36	11.79	92.94	0.351	0.024	0.375	750	0.76%		1.012	2.22	0.00	37%	Controlled discharge from SWMHYMO model for Catchment A3 added as additional flow (0.024 m3s)

APPENDIX B

SWMHYMO INPUT/OUTPUT FILES

```
00001> 2     Metric units
00002> *#************************************************************************|
00003> *#  Project Name: 1376 & 1382 PLAINS ROAD EAST
00004> *#               BURLINGTON, ONTARIO
00005> *#  JOB NUMBER  : 25090
00006> *#       Date   : JANUARY 2026
00007> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00008> *#       File   : 25090.DAT
00009> *#************************************************************************|
00010> *
00011> *
00012> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[002]
00013>                     BUR6_002.stm
00014> *
00015> READ STORM          STORM_FILENAME "STORM.001"
00016> *
00017> *#************************************************************************|
00018> *#
00019> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING (PHASE 1)
00020> *#        ============================================================
00021> *#
00022> *#************************************************************************|
00023> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (ACTUAL IMPERVIOUS
00024> *
00025> CALIB STANDHYD      ID=[1], NHYD=["101"], DT=[1](min), AREA=[0.27](ha),
00026>                     XIMP=[0.91], TIMP=[0.91], DWF=[0](cms), LOSS=[2],
00027>                     SCS curve number CN=[80],
00028>                     Pervious   surfaces: IAper=[6.35](mm), SLPP=[10.0](%),
00029>                                          LGP=[5](m), MNP=[0.250], SCP=[0](min),
00030>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.1](%),
00031>                                          LGI=[30](m), MNI=[0.013], SCI=[0](min),
00032>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00033> *%-----------------|-------------------------------------------------------|
00034> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (CITY SPECIFIED IM
00035> *
00036> CALIB STANDHYD      ID=[2], NHYD=["101"], DT=[1](min), AREA=[0.27](ha),
00037>                     XIMP=[0.36], TIMP=[0.36], DWF=[0](cms), LOSS=[2],
00038>                     SCS curve number CN=[80],
00039>                     Pervious   surfaces: IAper=[6.35](mm), SLPP=[10.0](%),
00040>                                          LGP=[5](m), MNP=[0.250], SCP=[0](min),
00041>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.1](%),
00042>                                          LGI=[30](m), MNI=[0.013], SCI=[0](min),
00043>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00044> *%-----------------|-------------------------------------------------------|
00045> *# CATCHMENT 102 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS FROM EXTERNAL LAND
00046> *
00047> CALIB STANDHYD      ID=[3], NHYD=["102"], DT=[1](min), AREA=[0.50](ha),
00048>                     XIMP=[0.87], TIMP=[0.87], DWF=[0](cms), LOSS=[2],
00049>                     SCS curve number CN=[80],
00050>                     Pervious   surfaces: IAper=[6.35](mm), SLPP=[2.0](%),
00051>                                          LGP=[5](m), MNP=[0.250], SCP=[0](min),
00052>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.2](%),
00053>                                          LGI=[169](m), MNI=[0.013], SCI=[0](min)
00054>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00055> *%-----------------|-------------------------------------------------------|
00056> * ADD TOTAL EXISTING FLOWS DIRECTED SOUTH
00057> ADD HYD             IDsum=[4], NHYD=["101+102"], IDs to add=[1,3]
00058> *%-----------------|-------------------------------------------------------|
00059> *#************************************************************************|
00060> *#
00061> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00062> *#        ==============================================
00063> *#
00064> **#***********************************************************************|
00065> *# CATCHMENT 201 - CONTROLLED DISCHARGE TO PLAINS ROAD
00066> *
00067> CALIB STANDHYD      ID=[1], NHYD=["201"], DT=[1](min), AREA=[0.23](ha),
00068>                     XIMP=[0.99], TIMP=[0.99], DWF=[0](cms), LOSS=[2],
00069>                     SCS curve number CN=[80],
00070>                     Pervious   surfaces: IAper=[6.35](mm), SLPP=[2.0](%),
00071>                                          LGP=[5](m), MNP=[0.250], SCP=[0](min),
00072>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%),
00073>                                          LGI=[10](m), MNI=[0.013], SCI=[0](min),
00074>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00075> *%-----------------|-------------------------------------------------------|
00076> *# ROUTE CATCHMENT 201 THROUGH ORIFICE PIPE AND TANK
00077> *
00078> ROUTE RESERVOIR     IDout=[2],  NHYD=["201 CONTROLED"],  IDin=[1],
00079>                     RDT=[1](min),
00080>                          TABLE of ( OUTFLOW-STORAGE ) values
00081>                                   (cms) - (ha-m)
00082>                                 0.0000   0.0000
00083>                                 0.0108   0.0007
00084>                                 0.0173   0.0014
00085>                                 0.0219   0.0021
00086>                                 0.0243   0.0025
00087>                                 0.0243   0.00251
00088>                                 0.0243   0.0041
00089>                                 0.0243   0.0056
00090>                                 0.0243   0.0072
00091>                                 0.0243   0.0078
00092>                                 0.0243   0.0080
00093>                                 0.0284   0.0090
00094>                                   -1   ,  -1     (max twenty pts)
00095>                          IDovf=[3], NHYDovf=["201.OVF"]
00096> *%-----------------|-------------------------------------------------------|
00097> *# CATCHMENT 202 - UNCONTROLLED DISCHARGE TO PLAINS ROAD
00098> *
00099> CALIB STANDHYD      ID=[4], NHYD=["202"], DT=[1](min), AREA=[0.04](ha),
00100>                     XIMP=[0.54], TIMP=[0.54], DWF=[0](cms), LOSS=[2],
00101>                     SCS curve number CN=[80],
00102>                     Pervious   surfaces: IAper=[6.35](mm), SLPP=[2.0](%),
00103>                                          LGP=[5](m), MNP=[0.250], SCP=[0](min),
00104>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%),
00105>                                          LGI=[5](m), MNI=[0.013], SCI=[0](min),
00106>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00107> *%-----------------|-------------------------------------------------------|
00108> * ADD TOTAL FLOWS FROM DEVELOPMENT LANDS
00109> ADD HYD             IDsum=[5], NHYD=["201+202"], IDs to add=[2,3,4]
00110> *%-----------------|-------------------------------------------------------|
00111> *# CATCHMENT 203 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
00112> *
00113> CALIB STANDHYD      ID=[6], NHYD=["203"], DT=[1](min), AREA=[0.38](ha),
00114>                     XIMP=[0.90], TIMP=[0.90], DWF=[0](cms), LOSS=[2],
00115>                     SCS curve number CN=[80],
00116>                     Pervious   surfaces: IAper=[6.35](mm), SLPP=[2.0](%),
00117>                                          LGP=[5](m), MNP=[0.250], SCP=[0](min),
00118>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.0](%),
00119>                                          LGI=[105](m), MNI=[0.013], SCI=[0](min)
00120>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00121> *%-----------------|-------------------------------------------------------|
00122> *# CATCHMENT 204 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
00123> *
00124> CALIB STANDHYD      ID=[7], NHYD=["204"], DT=[1](min), AREA=[0.12](ha),
00125>                     XIMP=[0.85], TIMP=[0.85], DWF=[0](cms), LOSS=[2],
00126>                     SCS curve number CN=[80],
00127>                     Pervious   surfaces: IAper=[6.35](mm), SLPP=[2.0](%),
00128>                                          LGP=[5](m), MNP=[0.250], SCP=[0](min),
00129>                     Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.5](%),
00130>                                          LGI=[66](m), MNI=[0.013], SCI=[0](min),
00131>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00132> *%-----------------|-------------------------------------------------------|
00133> * ADD TOTAL FLOWS FROM EXTERNAL LANDS
00134> ADD HYD             IDsum=[8], NHYD=["203+204"], IDs to add=[6,7]
00135> *%-----------------|-------------------------------------------------------|
00136> **#**********************************************************************|
00137> * RUN REMAINING DESIGN STORMS (CITY OF BURLINGTON 2 TO 100-YR)
00138> *
00139> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[005]
00140>                     BUR6_005.stm
00141> *
00142> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[010]
00143>                     BUR6_010.stm
00144> *
00145> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[025]
00146>                     BUR6_025.stm
00147> *
00148> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[050]
00149>                     BUR6_050.stm
00150> *
00151> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[100]
00152>                     BUR6_100.stm
00153> *%-----------------|-------------------------------------------------------|
00154> FINISH
00155>
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```

```
00001> ================================================================================
00002>
00003>   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
00004>   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
00006>       S  W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
00007>   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9   =========
00008>                                                          9   9  9   9   # 3902680
00009>         StormWater Management HYdrologic Model            999    999    =========
00010>
00011> ********************************************************************************
00012> ***************************** SWMHYMO Ver/4.05  ********************************
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: S. Llewellyn & Associates Ltd                +++++++++
00025> +++++++++                in any City          SERIAL#:3902680       +++++++++
00026> +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028> ********************************************************************************
00029> *********          ++++++ PROGRAM ARRAY DIMENSIONS ++++++              *********
00030> *********          Maximum value for ID numbers  :     10             *********
00031> *********          Max. number of rainfall points: 105408             *********
00032> *********          Max. number of flow points    : 105408             *********
00033> ********************************************************************************
00034>
00035>
00036> **********************   D E T A I L E D   O U T P U T   **********************
00037> ********************************************************************************
00038> *         DATE: 2026-01-19     TIME: 16:43:57     RUN COUNTER: 000342          *
00039> ********************************************************************************
00040> * Input   filename: T:\PROJECTS\25090\SWMHYMO\25090.dat                        *
00041> * Output  filename: T:\PROJECTS\25090\SWMHYMO\25090.out                        *
00042> * Summary filename: T:\PROJECTS\25090\SWMHYMO\25090.sum                        *
00043> * User comments:                                                              *
00044> * 1:_____________________________________________________________________     *
00045> * 2:_____________________________________________________________________     *
00046> * 3:_____________________________________________________________________     *
00047> ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001--------------------------------------------------------------------------
00051> *#*****************************************************************************|
00052> *#  Project Name: 1376 & 1382 PLAINS ROAD EAST
00053> *#               BURLINGTON, ONTARIO
00054> *#  JOB NUMBER  : 25090
00055> *#       Date   : JANUARY 2026
00056> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00057> *#       File   : 25090.DAT
00058> *#*****************************************************************************|
00059> *
00060> *
00061>   ** END OF RUN :   1
00062>
00063> ********************************************************************************
00064>
00065>
00066>
00067>
00068>
00069> --------------------
00070> | START            |  Project  dir.: T:\PROJECTS\25090\SWMHYMO\
00071> --------------------  Rainfall dir.: T:\PROJECTS\25090\SWMHYMO\
00072>     TZERO =   .00 hrs on        0
00073>     METOUT=   2 (output = METRIC)
00074>     NRUN  = 002
00075>     NSTORM=   1
00076>              #  1=BUR6_002.stm
00077> --------------------------------------------------------------------------------
00078> 002:0002--------------------------------------------------------------------------
00079> *#*****************************************************************************|
00080> *#  Project Name: 1376 & 1382 PLAINS ROAD EAST
00081> *#               BURLINGTON, ONTARIO
00082> *#  JOB NUMBER  : 25090
00083> *#       Date   : JANUARY 2026
00084> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00085> *#       File   : 25090.DAT
00086> *#*****************************************************************************|
00087> *
00088> *
00089> --------------------------------------------------------------------------------
00090> 002:0002--------------------------------------------------------------------------
00091> *
00092> --------------------
00093> | READ STORM       |    Filename: Burlington 2-yr 6hr CHICAGO  (A=681.52,
00094> | Ptotal=  40.93 mm|    Comments: Burlington 2-yr 6hr CHICAGO  (A=681.52,
00095> --------------------
00096>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00097>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00098>                .17   1.715 |   1.67   8.325 |   3.17   4.467 |   4.67   2.213
00099>                .33   1.858 |   1.83  19.646 |   3.33   3.978 |   4.83   2.105
00100>                .50   2.032 |   2.00  78.391 |   3.50   3.595 |   5.00   2.008
00101>                .67   2.247 |   2.17  25.776 |   3.67   3.286 |   5.17   1.920
00102>                .83   2.522 |   2.33  13.777 |   3.83   3.030 |   5.33   1.841
00103>               1.00   2.888 |   2.50   9.511 |   4.00   2.815 |   5.50   1.769
00104>               1.17   3.399 |   2.67   7.331 |   4.17   2.632 |   5.67   1.703
00105>               1.33   4.172 |   2.83   6.005 |   4.33   2.474 |   5.83   1.642
00106>               1.50   5.492 |   3.00   5.111 |   4.50   2.335 |   6.00   1.586
00107>
00108> --------------------------------------------------------------------------------
00109> 002:0003--------------------------------------------------------------------------
00110> *
00111> *#*****************************************************************************|
00112> *#
00113> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING (PHASE 1)
00114> *#        ============================================================
00115> *#
00116> *#*****************************************************************************|
00117> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (ACTUAL IMPERVIOUS
00118> *
00119> ----------------------
00120> | CALIB STANDHYD     |   Area    (ha)=     .27
00121> | 01:101    DT= 1.00 |   Total Imp(%)=   91.00   Dir. Conn.(%)=   91.00
00122> ----------------------
00123>                                IMPERVIOUS    PERVIOUS (i)
00124>      Surface Area     (ha)=        .25          .02
00125>      Dep. Storage     (mm)=       1.00         6.35
00126>      Average Slope     (%)=       1.10        10.00
00127>      Length            (m)=      30.00         5.00
00128>      Mannings n            =       .013         .250
00129>
00130>      Max.eff.Inten.(mm/hr)=      78.39        24.53
00131>                   over (min)        1.00         4.00
00132>      Storage Coeff.  (min)=       1.33 (ii)    3.52 (ii)
00133>      Unit Hyd. Tpeak (min)=       1.00         4.00
00134>      Unit Hyd. peak  (cms)=        .90          .31
00135>                                                          *TOTALS*
00136>      PEAK FLOW       (cms)=        .05          .00          .055 (iii)
00137>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
00138>      RUNOFF VOLUME    (mm)=      39.93        12.19        37.436
00139>      TOTAL RAINFALL   (mm)=      40.93        40.93        40.933
00140>      RUNOFF COEFFICIENT   =        .98          .30          .915
00141>
00142>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00143>            CN* =  80.0    Ia = Dep. Storage  (Above)
00144>         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00145>              THAN THE STORAGE COEFFICIENT.
00146>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00147>
00148> --------------------------------------------------------------------------------
00149> 002:0004--------------------------------------------------------------------------
00150> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (CITY SPECIFIED IM
00151> *
00152> ----------------------
00153> | CALIB STANDHYD     |   Area    (ha)=     .27
00154> | 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
00155> ----------------------
00156>                                IMPERVIOUS    PERVIOUS (i)
00157>      Surface Area     (ha)=        .10          .17
00158>      Dep. Storage     (mm)=       1.00         6.35
00159>      Average Slope     (%)=       1.10        10.00
00160>      Length            (m)=      30.00         5.00
00161>      Mannings n            =       .013         .250
00162>
00163>      Max.eff.Inten.(mm/hr)=      78.39        24.53
00164>                   over (min)        1.00         4.00
00165>      Storage Coeff.  (min)=       1.33 (ii)    3.52 (ii)
00166>      Unit Hyd. Tpeak (min)=       1.00         4.00
00167>      Unit Hyd. peak  (cms)=        .90          .31
00168>                                                          *TOTALS*
00169>      PEAK FLOW       (cms)=        .02          .01          .030 (iii)
00170>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
00171>      RUNOFF VOLUME    (mm)=      39.93        12.19        22.179
00172>      TOTAL RAINFALL   (mm)=      40.93        40.93        40.933
00173>      RUNOFF COEFFICIENT   =        .98          .30          .542
00174>
00175>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00176>            CN* =  80.0    Ia = Dep. Storage  (Above)
00177>         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00178>              THAN THE STORAGE COEFFICIENT.
00179>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00180>
00181> --------------------------------------------------------------------------------
00182> 002:0005--------------------------------------------------------------------------
00183> *# CATCHMENT 102 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS FROM EXTERNAL LAND
00184> *
00185> ----------------------
00186> | CALIB STANDHYD     |   Area    (ha)=     .50
00187> | 03:102    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
00188> ----------------------
00189>                                IMPERVIOUS    PERVIOUS (i)
00190>      Surface Area     (ha)=        .44          .06
00191>      Dep. Storage     (mm)=       1.00         6.35
00192>      Average Slope     (%)=       2.20         2.00
00193>      Length            (m)=     169.00         5.00
00194>      Mannings n            =       .013         .250
00195>
00196>      Max.eff.Inten.(mm/hr)=      78.39        21.52
00197>                   over (min)        3.00         7.00
00198>      Storage Coeff.  (min)=       3.05 (ii)    6.79 (ii)
00199>      Unit Hyd. Tpeak (min)=       3.00         7.00
00200>      Unit Hyd. peak  (cms)=        .37          .16
00201>                                                          *TOTALS*
00202>      PEAK FLOW       (cms)=        .09          .00          .093 (iii)
00203>      TIME TO PEAK    (hrs)=       2.00         2.08         2.000
00204>      RUNOFF VOLUME    (mm)=      39.93        12.19        36.327
00205>      TOTAL RAINFALL   (mm)=      40.93        40.93        40.933
00206>      RUNOFF COEFFICIENT   =        .98          .30          .887
00207>
00208>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00209>            CN* =  80.0    Ia = Dep. Storage  (Above)
00210>         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00211>              THAN THE STORAGE COEFFICIENT.
00212>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00213>
00214> --------------------------------------------------------------------------------
00215> 002:0006--------------------------------------------------------------------------
00216> * ADD TOTAL EXISTING FLOWS DIRECTED SOUTH
00217> ------------------------
00218> | ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00219> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00220>                       ID1 01:101           .27     .055    2.00  37.44    .000
00221>                     +ID2 03:102            .50     .093    2.00  36.33    .000
00222>                       ========================================================
00223>                       SUM 04:101+102       .77     .147    2.00  36.72    .000
00224>
00225>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00226>
00227> --------------------------------------------------------------------------------
00228> 002:0007--------------------------------------------------------------------------
00229> *#*****************************************************************************|
00230> *#
00231> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00232> *#        ==============================================
00233> *#
00234> **#*****************************************************************************|
00235> *# CATCHMENT 201 - CONTROLLED DISCHARGE TO PLAINS ROAD
00236> *
00237> ----------------------
00238> | CALIB STANDHYD     |   Area    (ha)=     .23
00239> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00240> ----------------------
00241>                                IMPERVIOUS    PERVIOUS (i)
00242>      Surface Area     (ha)=        .23          .00
00243>      Dep. Storage     (mm)=       1.00         6.35
00244>      Average Slope     (%)=       2.00         2.00
00245>      Length            (m)=      10.00         5.00
00246>      Mannings n            =       .013         .250
00247>
00248>      Max.eff.Inten.(mm/hr)=      78.39        24.53
00249>                   over (min)        1.00         4.00
00250>      Storage Coeff.  (min)=        .57 (ii)    4.13 (ii)
00251>      Unit Hyd. Tpeak (min)=       1.00         4.00
00252>      Unit Hyd. peak  (cms)=       1.40          .28
00253>                                                          *TOTALS*
00254>      PEAK FLOW       (cms)=        .05          .00          .050 (iii)
00255>      TIME TO PEAK    (hrs)=       1.97         2.03         2.000
00256>      RUNOFF VOLUME    (mm)=      39.93        12.19        39.655
00257>      TOTAL RAINFALL   (mm)=      40.93        40.93        40.933
00258>      RUNOFF COEFFICIENT   =        .98          .30          .969
00259>
00260>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00261>            CN* =  80.0    Ia = Dep. Storage  (Above)
00262>         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00263>              THAN THE STORAGE COEFFICIENT.
00264>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00265>
00266> --------------------------------------------------------------------------------
00267> 002:0008--------------------------------------------------------------------------
00268> *# ROUTE CATCHMENT 201 THROUGH ORIFICE PIPE AND TANK
00269> *
00270> ----------------------
```

```
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(201   )   |
| OUT<02:(201 CO)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00    |     .024  .4100E-02
                           .011  .7000E-03    |     .024  .5600E-02
                           .017  .1400E-02    |     .024  .7200E-02
                           .022  .2100E-02    |     .024  .7800E-02
                           .024  .2500E-02    |     .024  .8000E-02
                           .024  .2510E-02    |     .028  .9000E-02

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (201   )        .23      .050     2.000     39.655
     OUTFLOW<02: (201 CO)        .23      .024     2.017     39.655
    OVERFLOW<03: (201.OV)        .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   48.210
                    TIME SHIFT OF PEAK FLOW         (min)=    1.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2448E-02

--------------------------------------------------------------------------------
002:0009----------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE TO PLAINS ROAD
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=     .04
| 04:202    DT= 1.00 |   Total Imp(%)=   54.00   Dir. Conn.(%)=   54.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .02         .02
     Dep. Storage     (mm)=      1.00        6.35
     Average Slope     (%)=      2.00        2.00
     Length            (m)=      5.00        5.00
     Mannings n            =      .013        .250

     Max.eff.Inten.(mm/hr)=     78.39       24.53
                   over (min)      1.00        4.00
     Storage Coeff.  (min)=       .38 (ii)    3.93 (ii)
     Unit Hyd. Tpeak (min)=      1.00        4.00
     Unit Hyd. peak  (cms)=      1.58         .29
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .00         .00          .006 (iii)
     TIME TO PEAK    (hrs)=      1.92        2.03         2.000
     RUNOFF VOLUME    (mm)=     39.93       12.19        27.173
     TOTAL RAINFALL   (mm)=     40.93       40.93        40.933
     RUNOFF COEFFICIENT   =       .98         .30          .664

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0010----------------------------------------------------------------------
* ADD TOTAL FLOWS FROM DEVELOPMENT LANDS
-----------------------
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 02:201 CONTRO     .23     .024    2.02  39.66    .000
                     +ID2 03:201.OVF        .00     .000     .00    .00    .000
                     +ID3 04:202            .04     .006    2.00  27.17    .000
                      ==========================================================
                      SUM 05:201+202        .27     .029    2.00  37.81    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0011----------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=     .38
| 06:203    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .34         .04
     Dep. Storage     (mm)=      1.00        6.35
     Average Slope     (%)=      1.00        2.00
     Length            (m)=    105.00        5.00
     Mannings n            =      .013        .250

     Max.eff.Inten.(mm/hr)=     78.39       21.52
                   over (min)      3.00        7.00
     Storage Coeff.  (min)=      2.90 (ii)   6.65 (ii)
     Unit Hyd. Tpeak (min)=      3.00        7.00
     Unit Hyd. peak  (cms)=       .38         .17
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .07         .00          .073 (iii)
     TIME TO PEAK    (hrs)=      2.00        2.08         2.000
     RUNOFF VOLUME    (mm)=     39.93       12.19        37.159
     TOTAL RAINFALL   (mm)=     40.93       40.93        40.933
     RUNOFF COEFFICIENT   =       .98         .30          .908

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0012----------------------------------------------------------------------
*# CATCHMENT 204 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=     .12
| 07:204    DT= 1.00 |   Total Imp(%)=   85.00   Dir. Conn.(%)=   85.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .10         .02
     Dep. Storage     (mm)=      1.00        6.35
     Average Slope     (%)=      1.50        2.00
     Length            (m)=     66.00        5.00
     Mannings n            =      .013        .250

     Max.eff.Inten.(mm/hr)=     78.39       22.56
                   over (min)      2.00        6.00
     Storage Coeff.  (min)=      1.94 (ii)   5.62 (ii)
     Unit Hyd. Tpeak (min)=      2.00        6.00
     Unit Hyd. peak  (cms)=       .57         .20
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .02         .00          .023 (iii)
     TIME TO PEAK    (hrs)=      2.00        2.07         2.000
     RUNOFF VOLUME    (mm)=     39.93       12.19        35.772
     TOTAL RAINFALL   (mm)=     40.93       40.93        40.933
     RUNOFF COEFFICIENT   =       .98         .30          .874

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0013----------------------------------------------------------------------
* ADD TOTAL FLOWS FROM EXTERNAL LANDS
-----------------------
| ADD HYD (203+204   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:203             .38      .073    2.00  37.16    .000
                     +ID2 07:204             .12      .023    2.00  35.77    .000
                      ==========================================================
                      SUM 08:203+204         .50      .095    2.00  36.83    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0014----------------------------------------------------------------------
*#**********************************************************************|
* RUN REMAINING DESIGN STORMS (CITY OF BURLINGTON 2 TO 100-YR)
*
  ** END OF RUN :   4

**************************************************************************
```

```
--------------------
| START             |  Project  dir.: T:\PROJECTS\25090\SWMHYMO\
--------------------  Rainfall dir.: T:\PROJECTS\25090\SWMHYMO\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
           #  1=BUR6_005.stm
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*#**********************************************************************|
*#  Project Name: 1376 & 1382 PLAINS ROAD EAST
*#               BURLINGTON, ONTARIO
*#  JOB NUMBER  : 25090
*#       Date   : JANUARY 2026
*#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
*#       File   : 25090.DAT
*#**********************************************************************|
*
*
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*
--------------------
| READ STORM        |    Filename: Burlington 5-yr 6hr CHICAGO    (A=802.04
| Ptotal=  53.05 mm|    Comments: Burlington 5-yr 6hr CHICAGO    (A=802.04
--------------------
                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                 .17   2.348 |   1.67  10.690 |   3.17   5.897 |   4.67   3.004
                 .33   2.537 |   1.83  24.479 |   3.33   5.279 |   4.83   2.862
                 .50   2.766 |   2.00 101.312 |   3.50   4.790 |   5.00   2.734
                 .67   3.048 |   2.17  31.941 |   3.67   4.394 |   5.17   2.619
                 .83   3.407 |   2.33  17.333 |   3.83   4.065 |   5.33   2.514
                1.00   3.881 |   2.50  12.145 |   4.00   3.788 |   5.50   2.419
                1.17   4.539 |   2.67   9.469 |   4.17   3.550 |   5.67   2.331
                1.33   5.523 |   2.83   7.826 |   4.33   3.344 |   5.83   2.251
                1.50   7.185 |   3.00   6.709 |   4.50   3.164 |   6.00   2.176

--------------------------------------------------------------------------------
005:0003----------------------------------------------------------------------
*
*#**********************************************************************|
*#
*#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING (PHASE 1)
*#        ================================================
*#
*#**********************************************************************|
*# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (ACTUAL IMPERVIOUS
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=     .27
| 01:101    DT= 1.00 |   Total Imp(%)=   91.00   Dir. Conn.(%)=   91.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .25         .02
     Dep. Storage     (mm)=      1.00        6.35
     Average Slope     (%)=      1.10       10.00
     Length            (m)=     30.00        5.00
     Mannings n            =      .013        .250

     Max.eff.Inten.(mm/hr)=    101.31       42.29
                   over (min)      1.00        3.00
     Storage Coeff.  (min)=      1.20 (ii)   2.96 (ii)
     Unit Hyd. Tpeak (min)=      1.00        3.00
     Unit Hyd. peak  (cms)=       .96         .38
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .07         .00          .071 (iii)
     TIME TO PEAK    (hrs)=      2.00        2.02         2.000
     RUNOFF VOLUME    (mm)=     52.05       19.79        49.149
     TOTAL RAINFALL   (mm)=     53.05       53.05        53.053
     RUNOFF COEFFICIENT   =       .98         .37          .926

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
005:0004----------------------------------------------------------------------
*# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (CITY SPECIFIED IM
*
---------------------
| CALIB STANDHYD    |   Area    (ha)=     .27
| 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .10         .17
     Dep. Storage     (mm)=      1.00        6.35
     Average Slope     (%)=      1.10       10.00
     Length            (m)=     30.00        5.00
     Mannings n            =      .013        .250

     Max.eff.Inten.(mm/hr)=    101.31       42.29
                   over (min)      1.00        3.00
     Storage Coeff.  (min)=      1.20 (ii)   2.96 (ii)
     Unit Hyd. Tpeak (min)=      1.00        3.00
     Unit Hyd. peak  (cms)=       .96         .38
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .03         .02          .044 (iii)
     TIME TO PEAK    (hrs)=      2.00        2.02         2.000
     RUNOFF VOLUME    (mm)=     52.05       19.79        31.406
     TOTAL RAINFALL   (mm)=     53.05       53.05        53.053
```

```
00541>      RUNOFF COEFFICIENT   =        .98          .37           .592
00542>
00543>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00544>            CN* =  80.0    Ia = Dep. Storage  (Above)
00545>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00546>            THAN THE STORAGE COEFFICIENT.
00547>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00548>
00549> ---------------------------------------------------------------------------
00550> 005:0005----------------------------------------------------------------------
00551> *# CATCHMENT 102 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS FROM EXTERNAL LAND
00552> *
00553> ----------------------
00554> | CALIB STANDHYD     |   Area    (ha)=     .50
00555> | 03:102    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
00556> ----------------------
00557>                              IMPERVIOUS    PERVIOUS (i)
00558>      Surface Area     (ha)=        .44          .06
00559>      Dep. Storage     (mm)=       1.00         6.35
00560>      Average Slope     (%)=       2.20         2.00
00561>      Length            (m)=     169.00         5.00
00562>      Mannings n             =       .013         .250
00563>
00564>      Max.eff.Inten.(mm/hr)=     101.31        38.34
00565>                    over (min)        3.00         6.00
00566>      Storage Coeff.  (min)=       2.75 (ii)    5.72 (ii)
00567>      Unit Hyd. Tpeak (min)=       3.00         6.00
00568>      Unit Hyd. peak  (cms)=        .40          .19
00569>                                                          *TOTALS*
00570>      PEAK FLOW       (cms)=        .12          .00          .123 (iii)
00571>      TIME TO PEAK    (hrs)=       2.00         2.05         2.000
00572>      RUNOFF VOLUME    (mm)=      52.05        19.79        47.859
00573>      TOTAL RAINFALL   (mm)=      53.05        53.05        53.053
00574>      RUNOFF COEFFICIENT   =        .98          .37          .902
00575>
00576>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00577>            CN* =  80.0    Ia = Dep. Storage  (Above)
00578>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00579>            THAN THE STORAGE COEFFICIENT.
00580>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00581>
00582> ---------------------------------------------------------------------------
00583> 005:0006----------------------------------------------------------------------
00584> * ADD TOTAL EXISTING FLOWS DIRECTED SOUTH
00585> ----------------------
00586> | ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00587> ----------------------  (ha)     (cms)   (hrs)   (mm)   (cms)
00588>                       ID1 01:101          .27     .071    2.00  49.15    .000
00589>                      +ID2 03:102           .50     .123    2.00  47.86    .000
00590>                       ============================================================
00591>                       SUM 04:101+102        .77     .194    2.00  48.31    .000
00592>
00593>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00594>
00595> ---------------------------------------------------------------------------
00596> 005:0007----------------------------------------------------------------------
00597> *#*************************************************************************|
00598> *#
00599> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00600> *#        ==============================================
00601> *#
00602> **#*********************************************************************************|
00603> *# CATCHMENT 201 - CONTROLLED DISCHARGE TO PLAINS ROAD
00604> *
00605> ----------------------
00606> | CALIB STANDHYD     |   Area    (ha)=     .23
00607> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00608> ----------------------
00609>                              IMPERVIOUS    PERVIOUS (i)
00610>      Surface Area     (ha)=        .23          .00
00611>      Dep. Storage     (mm)=       1.00         6.35
00612>      Average Slope     (%)=       2.00         2.00
00613>      Length            (m)=      10.00         5.00
00614>      Mannings n             =       .013         .250
00615>
00616>      Max.eff.Inten.(mm/hr)=     101.31        42.29
00617>                    over (min)        1.00         3.00
00618>      Storage Coeff.  (min)=        .52 (ii)    3.38 (ii)
00619>      Unit Hyd. Tpeak (min)=       1.00         3.00
00620>      Unit Hyd. peak  (cms)=       1.45          .35
00621>                                                          *TOTALS*
00622>      PEAK FLOW       (cms)=        .06          .00          .064 (iii)
00623>      TIME TO PEAK    (hrs)=       1.97         2.02         2.000
00624>      RUNOFF VOLUME    (mm)=      52.05        19.79        51.730
00625>      TOTAL RAINFALL   (mm)=      53.05        53.05        53.053
00626>      RUNOFF COEFFICIENT   =        .98          .37          .975
00627>
00628>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00629>            CN* =  80.0    Ia = Dep. Storage  (Above)
00630>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00631>            THAN THE STORAGE COEFFICIENT.
00632>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00633>
00634> ---------------------------------------------------------------------------
00635> 005:0008----------------------------------------------------------------------
00636> *# ROUTE CATCHMENT 201 THROUGH ORIFICE PIPE AND TANK
00637> *
00638> ----------------------
00639> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00640> |  IN>01:(201   )    |
00641> | OUT<02:(201 CO)    |    =========  OUTLFOW STORAGE TABLE  =========
00642> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00643>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
00644>                              .000  .0000E+00   |     .024  .4100E-02
00645>                              .011  .7000E-03   |     .024  .5600E-02
00646>                              .017  .1400E-02   |     .024  .7200E-02
00647>                              .022  .2100E-02   |     .024  .7800E-02
00648>                              .024  .2500E-02   |     .024  .8000E-02
00649>                              .024  .2510E-02   |     .028  .9000E-02
00650>
00651>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00652>      --------------------       (ha)     (cms)     (hrs)       (mm)
00653>      INFLOW >01: (201   )        .23      .064     2.000     51.730
00654>      OUTFLOW<02: (201 CO)        .23      .024     1.967     51.730
00655>     OVERFLOW<03: (201.OV)        .00      .000      .000       .000
00656>
00657>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00658>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00659>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00660>
00661>
00662>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   37.795
00663>                     TIME SHIFT OF PEAK FLOW         (min)=    -2.00
00664>                     MAXIMUM  STORAGE   USED       (ha.m.)=.3334E-02
00665>
00666> ---------------------------------------------------------------------------
00667> 005:0009----------------------------------------------------------------------
00668> *# CATCHMENT 202 - UNCONTROLLED DISCHARGE TO PLAINS ROAD
00669> *
00670> ----------------------
00671> | CALIB STANDHYD     |   Area    (ha)=     .04
00672> | 04:202    DT= 1.00 |   Total Imp(%)=   54.00   Dir. Conn.(%)=   54.00
00673> ----------------------
00674>                              IMPERVIOUS    PERVIOUS (i)
00675>      Surface Area     (ha)=        .02          .02
00676>      Dep. Storage     (mm)=       1.00         6.35
00677>      Average Slope     (%)=       2.00         2.00
00678>      Length            (m)=       5.00         5.00
00679>      Mannings n             =       .013         .250
00680>
00681>      Max.eff.Inten.(mm/hr)=     101.31        42.29
00682>                    over (min)        1.00         3.00
00683>      Storage Coeff.  (min)=        .34 (ii)    3.20 (ii)
00684>      Unit Hyd. Tpeak (min)=       1.00         3.00
00685>      Unit Hyd. peak  (cms)=       1.61          .36
00686>                                                          *TOTALS*
00687>      PEAK FLOW       (cms)=        .01          .00          .008 (iii)
00688>      TIME TO PEAK    (hrs)=       1.92         2.02         2.000
00689>      RUNOFF VOLUME    (mm)=      52.05        19.79        37.213
00690>      TOTAL RAINFALL   (mm)=      53.05        53.05        53.053
00691>      RUNOFF COEFFICIENT   =        .98          .37          .701
00692>
00693>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00694>            CN* =  80.0    Ia = Dep. Storage  (Above)
00695>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00696>            THAN THE STORAGE COEFFICIENT.
00697>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00698>
00699> ---------------------------------------------------------------------------
00700> 005:0010----------------------------------------------------------------------
00701> * ADD TOTAL FLOWS FROM DEVELOPMENT LANDS
00702> ----------------------
00703> | ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00704> ----------------------  (ha)     (cms)   (hrs)   (mm)   (cms)
00705>                       ID1 02:201 CONTRO      .23     .024    1.97  51.73    .000
00706>                      +ID2 03:201.OVF         .00     .000     .00    .00    .000
00707>                      +ID3 04:202             .04     .008    2.00  37.21    .000
00708>                       ============================================================
00709>                       SUM 05:201+202         .27     .032    2.00  49.58    .000
00710>
00711>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00712>
00713> ---------------------------------------------------------------------------
00714> 005:0011----------------------------------------------------------------------
00715> *# CATCHMENT 203 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
00716> *
00717> ----------------------
00718> | CALIB STANDHYD     |   Area    (ha)=     .38
00719> | 06:203    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
00720> ----------------------
00721>                              IMPERVIOUS    PERVIOUS (i)
00722>      Surface Area     (ha)=        .34          .04
00723>      Dep. Storage     (mm)=       1.00         6.35
00724>      Average Slope     (%)=       1.00         2.00
00725>      Length            (m)=     105.00         5.00
00726>      Mannings n             =       .013         .250
00727>
00728>      Max.eff.Inten.(mm/hr)=     101.31        38.34
00729>                    over (min)        3.00         6.00
00730>      Storage Coeff.  (min)=       2.62 (ii)    5.59 (ii)
00731>      Unit Hyd. Tpeak (min)=       3.00         6.00
00732>      Unit Hyd. peak  (cms)=        .41          .20
00733>                                                          *TOTALS*
00734>      PEAK FLOW       (cms)=        .09          .00          .096 (iii)
00735>      TIME TO PEAK    (hrs)=       2.00         2.05         2.000
00736>      RUNOFF VOLUME    (mm)=      52.05        19.79        48.827
00737>      TOTAL RAINFALL   (mm)=      53.05        53.05        53.053
00738>      RUNOFF COEFFICIENT   =        .98          .37          .920
00739>
00740>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00741>            CN* =  80.0    Ia = Dep. Storage  (Above)
00742>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00743>            THAN THE STORAGE COEFFICIENT.
00744>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00745>
00746> ---------------------------------------------------------------------------
00747> 005:0012----------------------------------------------------------------------
00748> *# CATCHMENT 204 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
00749> *
00750> ----------------------
00751> | CALIB STANDHYD     |   Area    (ha)=     .12
00752> | 07:204    DT= 1.00 |   Total Imp(%)=   85.00   Dir. Conn.(%)=   85.00
00753> ----------------------
00754>                              IMPERVIOUS    PERVIOUS (i)
00755>      Surface Area     (ha)=        .10          .02
00756>      Dep. Storage     (mm)=       1.00         6.35
00757>      Average Slope     (%)=       1.50         2.00
00758>      Length            (m)=      66.00         5.00
00759>      Mannings n             =       .013         .250
00760>
00761>      Max.eff.Inten.(mm/hr)=     101.31        39.72
00762>                    over (min)        2.00         5.00
00763>      Storage Coeff.  (min)=       1.75 (ii)    4.69 (ii)
00764>      Unit Hyd. Tpeak (min)=       2.00         5.00
00765>      Unit Hyd. peak  (cms)=        .61          .24
00766>                                                          *TOTALS*
00767>      PEAK FLOW       (cms)=        .03          .00          .030 (iii)
00768>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
00769>      RUNOFF VOLUME    (mm)=      52.05        19.79        47.214
00770>      TOTAL RAINFALL   (mm)=      53.05        53.05        53.053
00771>      RUNOFF COEFFICIENT   =        .98          .37          .890
00772>
00773>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00774>            CN* =  80.0    Ia = Dep. Storage  (Above)
00775>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00776>            THAN THE STORAGE COEFFICIENT.
00777>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00778>
00779> ---------------------------------------------------------------------------
00780> 005:0013----------------------------------------------------------------------
00781> * ADD TOTAL FLOWS FROM EXTERNAL LANDS
00782> ----------------------
00783> | ADD HYD (203+204   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00784> ----------------------  (ha)     (cms)   (hrs)   (mm)   (cms)
00785>                       ID1 06:203             .38     .096    2.00  48.83    .000
00786>                      +ID2 07:204             .12     .030    2.00  47.21    .000
00787>                       ============================================================
00788>                       SUM 08:203+204         .50     .126    2.00  48.44    .000
00789>
00790>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00791>
00792> ---------------------------------------------------------------------------
00793> 005:0014----------------------------------------------------------------------
00794> **#*********************************************************************************|
00795> * RUN REMAINING DESIGN STORMS (CITY OF BURLINGTON 2 TO 100-YR)
00796> *
00797> ---------------------------------------------------------------------------
00798> 005:0002----------------------------------------------------------------------
00799> *
00800>   ** END OF RUN :   9
00801>
00802> ***************************************************************************
00803>
00804>
00805>
00806>
00807>
00808> --------------------
00809> | START            |  Project  dir.: T:\PROJECTS\25090\SWMHYMO\
00810> --------------------  Rainfall dir.: T:\PROJECTS\25090\SWMHYMO\
```

```
00811>     TZERO =   .00 hrs on       0
00812>     METOUT=   2 (output = METRIC)
00813>     NRUN  = 010
00814>     NSTORM=   1
00815>            #  1=BUR6_010.stm
00816> ------------------------------------------------------------------------------
00817> 010:0002-------------------------------------------------------------------------
00818> *#*************************************************************************|
00819> *#  Project Name: 1376 & 1382 PLAINS ROAD EAST
00820> *#               BURLINGTON, ONTARIO
00821> *#  JOB NUMBER  : 25090
00822> *#       Date   : JANUARY 2026
00823> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
00824> *#       File   : 25090.DAT
00825> *#*************************************************************************|
00826> *
00827> *
00828> ------------------------------------------------------------------------------
00829> 010:0002-------------------------------------------------------------------------
00830> *
00831> --------------------
00832> | READ STORM      |    Filename: Burlington 10-yr 6hr CHICAGO     (A=918.
00833> | Ptotal=  61.10 mm|    Comments: Burlington 10-yr 6hr CHICAGO     (A=918.
00834> --------------------
00835>              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00836>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00837>               .17   2.714 |   1.67  12.326 |   3.17   6.808 |   4.67   3.472
00838>               .33   2.933 |   1.83  28.176 |   3.33   6.095 |   4.83   3.308
00839>               .50   3.197 |   2.00 116.310 |   3.50   5.532 |   5.00   3.161
00840>               .67   3.523 |   2.17  36.748 |   3.67   5.075 |   5.17   3.027
00841>               .83   3.937 |   2.33  19.967 |   3.83   4.696 |   5.33   2.907
00842>              1.00   4.483 |   2.50  14.001 |   4.00   4.376 |   5.50   2.796
00843>              1.17   5.242 |   2.67  10.921 |   4.17   4.102 |   5.67   2.695
00844>              1.33   6.377 |   2.83   9.030 |   4.33   3.864 |   5.83   2.602
00845>              1.50   8.291 |   3.00   7.743 |   4.50   3.656 |   6.00   2.516
00846>
00847> ------------------------------------------------------------------------------
00848> 010:0003-------------------------------------------------------------------------
00849> *
00850> *#*************************************************************************|
00851> *#
00852> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING (PHASE 1)
00853> *#        ========================================================
00854> *#
00855> *#*************************************************************************|
00856> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (ACTUAL IMPERVIOUS
00857> *
00858> ----------------------
00859> | CALIB STANDHYD     |   Area    (ha)=     .27
00860> | 01:101    DT= 1.00 |   Total Imp(%)=   91.00   Dir. Conn.(%)=   91.00
00861> ----------------------
00862>                              IMPERVIOUS    PERVIOUS (i)
00863>      Surface Area     (ha)=        .25          .02
00864>      Dep. Storage     (mm)=       1.00         6.35
00865>      Average Slope     (%)=       1.10        10.00
00866>      Length            (m)=      30.00         5.00
00867>      Mannings n             =      .013         .250
00868>
00869>      Max.eff.Inten.(mm/hr)=     116.31        54.51
00870>                 over (min)        1.00         3.00
00871>      Storage Coeff.  (min)=       1.13 (ii)    2.73 (ii)
00872>      Unit Hyd. Tpeak (min)=       1.00         3.00
00873>      Unit Hyd. peak  (cms)=       1.00          .40
00874>                                                          *TOTALS*
00875>      PEAK FLOW       (cms)=        .08          .00          .082 (iii)
00876>      TIME TO PEAK    (hrs)=       2.00         2.02         2.000
00877>      RUNOFF VOLUME    (mm)=      60.10        25.35        56.974
00878>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00879>      RUNOFF COEFFICIENT   =        .98          .41          .932
00880>
00881>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00882>            CN* =  80.0    Ia = Dep. Storage  (Above)
00883>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00884>            THAN THE STORAGE COEFFICIENT.
00885>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00886>
00887> ------------------------------------------------------------------------------
00888> 010:0004-------------------------------------------------------------------------
00889> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (CITY SPECIFIED IM
00890> *
00891> ----------------------
00892> | CALIB STANDHYD     |   Area    (ha)=     .27
00893> | 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
00894> ----------------------
00895>                              IMPERVIOUS    PERVIOUS (i)
00896>      Surface Area     (ha)=        .10          .17
00897>      Dep. Storage     (mm)=       1.00         6.35
00898>      Average Slope     (%)=       1.10        10.00
00899>      Length            (m)=      30.00         5.00
00900>      Mannings n             =      .013         .250
00901>
00902>      Max.eff.Inten.(mm/hr)=     116.31        54.51
00903>                 over (min)        1.00         3.00
00904>      Storage Coeff.  (min)=       1.13 (ii)    2.73 (ii)
00905>      Unit Hyd. Tpeak (min)=       1.00         3.00
00906>      Unit Hyd. peak  (cms)=       1.00          .40
00907>                                                          *TOTALS*
00908>      PEAK FLOW       (cms)=        .03          .02          .054 (iii)
00909>      TIME TO PEAK    (hrs)=       2.00         2.02         2.000
00910>      RUNOFF VOLUME    (mm)=      60.10        25.35        37.861
00911>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00912>      RUNOFF COEFFICIENT   =        .98          .41          .620
00913>
00914>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00915>            CN* =  80.0    Ia = Dep. Storage  (Above)
00916>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00917>            THAN THE STORAGE COEFFICIENT.
00918>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00919>
00920> ------------------------------------------------------------------------------
00921> 010:0005-------------------------------------------------------------------------
00922> *# CATCHMENT 102 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS FROM EXTERNAL LAND
00923> *
00924> ----------------------
00925> | CALIB STANDHYD     |   Area    (ha)=     .50
00926> | 03:102    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
00927> ----------------------
00928>                              IMPERVIOUS    PERVIOUS (i)
00929>      Surface Area     (ha)=        .44          .06
00930>      Dep. Storage     (mm)=       1.00         6.35
00931>      Average Slope     (%)=       2.20         2.00
00932>      Length            (m)=     169.00         5.00
00933>      Mannings n             =      .013         .250
00934>
00935>      Max.eff.Inten.(mm/hr)=     116.31        51.53
00936>                 over (min)        3.00         5.00
00937>      Storage Coeff.  (min)=       2.60 (ii)    5.24 (ii)
00938>      Unit Hyd. Tpeak (min)=       3.00         5.00
00939>      Unit Hyd. peak  (cms)=        .41          .22
00940>                                                          *TOTALS*
00941>      PEAK FLOW       (cms)=        .14          .01          .143 (iii)
00942>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
00943>      RUNOFF VOLUME    (mm)=      60.10        25.35        55.584
00944>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00945>      RUNOFF COEFFICIENT   =        .98          .41          .910
00946>
00947>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00948>            CN* =  80.0    Ia = Dep. Storage  (Above)
00949>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00950>            THAN THE STORAGE COEFFICIENT.
00951>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00952>
00953> ------------------------------------------------------------------------------
00954> 010:0006-------------------------------------------------------------------------
00955> * ADD TOTAL EXISTING FLOWS DIRECTED SOUTH
00956> ------------------------
00957> | ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00958> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00959>                       ID1 01:101           .27     .082    2.00  56.97    .000
00960>                      +ID2 03:102           .50     .143    2.00  55.58    .000
00961>                       ========================================================
00962>                       SUM 04:101+102       .77     .225    2.00  56.07    .000
00963>
00964>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00965>
00966> ------------------------------------------------------------------------------
00967> 010:0007-------------------------------------------------------------------------
00968> *#*************************************************************************|
00969> *#
00970> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
00971> *#        ==============================================
00972> *#
00973> **#*************************************************************************|
00974> *# CATCHMENT 201 - CONTROLLED DISCHARGE TO PLAINS ROAD
00975> *
00976> ----------------------
00977> | CALIB STANDHYD     |   Area    (ha)=     .23
00978> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
00979> ----------------------
00980>                              IMPERVIOUS    PERVIOUS (i)
00981>      Surface Area     (ha)=        .23          .00
00982>      Dep. Storage     (mm)=       1.00         6.35
00983>      Average Slope     (%)=       2.00         2.00
00984>      Length            (m)=      10.00         5.00
00985>      Mannings n             =      .013         .250
00986>
00987>      Max.eff.Inten.(mm/hr)=     116.31        54.51
00988>                 over (min)        1.00         3.00
00989>      Storage Coeff.  (min)=        .49 (ii)    3.07 (ii)
00990>      Unit Hyd. Tpeak (min)=       1.00         3.00
00991>      Unit Hyd. peak  (cms)=       1.48          .37
00992>                                                          *TOTALS*
00993>      PEAK FLOW       (cms)=        .07          .00          .074 (iii)
00994>      TIME TO PEAK    (hrs)=       1.98         2.02         2.000
00995>      RUNOFF VOLUME    (mm)=      60.10        25.35        59.754
00996>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
00997>      RUNOFF COEFFICIENT   =        .98          .41          .978
00998>
00999>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01000>            CN* =  80.0    Ia = Dep. Storage  (Above)
01001>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01002>            THAN THE STORAGE COEFFICIENT.
01003>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01004>
01005> ------------------------------------------------------------------------------
01006> 010:0008-------------------------------------------------------------------------
01007> *# ROUTE CATCHMENT 201 THROUGH ORIFICE PIPE AND TANK
01008> *
01009> ----------------------
01010> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01011> |  IN>01:(201    )   |
01012> | OUT<02:(201 CO)    |    =========  OUTLFOW STORAGE TABLE  =========
01013> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01014>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
01015>                              .000  .0000E+00    |     .024  .4100E-02
01016>                              .011  .7000E-03    |     .024  .5600E-02
01017>                              .017  .1400E-02    |     .024  .7200E-02
01018>                              .022  .2100E-02    |     .024  .7800E-02
01019>                              .024  .2500E-02    |     .024  .8000E-02
01020>                              .024  .2510E-02    |     .028  .9000E-02
01021>
01022>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01023>      --------------------       (ha)     (cms)     (hrs)       (mm)
01024>      INFLOW >01: (201   )         .23      .074     2.000     59.754
01025>      OUTFLOW<02: (201 CO)         .23      .024     1.933     59.754
01026>     OVERFLOW<03: (201.OV)         .00      .000      .000       .000
01027>
01028>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01029>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
01030>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
01031>
01032>
01033>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   32.903
01034>                    TIME SHIFT OF PEAK FLOW         (min)=    -4.00
01035>                    MAXIMUM  STORAGE   USED       (ha.m.)=.3989E-02
01036>
01037> ------------------------------------------------------------------------------
01038> 010:0009-------------------------------------------------------------------------
01039> *# CATCHMENT 202 - UNCONTROLLED DISCHARGE TO PLAINS ROAD
01040> *
01041> ----------------------
01042> | CALIB STANDHYD     |   Area    (ha)=     .04
01043> | 04:202    DT= 1.00 |   Total Imp(%)=   54.00   Dir. Conn.(%)=   54.00
01044> ----------------------
01045>                              IMPERVIOUS    PERVIOUS (i)
01046>      Surface Area     (ha)=        .02          .02
01047>      Dep. Storage     (mm)=       1.00         6.35
01048>      Average Slope     (%)=       2.00         2.00
01049>      Length            (m)=       5.00         5.00
01050>      Mannings n             =      .013         .250
01051>
01052>      Max.eff.Inten.(mm/hr)=     116.31        54.51
01053>                 over (min)        1.00         3.00
01054>      Storage Coeff.  (min)=        .32 (ii)    2.91 (ii)
01055>      Unit Hyd. Tpeak (min)=       1.00         3.00
01056>      Unit Hyd. peak  (cms)=       1.62          .38
01057>                                                          *TOTALS*
01058>      PEAK FLOW       (cms)=        .01          .00          .009 (iii)
01059>      TIME TO PEAK    (hrs)=       1.92         2.02         2.000
01060>      RUNOFF VOLUME    (mm)=      60.10        25.35        44.116
01061>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
01062>      RUNOFF COEFFICIENT   =        .98          .41          .722
01063>
01064>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01065>            CN* =  80.0    Ia = Dep. Storage  (Above)
01066>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01067>            THAN THE STORAGE COEFFICIENT.
01068>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01069>
01070> ------------------------------------------------------------------------------
01071> 010:0010-------------------------------------------------------------------------
01072> * ADD TOTAL FLOWS FROM DEVELOPMENT LANDS
01073> ------------------------
01074> | ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01075> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01076>                       ID1 02:201 CONTRO    .23     .024    1.93  59.75    .000
01077>                      +ID2 03:201.OVF       .00     .000     .00    .00    .000
01078>                      +ID3 04:202           .04     .009    2.00  44.12    .000
01079>                       ========================================================
01080>                       SUM 05:201+202       .27     .034    2.00  57.44    .000
```

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01081>
01082>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01083>
01084> ------------------------------------------------------------------------------
01085> 010:0011----------------------------------------------------------------------
01086> *# CATCHMENT 203 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
01087> *
01088> ----------------------
01089> | CALIB STANDHYD     |   Area    (ha)=     .38
01090> | 06:203    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
01091> ----------------------
01092>                             IMPERVIOUS    PERVIOUS (i)
01093>      Surface Area     (ha)=        .34          .04
01094>      Dep. Storage     (mm)=       1.00         6.35
01095>      Average Slope     (%)=       1.00         2.00
01096>      Length            (m)=     105.00         5.00
01097>      Mannings n            =       .013         .250
01098>
01099>      Max.eff.Inten.(mm/hr)=     116.31        51.53
01100>                  over (min)        2.00         5.00
01101>      Storage Coeff.  (min)=       2.48 (ii)    5.12 (ii)
01102>      Unit Hyd. Tpeak (min)=       2.00         5.00
01103>      Unit Hyd. peak  (cms)=        .48          .22
01104>                                                          *TOTALS*
01105>      PEAK FLOW       (cms)=        .11          .00          .112 (iii)
01106>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
01107>      RUNOFF VOLUME    (mm)=      60.10        25.35        56.626
01108>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
01109>      RUNOFF COEFFICIENT   =        .98          .41          .927
01110>
01111>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01112>            CN* =  80.0    Ia = Dep. Storage  (Above)
01113>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01114>            THAN THE STORAGE COEFFICIENT.
01115>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01116>
01117> ------------------------------------------------------------------------------
01118> 010:0012----------------------------------------------------------------------
01119> *# CATCHMENT 204 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
01120> *
01121> ----------------------
01122> | CALIB STANDHYD     |   Area    (ha)=     .12
01123> | 07:204    DT= 1.00 |   Total Imp(%)=   85.00   Dir. Conn.(%)=   85.00
01124> ----------------------
01125>                             IMPERVIOUS    PERVIOUS (i)
01126>      Surface Area     (ha)=        .10          .02
01127>      Dep. Storage     (mm)=       1.00         6.35
01128>      Average Slope     (%)=       1.50         2.00
01129>      Length            (m)=      66.00         5.00
01130>      Mannings n            =       .013         .250
01131>
01132>      Max.eff.Inten.(mm/hr)=     116.31        53.05
01133>                  over (min)        2.00         4.00
01134>      Storage Coeff.  (min)=       1.66 (ii)    4.27 (ii)
01135>      Unit Hyd. Tpeak (min)=       2.00         4.00
01136>      Unit Hyd. peak  (cms)=        .63          .27
01137>                                                          *TOTALS*
01138>      PEAK FLOW       (cms)=        .03          .00          .035 (iii)
01139>      TIME TO PEAK    (hrs)=       2.00         2.02         2.000
01140>      RUNOFF VOLUME    (mm)=      60.10        25.35        54.889
01141>      TOTAL RAINFALL   (mm)=      61.10        61.10        61.101
01142>      RUNOFF COEFFICIENT   =        .98          .41          .898
01143>
01144>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01145>            CN* =  80.0    Ia = Dep. Storage  (Above)
01146>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01147>            THAN THE STORAGE COEFFICIENT.
01148>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01149>
01150> ------------------------------------------------------------------------------
01151> 010:0013----------------------------------------------------------------------
01152> * ADD TOTAL FLOWS FROM EXTERNAL LANDS
01153> ----------------------
01154> | ADD HYD (203+204   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01155> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
01156>                       ID1 06:203            .38      .112    2.00  56.63    .000
01157>                      +ID2 07:204            .12      .035    2.00  54.89    .000
01158>                       ========================================================
01159>                       SUM 08:203+204         .50      .147    2.00  56.21    .000
01160>
01161>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01162>
01163> ------------------------------------------------------------------------------
01164> 010:0014----------------------------------------------------------------------
01165> **#*****************************************************************************|
01166> * RUN REMAINING DESIGN STORMS (CITY OF BURLINGTON 2 TO 100-YR)
01167> *
01168> ------------------------------------------------------------------------------
01169> 010:0002----------------------------------------------------------------------
01170> *
01171> ------------------------------------------------------------------------------
01172> 010:0002----------------------------------------------------------------------
01173> *
01174>   ** END OF RUN :  24
01175>
01176> ******************************************************************************
01177>
01178>
01179>
01180>
01181>
01182> --------------------
01183> | START            |  Project  dir.: T:\PROJECTS\25090\SWMHYMO\
01184> --------------------  Rainfall dir.: T:\PROJECTS\25090\SWMHYMO\
01185>      TZERO =   .00 hrs on      0
01186>      METOUT=   2 (output = METRIC)
01187>      NRUN  = 025
01188>      NSTORM=   1
01189>             #  1=BUR6_025.stm
01190> ------------------------------------------------------------------------------
01191> 025:0002----------------------------------------------------------------------
01192> *#*****************************************************************************|
01193> *#  Project Name: 1376 & 1382 PLAINS ROAD EAST
01194> *#               BURLINGTON, ONTARIO
01195> *#  JOB NUMBER  : 25090
01196> *#       Date   : JANUARY 2026
01197> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
01198> *#       File   : 25090.DAT
01199> *#*****************************************************************************|
01200> *
01201> *
01202> ------------------------------------------------------------------------------
01203> 025:0002----------------------------------------------------------------------
01204> *
01205> --------------------
01206> | READ STORM       |    Filename: Burlington 25-yr 6hr CHICAGO      (A=106
01207> | Ptotal=  71.35 mm|    Comments: Burlington 25-yr 6hr CHICAGO      (A=106
01208> --------------------
01209>              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01210>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01211>               .17   3.182 |   1.67  14.410 |   3.17   7.968 |   4.67   4.068
01212>               .33   3.437 |   1.83  32.881 |   3.33   7.135 |   4.83   3.876
01213>               .50   3.746 |   2.00 135.380 |   3.50   6.477 |   5.00   3.704
01214>               .67   4.128 |   2.17  42.866 |   3.67   5.943 |   5.17   3.548
01215>               .83   4.612 |   2.33  23.321 |   3.83   5.499 |   5.33   3.407
01216>              1.00   5.251 |   2.50  16.365 |   4.00   5.125 |   5.50   3.278
01217>              1.17   6.138 |   2.67  12.771 |   4.17   4.805 |   5.67   3.160
01218>              1.33   7.465 |   2.83  10.563 |   4.33   4.527 |   5.83   3.051
01219>              1.50   9.700 |   3.00   9.061 |   4.50   4.284 |   6.00   2.950
01220>
01221> ------------------------------------------------------------------------------
01222> 025:0003----------------------------------------------------------------------
01223> *
01224> *#*****************************************************************************|
01225> *#
01226> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING (PHASE 1)
01227> *#        ================================================
01228> *#
01229> *#*****************************************************************************|
01230> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (ACTUAL IMPERVIOUS
01231> *
01232> ----------------------
01233> | CALIB STANDHYD     |   Area    (ha)=     .27
01234> | 01:101    DT= 1.00 |   Total Imp(%)=   91.00   Dir. Conn.(%)=   91.00
01235> ----------------------
01236>                             IMPERVIOUS    PERVIOUS (i)
01237>      Surface Area     (ha)=        .25          .02
01238>      Dep. Storage     (mm)=       1.00         6.35
01239>      Average Slope     (%)=       1.10        10.00
01240>      Length            (m)=      30.00         5.00
01241>      Mannings n            =       .013         .250
01242>
01243>      Max.eff.Inten.(mm/hr)=     135.38        72.61
01244>                  over (min)        1.00         2.00
01245>      Storage Coeff.  (min)=       1.07 (ii)    2.49 (ii)
01246>      Unit Hyd. Tpeak (min)=       1.00         2.00
01247>      Unit Hyd. peak  (cms)=       1.03          .48
01248>                                                          *TOTALS*
01249>      PEAK FLOW       (cms)=        .09          .00          .097 (iii)
01250>      TIME TO PEAK    (hrs)=       2.00         2.00         2.000
01251>      RUNOFF VOLUME    (mm)=      70.35        32.88        66.974
01252>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
01253>      RUNOFF COEFFICIENT   =        .99          .46          .939
01254>
01255>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01256>            CN* =  80.0    Ia = Dep. Storage  (Above)
01257>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01258>            THAN THE STORAGE COEFFICIENT.
01259>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01260>
01261> ------------------------------------------------------------------------------
01262> 025:0004----------------------------------------------------------------------
01263> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (CITY SPECIFIED IM
01264> *
01265> ----------------------
01266> | CALIB STANDHYD     |   Area    (ha)=     .27
01267> | 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
01268> ----------------------
01269>                             IMPERVIOUS    PERVIOUS (i)
01270>      Surface Area     (ha)=        .10          .17
01271>      Dep. Storage     (mm)=       1.00         6.35
01272>      Average Slope     (%)=       1.10        10.00
01273>      Length            (m)=      30.00         5.00
01274>      Mannings n            =       .013         .250
01275>
01276>      Max.eff.Inten.(mm/hr)=     135.38        72.61
01277>                  over (min)        1.00         2.00
01278>      Storage Coeff.  (min)=       1.07 (ii)    2.49 (ii)
01279>      Unit Hyd. Tpeak (min)=       1.00         2.00
01280>      Unit Hyd. peak  (cms)=       1.03          .48
01281>                                                          *TOTALS*
01282>      PEAK FLOW       (cms)=        .04          .03          .068 (iii)
01283>      TIME TO PEAK    (hrs)=       2.00         2.00         2.000
01284>      RUNOFF VOLUME    (mm)=      70.35        32.88        46.366
01285>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
01286>      RUNOFF COEFFICIENT   =        .99          .46          .650
01287>
01288>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01289>            CN* =  80.0    Ia = Dep. Storage  (Above)
01290>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01291>            THAN THE STORAGE COEFFICIENT.
01292>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01293>
01294> ------------------------------------------------------------------------------
01295> 025:0005----------------------------------------------------------------------
01296> *# CATCHMENT 102 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS FROM EXTERNAL LAND
01297> *
01298> ----------------------
01299> | CALIB STANDHYD     |   Area    (ha)=     .50
01300> | 03:102    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
01301> ----------------------
01302>                             IMPERVIOUS    PERVIOUS (i)
01303>      Surface Area     (ha)=        .44          .06
01304>      Dep. Storage     (mm)=       1.00         6.35
01305>      Average Slope     (%)=       2.20         2.00
01306>      Length            (m)=     169.00         5.00
01307>      Mannings n            =       .013         .250
01308>
01309>      Max.eff.Inten.(mm/hr)=     135.38        67.57
01310>                  over (min)        2.00         5.00
01311>      Storage Coeff.  (min)=       2.45 (ii)    4.82 (ii)
01312>      Unit Hyd. Tpeak (min)=       2.00         5.00
01313>      Unit Hyd. peak  (cms)=        .49          .23
01314>                                                          *TOTALS*
01315>      PEAK FLOW       (cms)=        .16          .01          .169 (iii)
01316>      TIME TO PEAK    (hrs)=       2.00         2.03         2.000
01317>      RUNOFF VOLUME    (mm)=      70.35        32.88        65.476
01318>      TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
01319>      RUNOFF COEFFICIENT   =        .99          .46          .918
01320>
01321>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01322>            CN* =  80.0    Ia = Dep. Storage  (Above)
01323>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01324>            THAN THE STORAGE COEFFICIENT.
01325>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01326>
01327> ------------------------------------------------------------------------------
01328> 025:0006----------------------------------------------------------------------
01329> * ADD TOTAL EXISTING FLOWS DIRECTED SOUTH
01330> ----------------------
01331> | ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01332> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
01333>                       ID1 01:101            .27      .097    2.00  66.97    .000
01334>                      +ID2 03:102            .50      .169    2.00  65.48    .000
01335>                       ========================================================
01336>                       SUM 04:101+102         .77      .266    2.00  66.00    .000
01337>
01338>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01339>
01340> ------------------------------------------------------------------------------
01341> 025:0007----------------------------------------------------------------------
01342> *#*****************************************************************************|
01343> *#
01344> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
01345> *#        ===============================================
01346> *#
01347> **#*****************************************************************************|
01348> *# CATCHMENT 201 - CONTROLLED DISCHARGE TO PLAINS ROAD
01349> *
01350> ----------------------
```

```
| CALIB STANDHYD     |   Area    (ha)=     .23
| 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .23          .00
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      10.00         5.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=     135.38        71.01
               over (min)        1.00         3.00
     Storage Coeff.  (min)=       .46 (ii)    2.79 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.50          .39
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .09          .00          .086 (iii)
     TIME TO PEAK    (hrs)=       1.95         2.00         2.000
     RUNOFF VOLUME    (mm)=      70.35        32.88        69.972
     TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
     RUNOFF COEFFICIENT   =        .99          .46          .981

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
025:0008--------------------------------------------------------------------------
*# ROUTE CATCHMENT 201 THROUGH ORIFICE PIPE AND TANK
*
----------------------
|  ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(201   )    |
| OUT<02:(201 CO)    |    =========  OUTLFLOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .024  .4100E-02
                            .011  .7000E-03    |     .024  .5600E-02
                            .017  .1400E-02    |     .024  .7200E-02
                            .022  .2100E-02    |     .024  .7800E-02
                            .024  .2500E-02    |     .024  .8000E-02
                            .024  .2510E-02    |     .028  .9000E-02

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (201   )        .23      .086     2.000     69.972
     OUTFLOW<02: (201 CO)        .23      .024     1.917     69.972
    OVERFLOW<03: (201.OV)        .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   28.250
                    TIME SHIFT OF PEAK FLOW     (min)=    -5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5024E-02

--------------------------------------------------------------------------------
025:0009--------------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE TO PLAINS ROAD
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .04
| 04:202    DT= 1.00 |   Total Imp(%)=   54.00   Dir. Conn.(%)=   54.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .02          .02
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       5.00         5.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=     135.38        71.01
               over (min)        1.00         3.00
     Storage Coeff.  (min)=        .30 (ii)    2.63 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.64          .41
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .01          .00          .011 (iii)
     TIME TO PEAK    (hrs)=       1.92         2.00         2.000
     RUNOFF VOLUME    (mm)=      70.35        32.88        53.111
     TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
     RUNOFF COEFFICIENT   =        .99          .46          .744

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
025:0010--------------------------------------------------------------------------
* ADD TOTAL FLOWS FROM DEVELOPMENT LANDS
----------------------
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 02:201 CONTRO      .23     .024    1.92  69.97    .000
                     +ID2 03:201.OVF         .00     .000     .00    .00    .000
                     +ID3 04:202             .04     .011    2.00  53.11    .000
                      ==========================================================
                      SUM 05:201+202         .27     .036    2.00  67.47    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0011--------------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .38
| 06:203    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .34          .04
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     105.00         5.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=     135.38        67.57
               over (min)        2.00         5.00
     Storage Coeff.  (min)=       2.33 (ii)    4.70 (ii)
     Unit Hyd. Tpeak (min)=       2.00         5.00
     Unit Hyd. peak  (cms)=        .50          .24
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .13          .01          .132 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.03         2.000
     RUNOFF VOLUME    (mm)=      70.35        32.88        66.600
     TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
     RUNOFF COEFFICIENT   =        .99          .46          .933

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
025:0012--------------------------------------------------------------------------
*# CATCHMENT 204 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .12
| 07:204    DT= 1.00 |   Total Imp(%)=   85.00   Dir. Conn.(%)=   85.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .10          .02
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       1.50         2.00
     Length            (m)=      66.00         5.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=     135.38        69.33
               over (min)        2.00         4.00
     Storage Coeff.  (min)=       1.56 (ii)    3.91 (ii)
     Unit Hyd. Tpeak (min)=       2.00         4.00
     Unit Hyd. peak  (cms)=        .65          .29
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .04          .00          .041 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.02         2.000
     RUNOFF VOLUME    (mm)=      70.35        32.88        64.726
     TOTAL RAINFALL   (mm)=      71.35        71.35        71.347
     RUNOFF COEFFICIENT   =        .99          .46          .907

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
025:0013--------------------------------------------------------------------------
* ADD TOTAL FLOWS FROM EXTERNAL LANDS
----------------------
| ADD HYD (203+204   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:203             .38     .132    2.00  66.60    .000
                     +ID2 07:204             .12     .041    2.00  64.73    .000
                      ==========================================================
                      SUM 08:203+204         .50     .173    2.00  66.15    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0014--------------------------------------------------------------------------
**#*************************************************************************|
* RUN REMAINING DESIGN STORMS (CITY OF BURLINGTON 2 TO 100-YR)
*
--------------------------------------------------------------------------------
025:0002--------------------------------------------------------------------------
*
--------------------------------------------------------------------------------
025:0002--------------------------------------------------------------------------
*
--------------------------------------------------------------------------------
025:0002--------------------------------------------------------------------------
*
  ** END OF RUN :  49

*************************************************************************




--------------------
| START            |  Project  dir.: T:\PROJECTS\25090\SWMHYMO\
--------------------  Rainfall dir.: T:\PROJECTS\25090\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 050
    NSTORM=   1
                #  1=BUR6_050.stm
--------------------------------------------------------------------------------
050:0002--------------------------------------------------------------------------
*#*************************************************************************|
*#  Project Name: 1376 & 1382 PLAINS ROAD EAST
*#               BURLINGTON, ONTARIO
*#  JOB NUMBER  : 25090
*#       Date   : JANUARY 2026
*#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
*#       File   : 25090.DAT
*#*************************************************************************|
*
*
--------------------------------------------------------------------------------
050:0002--------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: Burlington 50-yr 6hr CHICAGO     (A=1172
| Ptotal=  78.93 mm|    Comments: Burlington 50-yr 6hr CHICAGO     (A=1172
--------------------
             TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
              hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
              .17   3.533 |   1.67  15.961 |   3.17   8.836 |   4.67   4.516
              .33   3.817 |   1.83  36.356 |   3.33   7.913 |   4.83   4.304
              .50   4.160 |   2.00 149.296 |   3.50   7.185 |   5.00   4.113
              .67   4.582 |   2.17  47.374 |   3.67   6.593 |   5.17   3.940
              .83   5.119 |   2.33  25.806 |   3.83   6.102 |   5.33   3.783
             1.00   5.827 |   2.50  18.121 |   4.00   5.688 |   5.67   3.640
             1.17   6.809 |   2.67  14.149 |   4.17   5.333 |   5.67   3.509
             1.33   8.278 |   2.83  11.707 |   4.33   5.025 |   5.83   3.388
             1.50  10.753 |   3.00  10.045 |   4.50   4.755 |   6.00   3.277

--------------------------------------------------------------------------------
050:0003--------------------------------------------------------------------------
*
*#*************************************************************************|
*#
*#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING (PHASE 1)
*#        ================================================
*#
*#*************************************************************************|
*# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (ACTUAL IMPERVIOUS
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .27
| 01:101    DT= 1.00 |   Total Imp(%)=   91.00   Dir. Conn.(%)=   91.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .25          .02
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       1.10        10.00
     Length            (m)=      30.00         5.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=     149.30        85.37
```

```
                over (min)        1.00         2.00
     Storage Coeff.  (min)=       1.03 (ii)    2.36 (ii)
     Unit Hyd. Tpeak (min)=       1.00         2.00
     Unit Hyd. peak  (cms)=       1.06          .50
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .10          .01          .107 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.00         2.000
     RUNOFF VOLUME    (mm)=      77.93        38.71        74.402
     TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
     RUNOFF COEFFICIENT   =        .99          .49          .943

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0004--------------------------------------------------------------------------
*# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (CITY SPECIFIED IM
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .27
| 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .10          .17
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       1.10        10.00
     Length            (m)=      30.00         5.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=     149.30        85.37
                over (min)        1.00         2.00
     Storage Coeff.  (min)=       1.03 (ii)    2.36 (ii)
     Unit Hyd. Tpeak (min)=       1.00         2.00
     Unit Hyd. peak  (cms)=       1.06          .50
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .04          .04          .077 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.00         2.000
     RUNOFF VOLUME    (mm)=      77.93        38.71        52.832
     TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
     RUNOFF COEFFICIENT   =        .99          .49          .669

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0005--------------------------------------------------------------------------
*# CATCHMENT 102 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS FROM EXTERNAL LAND
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .50
| 03:102    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .44          .06
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       2.20         2.00
     Length            (m)=     169.00         5.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=     149.30        79.90
                over (min)        2.00         5.00
     Storage Coeff.  (min)=       2.35 (ii)    4.57 (ii)
     Unit Hyd. Tpeak (min)=       2.00         5.00
     Unit Hyd. peak  (cms)=        .50          .24
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .18          .01          .188 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.03         2.000
     RUNOFF VOLUME    (mm)=      77.93        38.71        72.834
     TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
     RUNOFF COEFFICIENT   =        .99          .49          .923

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0006--------------------------------------------------------------------------
* ADD TOTAL EXISTING FLOWS DIRECTED SOUTH
------------------------
| ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 01:101            .27      .107    2.00  74.40    .000
                     +ID2 03:102            .50      .188    2.00  72.83    .000
                      ==========================================================
                      SUM 04:101+102         .77      .295    2.00  73.38    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0007--------------------------------------------------------------------------
*#*************************************************************************|
*#
*#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#        ===============================================
*#
**#*************************************************************************|
*# CATCHMENT 201 - CONTROLLED DISCHARGE TO PLAINS ROAD
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .23
| 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .23          .00
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      10.00         5.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=     149.30        83.65
                over (min)        1.00         3.00
     Storage Coeff.  (min)=        .44 (ii)    2.62 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.52          .41
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .09          .00          .095 (iii)
     TIME TO PEAK    (hrs)=       1.95         2.00         2.000
     RUNOFF VOLUME    (mm)=      77.93        38.71        77.540
     TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
     RUNOFF COEFFICIENT   =        .99          .49          .982

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0008--------------------------------------------------------------------------
*# ROUTE CATCHMENT 201 THROUGH ORIFICE PIPE AND TANK
*
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>01:(201    )   |
| OUT<02:(201 CO)   |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00    |     .024  .4100E-02
                            .011  .7000E-03    |     .024  .5600E-02
                            .017  .1400E-02    |     .024  .7200E-02
                            .022  .2100E-02    |     .024  .7800E-02
                            .024  .2500E-02    |     .024  .8000E-02
                            .024  .2510E-02    |     .028  .9000E-02

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (201   )        .23      .095     2.000     77.540
     OUTFLOW<02: (201 CO)        .23      .024     1.900     77.540
    OVERFLOW<03: (201.OV)        .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   25.606
                    TIME SHIFT OF PEAK FLOW         (min)=    -6.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5829E-02

--------------------------------------------------------------------------------
050:0009--------------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE TO PLAINS ROAD
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .04
| 04:202    DT= 1.00 |   Total Imp(%)=   54.00   Dir. Conn.(%)=   54.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .02          .02
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       5.00         5.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=     149.30        85.37
                over (min)        1.00         2.00
     Storage Coeff.  (min)=        .29 (ii)    2.45 (ii)
     Unit Hyd. Tpeak (min)=       1.00         2.00
     Unit Hyd. peak  (cms)=       1.64          .49
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .01          .00          .013 (iii)
     TIME TO PEAK    (hrs)=       1.90         2.00         2.000
     RUNOFF VOLUME    (mm)=      77.93        38.71        59.891
     TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
     RUNOFF COEFFICIENT   =        .99          .49          .759

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0010--------------------------------------------------------------------------
* ADD TOTAL FLOWS FROM DEVELOPMENT LANDS
------------------------
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 02:201 CONTRO     .23      .024    1.90  77.54    .000
                     +ID2 03:201.OVF        .00      .000     .00    .00    .000
                     +ID3 04:202            .04      .013    2.00  59.89    .000
                      ==========================================================
                      SUM 05:201+202         .27      .037    2.00  74.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0011--------------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .38
| 06:203    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .34          .04
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     105.00         5.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=     149.30        81.82
                over (min)        2.00         4.00
     Storage Coeff.  (min)=       2.24 (ii)    4.44 (ii)
     Unit Hyd. Tpeak (min)=       2.00         4.00
     Unit Hyd. peak  (cms)=        .52          .26
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .14          .01          .147 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.02         2.000
     RUNOFF VOLUME    (mm)=      77.93        38.71        74.010
     TOTAL RAINFALL   (mm)=      78.93        78.93        78.932
     RUNOFF COEFFICIENT   =        .99          .49          .938

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  80.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0012--------------------------------------------------------------------------
*# CATCHMENT 204 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
*
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .12
| 07:204    DT= 1.00 |   Total Imp(%)=   85.00   Dir. Conn.(%)=   85.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .10          .02
     Dep. Storage     (mm)=       1.00         6.35
     Average Slope     (%)=       1.50         2.00
     Length            (m)=      66.00         5.00
     Mannings n            =      .013          .250

     Max.eff.Inten.(mm/hr)=     149.30        81.82
                over (min)        2.00         4.00
     Storage Coeff.  (min)=       1.50 (ii)    3.70 (ii)
     Unit Hyd. Tpeak (min)=       2.00         4.00
     Unit Hyd. peak  (cms)=        .66          .30
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .04          .00          .045 (iii)
     TIME TO PEAK    (hrs)=       2.00         2.02         2.000
```

```
01891>      RUNOFF VOLUME    (mm)=      77.93        38.71         72.049
01892>      TOTAL RAINFALL   (mm)=      78.93        78.93         78.932
01893>      RUNOFF COEFFICIENT   =        .99          .49           .913
01894>
01895>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01896>            CN* =  80.0    Ia = Dep. Storage  (Above)
01897>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01898>            THAN THE STORAGE COEFFICIENT.
01899>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01900>
01901> ---------------------------------------------------------------------------
01902> 050:0013----------------------------------------------------------------------
01903> * ADD TOTAL FLOWS FROM EXTERNAL LANDS
01904> ----------------------
01905> | ADD HYD (203+204   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01906> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
01907>                       ID1 06:203            .38     .147    2.00  74.01    .000
01908>                      +ID2 07:204            .12     .045    2.00  72.05    .000
01909>                       ============================================================
01910>                       SUM 08:203+204         .50     .192    2.00  73.54    .000
01911>
01912>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01913>
01914> ---------------------------------------------------------------------------
01915> 050:0014----------------------------------------------------------------------
01916> **#*************************************************************************|
01917> * RUN REMAINING DESIGN STORMS (CITY OF BURLINGTON 2 TO 100-YR)
01918> *
01919> ---------------------------------------------------------------------------
01920> 050:0002----------------------------------------------------------------------
01921> *
01922> ---------------------------------------------------------------------------
01923> 050:0002----------------------------------------------------------------------
01924> *
01925> ---------------------------------------------------------------------------
01926> 050:0002----------------------------------------------------------------------
01927> *
01928> ---------------------------------------------------------------------------
01929> 050:0002----------------------------------------------------------------------
01930> *
01931>   ** END OF RUN :  99
01932>
01933> ***************************************************************************
01934>
01935>
01936>
01937>
01938>
01939> --------------------
01940> | START            |  Project  dir.: T:\PROJECTS\25090\SWMHYMO\
01941> --------------------  Rainfall dir.: T:\PROJECTS\25090\SWMHYMO\
01942>     TZERO =   .00 hrs on        0
01943>     METOUT=   2 (output = METRIC)
01944>     NRUN  = 100
01945>     NSTORM=   1
01946>               #  1=BUR6_100.stm
01947> ---------------------------------------------------------------------------
01948> 100:0002----------------------------------------------------------------------
01949> *#*************************************************************************|
01950> *#  Project Name: 1376 & 1382 PLAINS ROAD EAST
01951> *#               BURLINGTON, ONTARIO
01952> *#  JOB NUMBER  : 25090
01953> *#       Date   : JANUARY 2026
01954> *#    Company   : S. LLEWELLYN AND ASSOCIATES LTD.
01955> *#       File   : 25090.DAT
01956> *#*************************************************************************|
01957> *
01958> *
01959> ---------------------------------------------------------------------------
01960> 100:0002----------------------------------------------------------------------
01961> *
01962> --------------------
01963> | READ STORM       |    Filename: Burlington 100-yr 6hr CHICAGO        (A=
01964> | Ptotal=  86.27 mm|    Comments: Burlington 100-yr 6hr CHICAGO        (A=
01965> --------------------
01966>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01967>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01968>                .17   3.862 |   1.67  17.445 |   3.17   9.657 |   4.67   4.936
01969>                .33   4.172 |   1.83  39.736 |   3.33   8.649 |   4.83   4.704
01970>                .50   4.546 |   2.00 163.177 |   3.50   7.853 |   5.00   4.495
01971>                .67   5.008 |   2.17  51.779 |   3.67   7.206 |   5.17   4.306
01972>                .83   5.595 |   2.33  28.205 |   3.83   6.670 |   5.33   4.135
01973>               1.00   6.369 |   2.50  19.806 |   4.00   6.217 |   5.50   3.979
01974>               1.17   7.443 |   2.67  15.465 |   4.17   5.829 |   5.67   3.835
01975>               1.33   9.048 |   2.83  12.795 |   4.33   5.492 |   5.83   3.703
01976>               1.50  11.752 |   3.00  10.979 |   4.50   5.197 |   6.00   3.581
01977>
01978> ---------------------------------------------------------------------------
01979> 100:0003----------------------------------------------------------------------
01980> *
01981> *#*************************************************************************|
01982> *#
01983> *#        PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING (PHASE 1)
01984> *#        ======================================================
01985> *#
01986> *#*************************************************************************|
01987> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (ACTUAL IMPERVIOUS
01988> *
01989> ----------------------
01990> | CALIB STANDHYD     |   Area    (ha)=     .27
01991> | 01:101    DT= 1.00 |   Total Imp(%)=   91.00   Dir. Conn.(%)=   91.00
01992> ----------------------
01993>                                IMPERVIOUS    PERVIOUS (i)
01994>      Surface Area     (ha)=         .25          .02
01995>      Dep. Storage     (mm)=        1.00         6.35
01996>      Average Slope     (%)=        1.10        10.00
01997>      Length            (m)=       30.00         5.00
01998>      Mannings n             =       .013         .250
01999>
02000>      Max.eff.Inten.(mm/hr)=     163.18        98.36
02001>                    over (min)        1.00         2.00
02002>      Storage Coeff.  (min)=        .99 (ii)    2.25 (ii)
02003>      Unit Hyd. Tpeak (min)=       1.00         2.00
02004>      Unit Hyd. peak  (cms)=       1.08          .52
02005>                                                      *TOTALS*
02006>      PEAK FLOW       (cms)=        .11          .01          .117 (iii)
02007>      TIME TO PEAK    (hrs)=       2.00         2.00         2.000
02008>      RUNOFF VOLUME    (mm)=      85.27        44.54        81.605
02009>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
02010>      RUNOFF COEFFICIENT   =        .99          .52          .946
02011>
02012>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02013>            CN* =  80.0    Ia = Dep. Storage  (Above)
02014>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02015>            THAN THE STORAGE COEFFICIENT.
02016>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02017>
02018> ---------------------------------------------------------------------------
02019> 100:0004----------------------------------------------------------------------
02020> *# CATCHMENT 101 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS (CITY SPECIFIED IM
02021> *
02022> ----------------------
02023> | CALIB STANDHYD     |   Area    (ha)=     .27
02024> | 02:101    DT= 1.00 |   Total Imp(%)=   36.00   Dir. Conn.(%)=   36.00
02025> ----------------------
02026>                                IMPERVIOUS    PERVIOUS (i)
02027>      Surface Area     (ha)=         .10          .17
02028>      Dep. Storage     (mm)=        1.00         6.35
02029>      Average Slope     (%)=        1.10        10.00
02030>      Length            (m)=       30.00         5.00
02031>      Mannings n             =       .013         .250
02032>
02033>      Max.eff.Inten.(mm/hr)=     163.18        98.36
02034>                    over (min)        1.00         2.00
02035>      Storage Coeff.  (min)=        .99 (ii)    2.25 (ii)
02036>      Unit Hyd. Tpeak (min)=       1.00         2.00
02037>      Unit Hyd. peak  (cms)=       1.08          .52
02038>                                                      *TOTALS*
02039>      PEAK FLOW       (cms)=        .04          .04          .087 (iii)
02040>      TIME TO PEAK    (hrs)=       2.00         2.00         2.000
02041>      RUNOFF VOLUME    (mm)=      85.27        44.54        59.200
02042>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
02043>      RUNOFF COEFFICIENT   =        .99          .52          .686
02044>
02045>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02046>            CN* =  80.0    Ia = Dep. Storage  (Above)
02047>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02048>            THAN THE STORAGE COEFFICIENT.
02049>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02050>
02051> ---------------------------------------------------------------------------
02052> 100:0005----------------------------------------------------------------------
02053> *# CATCHMENT 102 -  PRE-DEVELOPMENT DISCHARGE TO ALLEYWAY CBS FROM EXTERNAL LAND
02054> *
02055> ----------------------
02056> | CALIB STANDHYD     |   Area    (ha)=     .50
02057> | 03:102    DT= 1.00 |   Total Imp(%)=   87.00   Dir. Conn.(%)=   87.00
02058> ----------------------
02059>                                IMPERVIOUS    PERVIOUS (i)
02060>      Surface Area     (ha)=         .44          .06
02061>      Dep. Storage     (mm)=        1.00         6.35
02062>      Average Slope     (%)=        2.20         2.00
02063>      Length            (m)=      169.00         5.00
02064>      Mannings n             =       .013         .250
02065>
02066>      Max.eff.Inten.(mm/hr)=     163.18        94.55
02067>                    over (min)        2.00         4.00
02068>      Storage Coeff.  (min)=        2.27 (ii)    4.34 (ii)
02069>      Unit Hyd. Tpeak (min)=       2.00         4.00
02070>      Unit Hyd. peak  (cms)=        .51          .27
02071>                                                      *TOTALS*
02072>      PEAK FLOW       (cms)=        .19          .01          .208 (iii)
02073>      TIME TO PEAK    (hrs)=       2.00         2.02         2.000
02074>      RUNOFF VOLUME    (mm)=      85.27        44.54        79.976
02075>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
02076>      RUNOFF COEFFICIENT   =        .99          .52          .927
02077>
02078>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02079>            CN* =  80.0    Ia = Dep. Storage  (Above)
02080>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02081>            THAN THE STORAGE COEFFICIENT.
02082>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02083>
02084> ---------------------------------------------------------------------------
02085> 100:0006----------------------------------------------------------------------
02086> * ADD TOTAL EXISTING FLOWS DIRECTED SOUTH
02087> ----------------------
02088> | ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02089> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
02090>                       ID1 01:101            .27     .117    2.00  81.60    .000
02091>                      +ID2 03:102            .50     .208    2.00  79.98    .000
02092>                       ============================================================
02093>                       SUM 04:101+102         .77     .325    2.00  80.55    .000
02094>
02095>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02096>
02097> ---------------------------------------------------------------------------
02098> 100:0007----------------------------------------------------------------------
02099> *#*************************************************************************|
02100> *#
02101> *#        POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
02102> *#        ==============================================
02103> *#
02104> **#*************************************************************************|
02105> *# CATCHMENT 201 - CONTROLLED DISCHARGE TO PLAINS ROAD
02106> *
02107> ----------------------
02108> | CALIB STANDHYD     |   Area    (ha)=     .23
02109> | 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
02110> ----------------------
02111>                                IMPERVIOUS    PERVIOUS (i)
02112>      Surface Area     (ha)=         .23          .00
02113>      Dep. Storage     (mm)=        1.00         6.35
02114>      Average Slope     (%)=        2.00         2.00
02115>      Length            (m)=       10.00         5.00
02116>      Mannings n             =       .013         .250
02117>
02118>      Max.eff.Inten.(mm/hr)=     163.18        98.36
02119>                    over (min)        1.00         2.00
02120>      Storage Coeff.  (min)=        .43 (ii)    2.47 (ii)
02121>      Unit Hyd. Tpeak (min)=       1.00         2.00
02122>      Unit Hyd. peak  (cms)=       1.53          .49
02123>                                                      *TOTALS*
02124>      PEAK FLOW       (cms)=        .10          .00          .104 (iii)
02125>      TIME TO PEAK    (hrs)=       1.95         2.00         2.000
02126>      RUNOFF VOLUME    (mm)=      85.27        44.54        84.864
02127>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
02128>      RUNOFF COEFFICIENT   =        .99          .52          .984
02129>
02130>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02131>            CN* =  80.0    Ia = Dep. Storage  (Above)
02132>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02133>            THAN THE STORAGE COEFFICIENT.
02134>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02135>
02136> ---------------------------------------------------------------------------
02137> 100:0008----------------------------------------------------------------------
02138> *# ROUTE CATCHMENT 201 THROUGH ORIFICE PIPE AND TANK
02139> *
02140> ----------------------
02141> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
02142> |  IN>01:(201   )    |
02143> | OUT<02:(201 CO)    |    =========  OUTLFOW STORAGE TABLE  =========
02144> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02145>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
02146>                              .000  .0000E+00    |     .024  .4100E-02
02147>                              .011  .7000E-03    |     .024  .5600E-02
02148>                              .017  .1400E-02    |     .024  .7200E-02
02149>                              .022  .2100E-02    |     .024  .7800E-02
02150>                              .024  .2500E-02    |     .024  .8000E-02
02151>                              .024  .2510E-02    |     .028  .9000E-02
02152>
02153>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
02154>      --------------------       (ha)     (cms)     (hrs)       (mm)
02155>      INFLOW >01: (201   )        .23      .104     2.000     84.864
02156>      OUTFLOW<02: (201 CO)        .23      .024     1.900     84.864
02157>     OVERFLOW<03: (201.OV)        .00      .000      .000       .000
02158>
02159>                      TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
02160>                      CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
```

```
02161>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
02162>
02163>
02164>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   23.415
02165>                    TIME SHIFT OF PEAK FLOW         (min)=    -6.00
02166>                    MAXIMUM  STORAGE   USED       (ha.m.)=.6633E-02
02167>
02168> --------------------------------------------------------------------------------
02169> 100:0009----------------------------------------------------------------------
02170> *# CATCHMENT 202 - UNCONTROLLED DISCHARGE TO PLAINS ROAD
02171> *
02172> ---------------------
02173> | CALIB STANDHYD     |   Area    (ha)=     .04
02174> | 04:202    DT= 1.00 |   Total Imp(%)=   54.00   Dir. Conn.(%)=   54.00
02175> ---------------------
02176>                              IMPERVIOUS    PERVIOUS (i)
02177>      Surface Area     (ha)=        .02          .02
02178>      Dep. Storage     (mm)=       1.00         6.35
02179>      Average Slope     (%)=       2.00         2.00
02180>      Length            (m)=       5.00         5.00
02181>      Mannings n             =       .013         .250
02182>
02183>      Max.eff.Inten.(mm/hr)=     163.18        98.36
02184>                  over (min)        1.00         2.00
02185>      Storage Coeff.  (min)=        .28 (ii)    2.32 (ii)
02186>      Unit Hyd. Tpeak (min)=       1.00         2.00
02187>      Unit Hyd. peak  (cms)=       1.65          .51
02188>                                                          *TOTALS*
02189>      PEAK FLOW       (cms)=        .01          .00          .014 (iii)
02190>      TIME TO PEAK    (hrs)=       1.90         2.00         2.000
02191>      RUNOFF VOLUME    (mm)=      85.27        44.54        66.533
02192>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
02193>      RUNOFF COEFFICIENT   =        .99          .52          .771
02194>
02195>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02196>            CN* =  80.0    Ia = Dep. Storage  (Above)
02197>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02198>            THAN THE STORAGE COEFFICIENT.
02199>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02200>
02201> --------------------------------------------------------------------------------
02202> 100:0010----------------------------------------------------------------------
02203> * ADD TOTAL FLOWS FROM DEVELOPMENT LANDS
02204> ------------------------
02205> | ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02206> ------------------------ (ha)     (cms)   (hrs)   (mm)   (cms)
02207>                       ID1 02:201 CONTRO     .23     .024    1.90  84.86    .000
02208>                      +ID2 03:201.OVF        .00     .000     .00    .00    .000
02209>                      +ID3 04:202            .04     .014    2.00  66.53    .000
02210>                       ============================================================
02211>                       SUM 05:201+202         .27     .039    2.00  82.15    .000
02212>
02213>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02214>
02215> --------------------------------------------------------------------------------
02216> 100:0011----------------------------------------------------------------------
02217> *# CATCHMENT 203 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
02218> *
02219> ---------------------
02220> | CALIB STANDHYD     |   Area    (ha)=     .38
02221> | 06:203    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
02222> ---------------------
02223>                              IMPERVIOUS    PERVIOUS (i)
02224>      Surface Area     (ha)=        .34          .04
02225>      Dep. Storage     (mm)=       1.00         6.35
02226>      Average Slope     (%)=       1.00         2.00
02227>      Length            (m)=     105.00         5.00
02228>      Mannings n             =       .013         .250
02229>
02230>      Max.eff.Inten.(mm/hr)=     163.18        94.55
02231>                  over (min)        2.00         4.00
02232>      Storage Coeff.  (min)=       2.16 (ii)    4.24 (ii)
02233>      Unit Hyd. Tpeak (min)=       2.00         4.00
02234>      Unit Hyd. peak  (cms)=        .53          .27
02235>                                                          *TOTALS*
02236>      PEAK FLOW       (cms)=        .15          .01          .161 (iii)
02237>      TIME TO PEAK    (hrs)=       2.00         2.02         2.000
02238>      RUNOFF VOLUME    (mm)=      85.27        44.54        81.198
02239>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
02240>      RUNOFF COEFFICIENT   =        .99          .52          .941
02241>
02242>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02243>            CN* =  80.0    Ia = Dep. Storage  (Above)
02244>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02245>            THAN THE STORAGE COEFFICIENT.
02246>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02247>
02248> --------------------------------------------------------------------------------
02249> 100:0012----------------------------------------------------------------------
02250> *# CATCHMENT 204 - UNCONTROLLED EXTERNAL CATCHMENT TO MUNICIPAL LANEWAY SEWERS (
02251> *
02252> ---------------------
02253> | CALIB STANDHYD     |   Area    (ha)=     .12
02254> | 07:204    DT= 1.00 |   Total Imp(%)=   85.00   Dir. Conn.(%)=   85.00
02255> ---------------------
02256>                              IMPERVIOUS    PERVIOUS (i)
02257>      Surface Area     (ha)=        .10          .02
02258>      Dep. Storage     (mm)=       1.00         6.35
02259>      Average Slope     (%)=       1.50         2.00
02260>      Length            (m)=      66.00         5.00
02261>      Mannings n             =       .013         .250
02262>
02263>      Max.eff.Inten.(mm/hr)=     163.18        94.55
02264>                  over (min)        1.00         4.00
02265>      Storage Coeff.  (min)=       1.45 (ii)    3.52 (ii)
02266>      Unit Hyd. Tpeak (min)=       1.00         4.00
02267>      Unit Hyd. peak  (cms)=        .85          .31
02268>                                                          *TOTALS*
02269>      PEAK FLOW       (cms)=        .05          .00          .050 (iii)
02270>      TIME TO PEAK    (hrs)=       2.00         2.02         2.000
02271>      RUNOFF VOLUME    (mm)=      85.27        44.54        79.160
02272>      TOTAL RAINFALL   (mm)=      86.27        86.27        86.271
02273>      RUNOFF COEFFICIENT   =        .99          .52          .918
02274>
02275>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02276>            CN* =  80.0    Ia = Dep. Storage  (Above)
02277>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02278>            THAN THE STORAGE COEFFICIENT.
02279>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02280>
02281> --------------------------------------------------------------------------------
02282> 100:0013----------------------------------------------------------------------
02283> * ADD TOTAL FLOWS FROM EXTERNAL LANDS
02284> ------------------------
02285> | ADD HYD (203+204   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02286> ------------------------ (ha)     (cms)   (hrs)   (mm)   (cms)
02287>                       ID1 06:203             .38     .161    2.00  81.20    .000
02288>                      +ID2 07:204             .12     .050    2.00  79.16    .000
02289>                       ============================================================
02290>                       SUM 08:203+204         .50     .211    2.00  80.71    .000
02291>
02292>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02293>
02294> --------------------------------------------------------------------------------
02295> 100:0014----------------------------------------------------------------------
02296> **#*********************************************************************|
02297> * RUN REMAINING DESIGN STORMS (CITY OF BURLINGTON 2 TO 100-YR)
02298> *
02299> --------------------------------------------------------------------------------
02300> 100:0002----------------------------------------------------------------------
02301> *
02302> --------------------------------------------------------------------------------
02303> 100:0002----------------------------------------------------------------------
02304> *
02305> --------------------------------------------------------------------------------
02306> 100:0002----------------------------------------------------------------------
02307> *
02308> --------------------------------------------------------------------------------
02309> 100:0002----------------------------------------------------------------------
02310> *
02311> --------------------------------------------------------------------------------
02312> 100:0002----------------------------------------------------------------------
02313>       FINISH
02314> --------------------------------------------------------------------------------
02315> ********************************************************************************
02316>      WARNINGS / ERRORS / NOTES
02317>      -------------------------
02318>    Simulation ended on 2026-01-19     at 16:43:58
02319> ================================================================================
02320>
02321>
```

APPENDIX C

STORMWATER QUALITY CONTROL INFORMATION

Hydroworks Sizing Summary

1376&1382 Plains Road East

01-13-2026

Recommended Size: HydroStorm HS 4

Hydroworks Sizing Program Version 5.8.5

A HydroStorm HS 4 is recommended to provide 50 % annual TSS removal based on a drainage area of 0.23 (ha) with an imperviousness of 100 % and Hamilton RBG, Ontario rainfall for the ETV particle size distribution.

The recommended HydroStorm HS 4 treats 97 % of the annual runoff and provides 71 % annual TSS removal for the Hamilton RBG rainfall records and ETV particle size distribution.

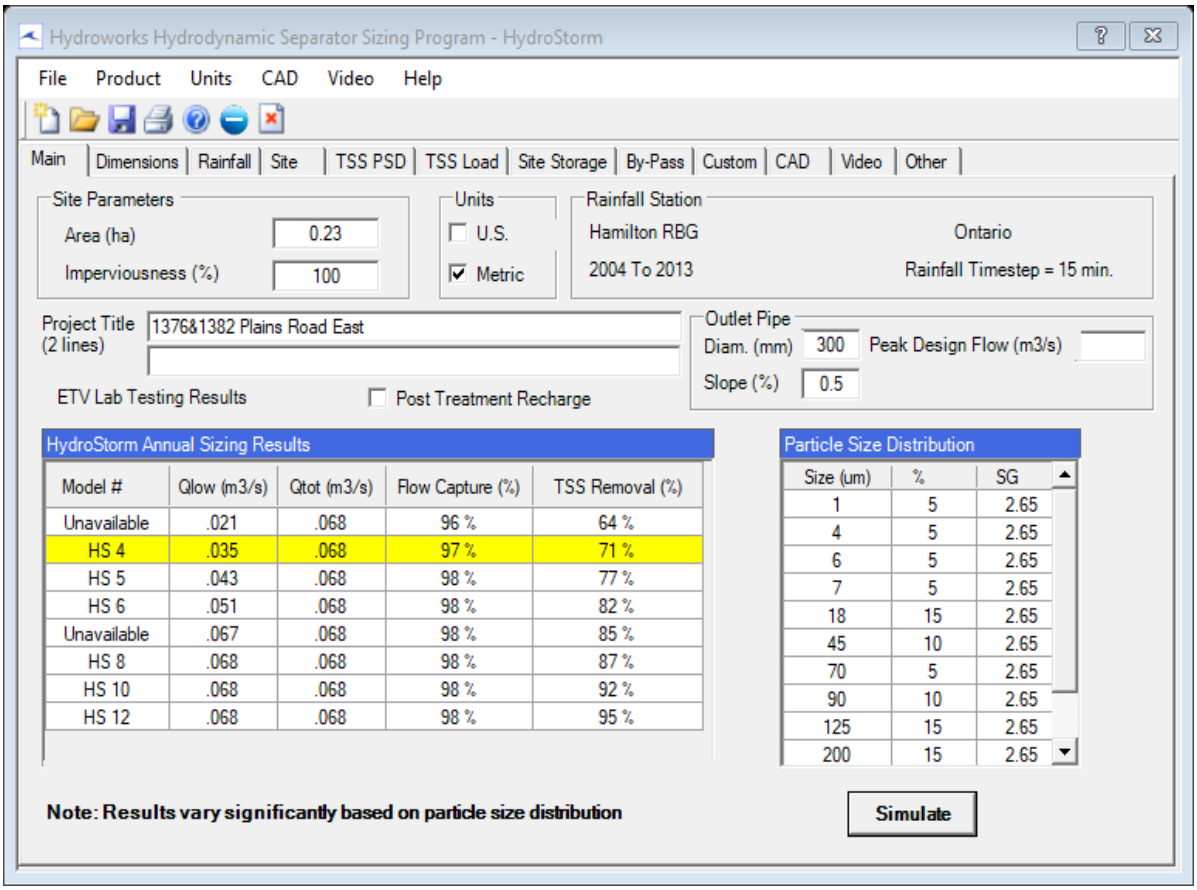
The HydroStorm has a headloss coefficient (K) of 1.04. Since a peak flow was not specified, headloss was calculated using the full pipe flow of .07 (m3/s) for the given 300 (mm) pipe diameter at .5% slope. The headloss was calculated to be 50 (mm) based on a flow depth of 300 (mm) (full pipe flow).

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.

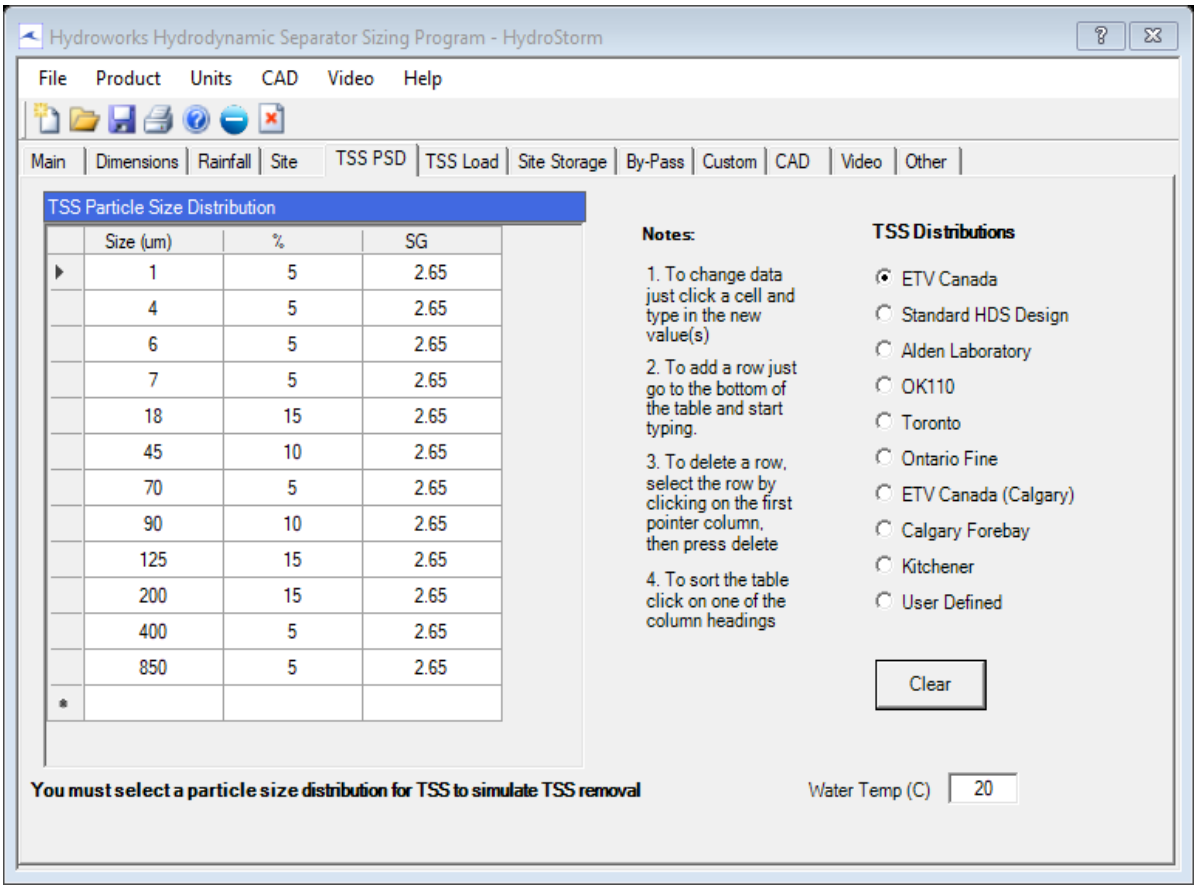
If you have any questions regarding this sizing summary please do not hesitate to contact Hydroworks at 888-290-7900 or email us at support@hydroworks.com.

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 HydroStorm .

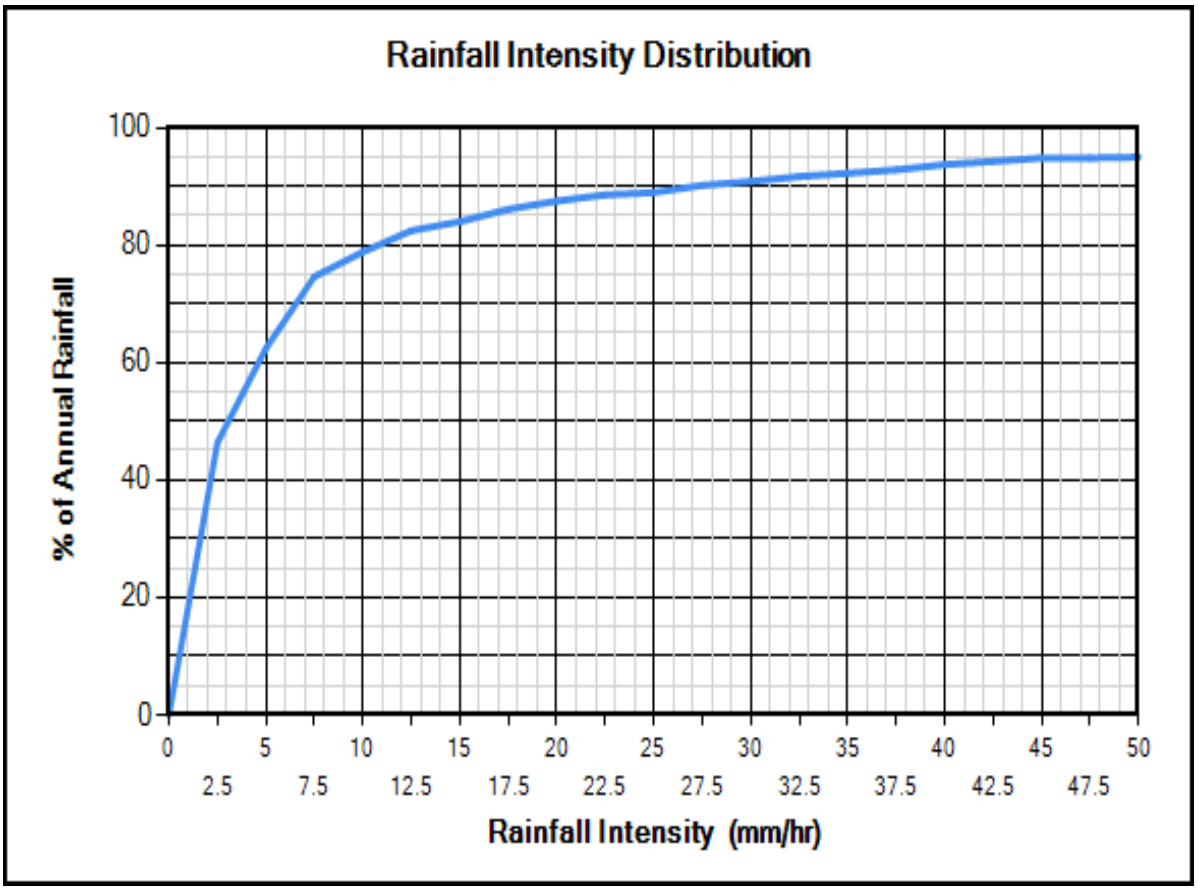
TSS Removal Sizing Summary



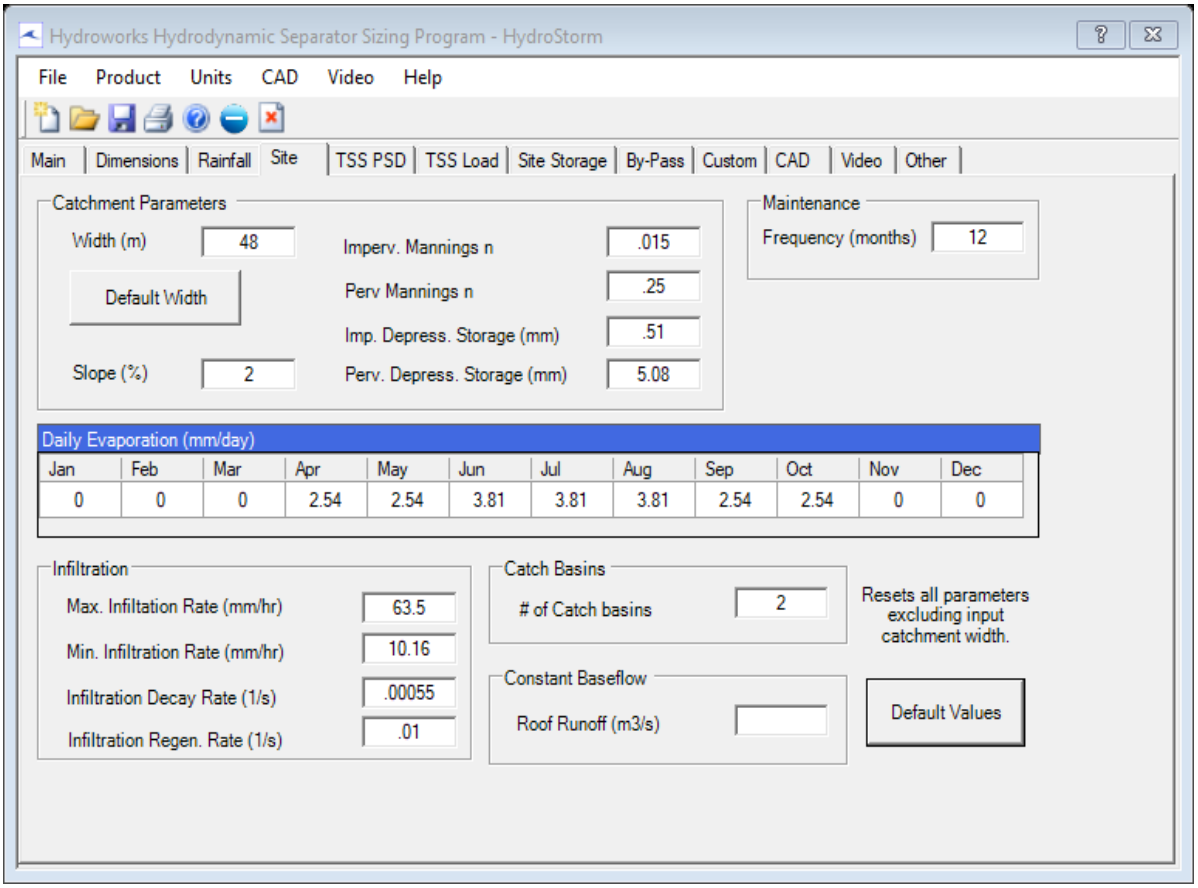
TSS Particle Size Distribution



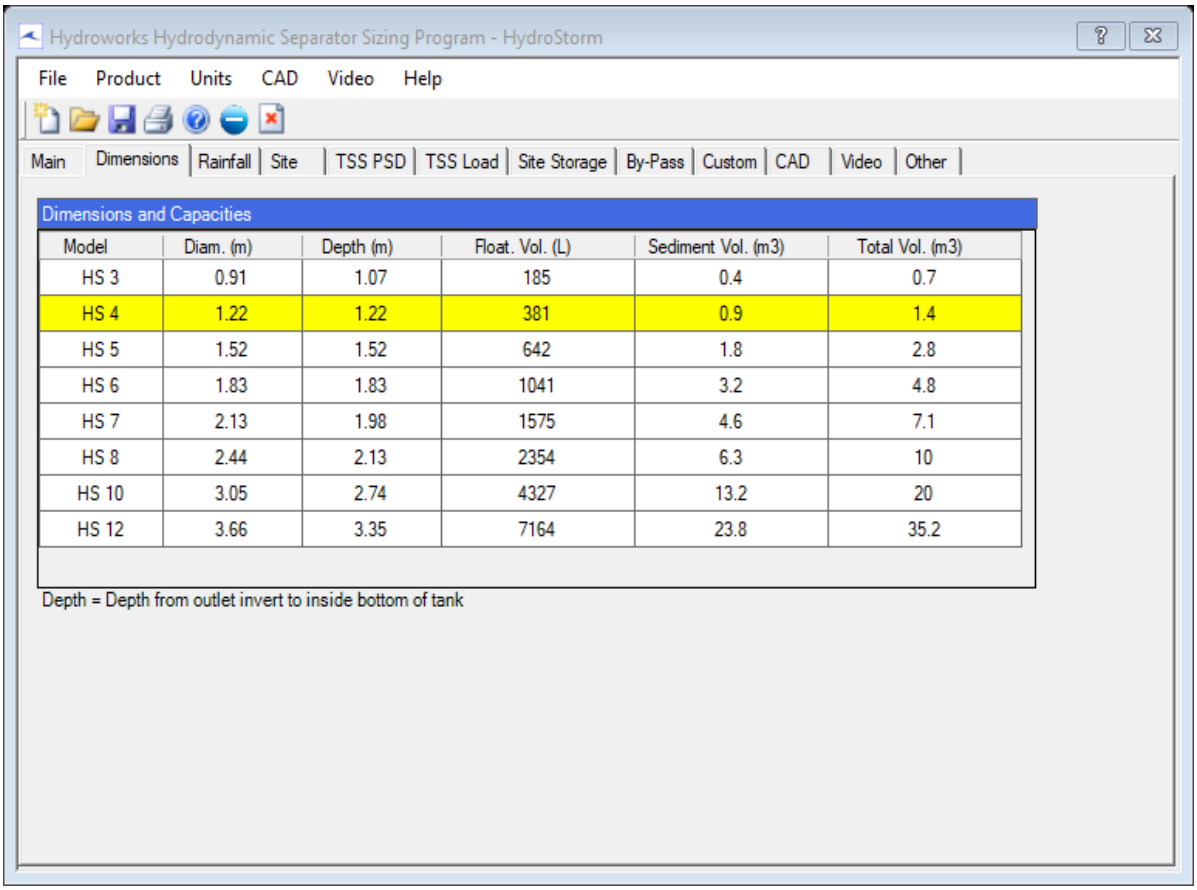
Rainfall Station - Hamilton RBG, Ontario(2004 To 2013)



Site Physical Characteristics



Dimensions And Capacities

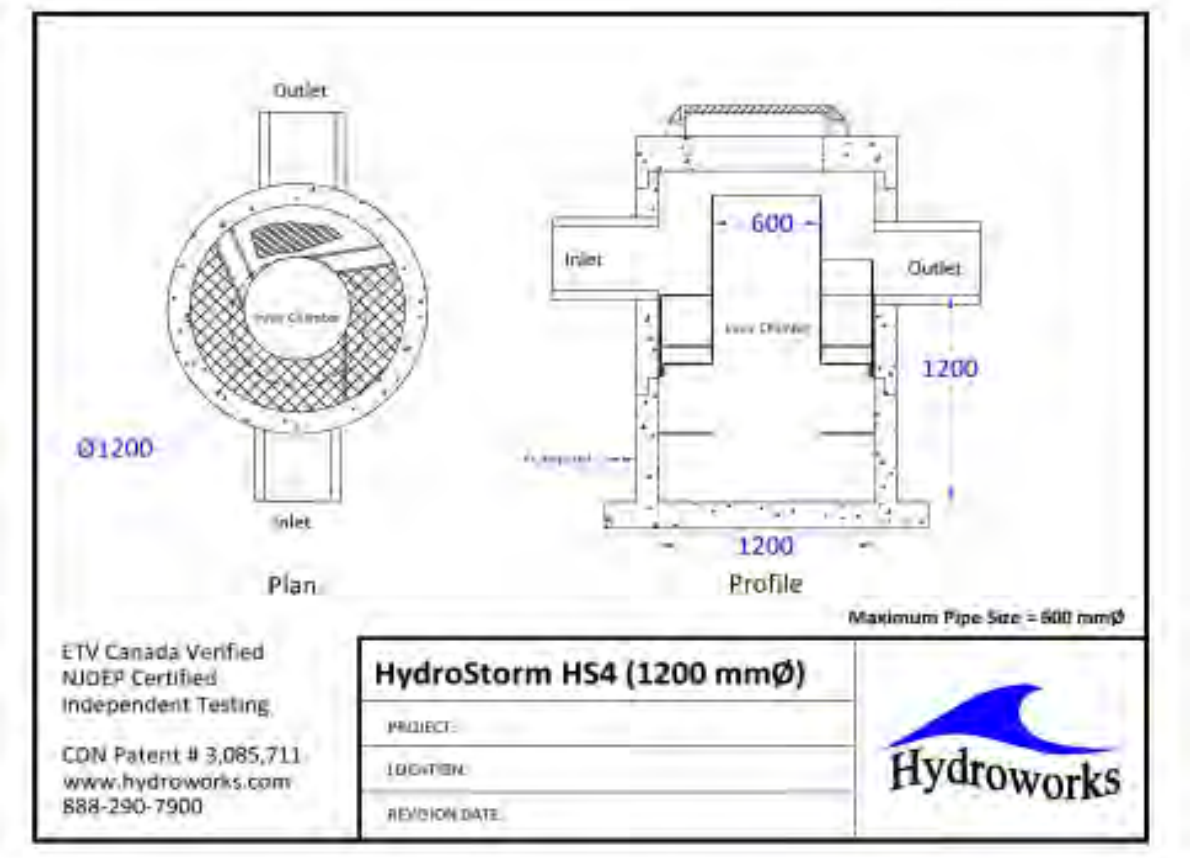


Dimensions and Capacities

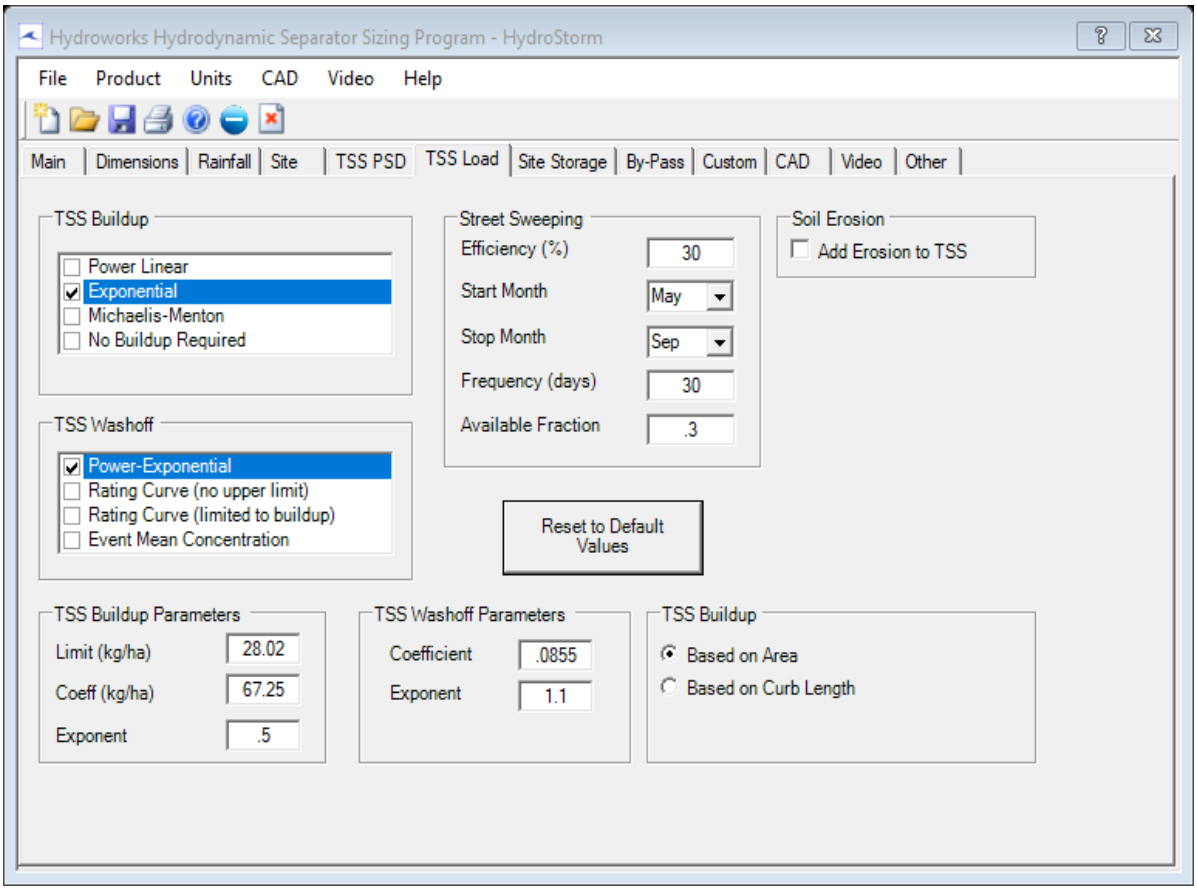
Model	Diam. (m)	Depth (m)	Float. Vol. (L)	Sediment Vol. (m3)	Total Vol. (m3)
HS 3	0.91	1.07	185	0.4	0.7
HS 4	1.22	1.22	381	0.9	1.4
HS 5	1.52	1.52	642	1.8	2.8
HS 6	1.83	1.83	1041	3.2	4.8
HS 7	2.13	1.98	1575	4.6	7.1
HS 8	2.44	2.13	2354	6.3	10
HS 10	3.05	2.74	4327	13.2	20
HS 12	3.66	3.35	7164	23.8	35.2

Depth = Depth from outlet invert to inside bottom of tank

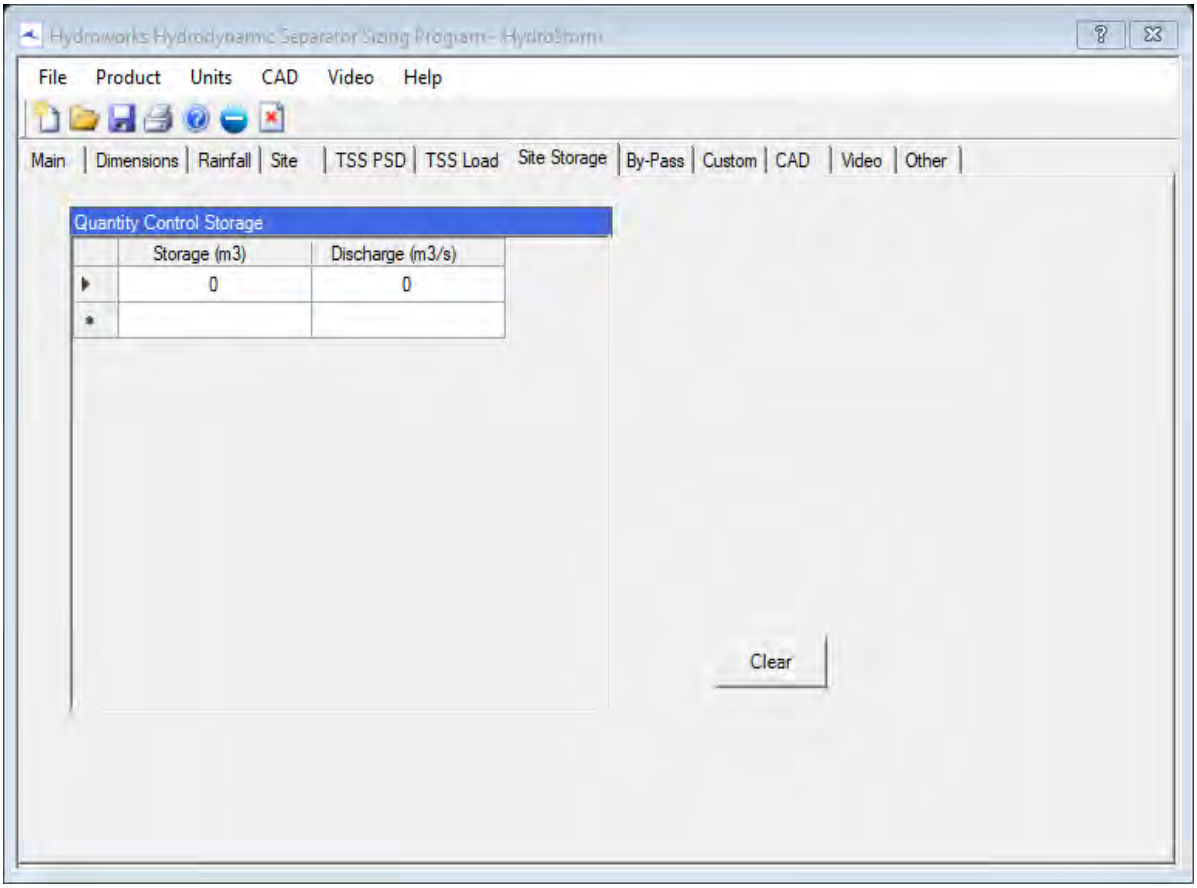
Generic HS 4 CAD Drawing



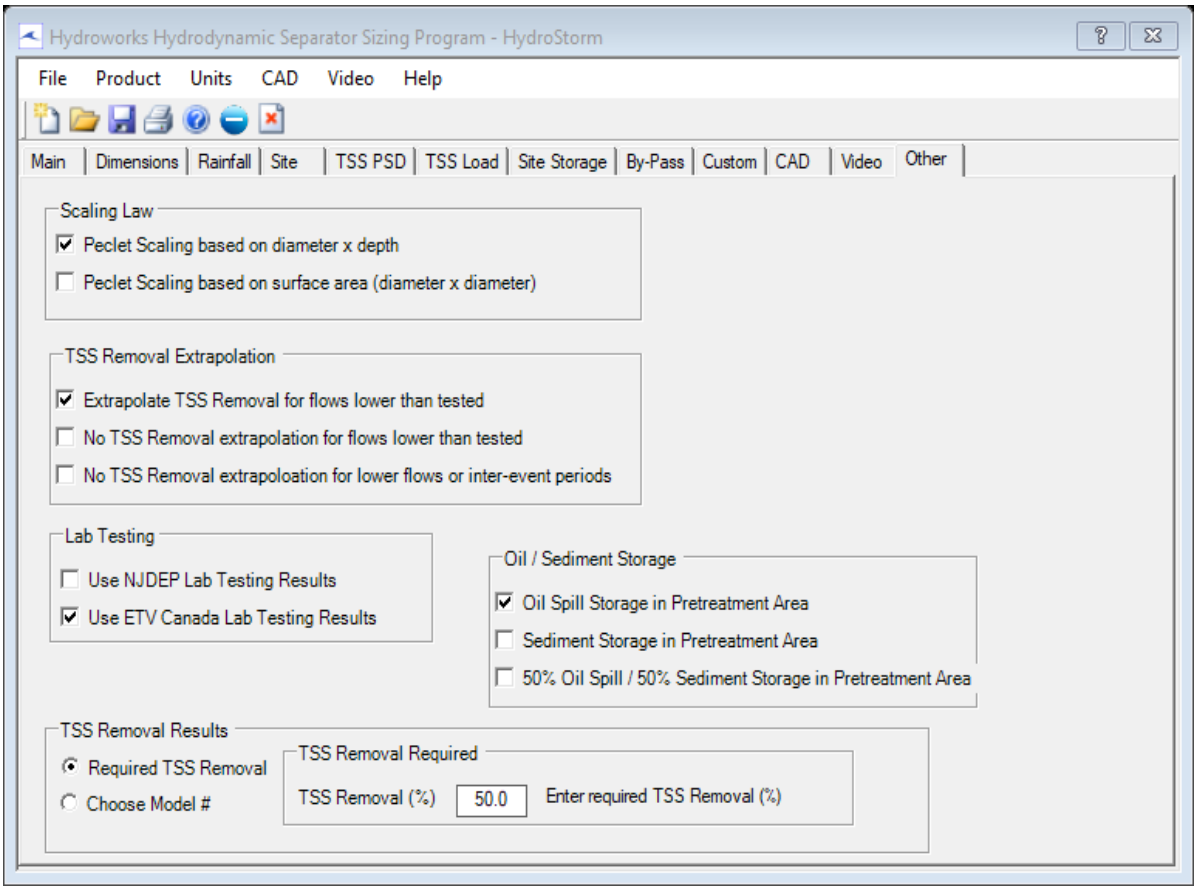
TSS Buildup And Washoff



Upstream Quantity Storage



Other Parameters



Flagged Issues

None

Hydroworks Sizing Program - Version 5.8.5
Copyright Hydroworks, LLC, 2024
1-800-290-7900
www.hydroworks.com

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Hydroworks® HydroStorm (HS) Hydrodynamic Separator

Developed by Hydroworks, LLC
Roselle, NJ, USA

Registration: GPS-ETV_VR2024-05-31_HS

In accordance with

ISO 14034:2016

Environmental management — Environmental technology verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

May 31, 2024
Vancouver, BC, Canada

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

Technology description and application

The Hydroworks® HydroStorm (HS) Hydrodynamic Separator is a concrete cylindrical device with an annular pre-treatment channel, an inner chamber, and lower collection sump. A schematic of the HS 4 test unit is shown in Figure 1. The pre-treatment channel extends below the outlet pipe invert and contains three intermediate low-flow weirs (flush with the outlet invert), and two downstream higher bypass weirs that extend above the outlet invert. The higher weirs bypass high flows to prevent oil and solids from being scoured out of the separator.

As water enters the unit through one or more inlets, coarser solids immediately start to settle below a horizontal grate extending from the inlet to two sets of lower weirs near the outlet pipe. The grating is positioned over the pre-treatment channel to help displace the inflow turbulence and protect the captured sediment from scour. Openings are located on the horizontal plate upstream of each weir to allow the flow to be conveyed into the inner chamber and lower sump. The weirs are positioned to create a counter clockwise rotation of water in the inner chamber to minimize turbulence and maximize settling. After water spirals down the inner chamber to the main settling chamber towards the floor of the separator where it deposits suspended sediments, it flows upwards between the wall of the unit and the outer edge of the disk extended from the inner chamber and through an arced opening at the bottom of the pre-treatment disk, downstream of the bypass weirs, where it is conveyed into the outlet pipe. An annular secondary horizontal plate with 32% of open-perforations is located within the lower sump to protect the collected sediment from scour. Oil and light liquids enter the inner chamber through the holes, reaching the bottom of the pre-treatment area and rises to the top of the water level where they are trapped.

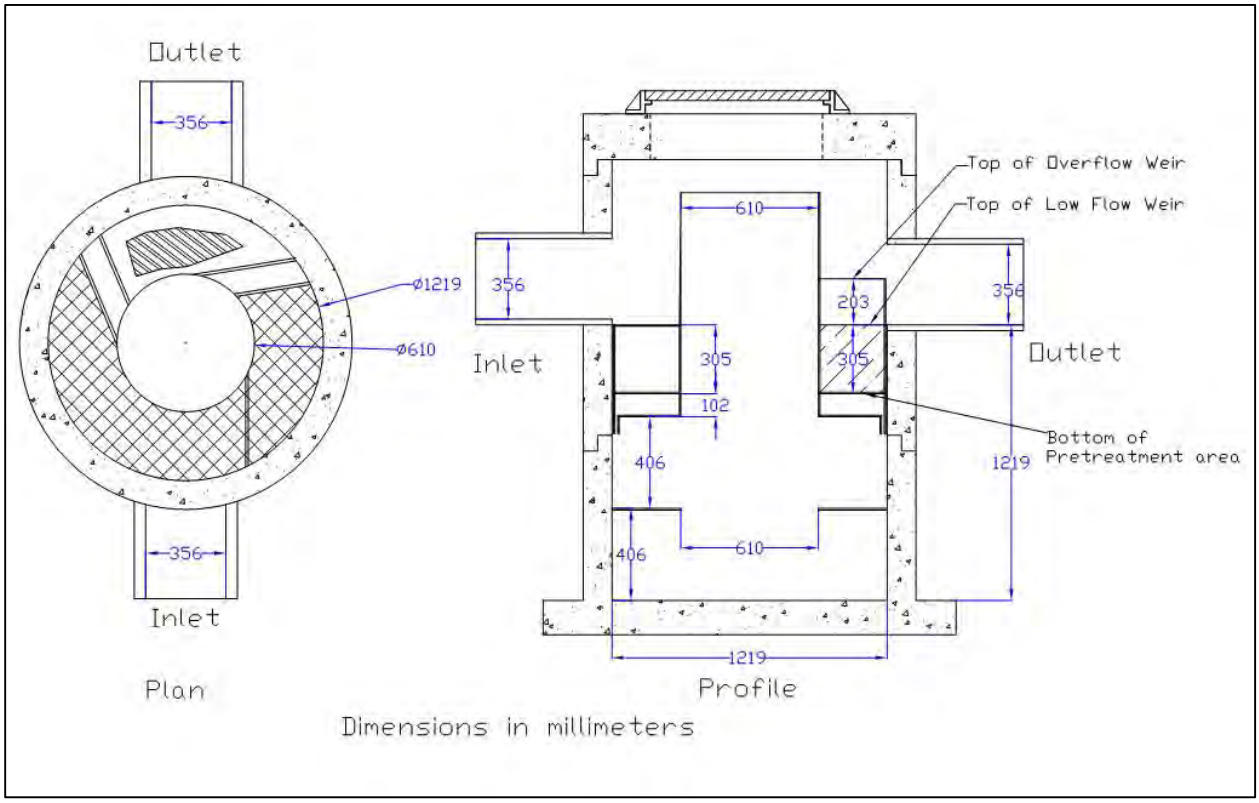


Figure 1: Schematic of the Hydroworks® HS4 Hydrodynamic Separator treatment unit tested as part of this verification.

Performance conditions

The data and results published in this Technology Fact Sheet were obtained from the testing program conducted on the Hydroworks® HS4 Hydrodynamic Separator, in accordance with the *Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014)*. The Procedure was prepared by the Toronto and Region Conservation Authority (TRCA) for the Canadian Environmental Technology Verification Program. A copy of the Procedure may be accessed on the Canadian ETV website at www.etvcanada.ca.

Performance claim(s)

Capture test[1]:

During the capture test, the Hydroworks® HS Hydrodynamic Separator, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 69, 64, 60, 56, 46, 41, and 36 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Scour test[1]:

During the scour test, the Hydroworks® HS Hydrodynamic Separator, with 10.2 cm (4 inches) of test sediment pre-loaded onto a false floor reaching 50% of the manufacturer's recommended maximum sediment sump storage depth and sediment loaded onto the pre-treatment channel emulating depositional pattern of the 40 L/min/m^2 capture test, generate corrected effluent concentrations of 22.4, 28.5, 20.0, 19.1, and 24.4 mg/L at 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Light liquid re-entrainment test[1]:

During the light liquid re-entrainment test, the Hydroworks® HS Hydrodynamic Separator with surrogate low-density polyethylene beads preloaded within the inner chamber, representing a floating light liquid volume equal to a depth of 50.8 mm over the sedimentation area, retains 100, 99.9, 95.4, 95.7, and 97.5 percent of loaded beads by mass during the 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Performance results

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

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

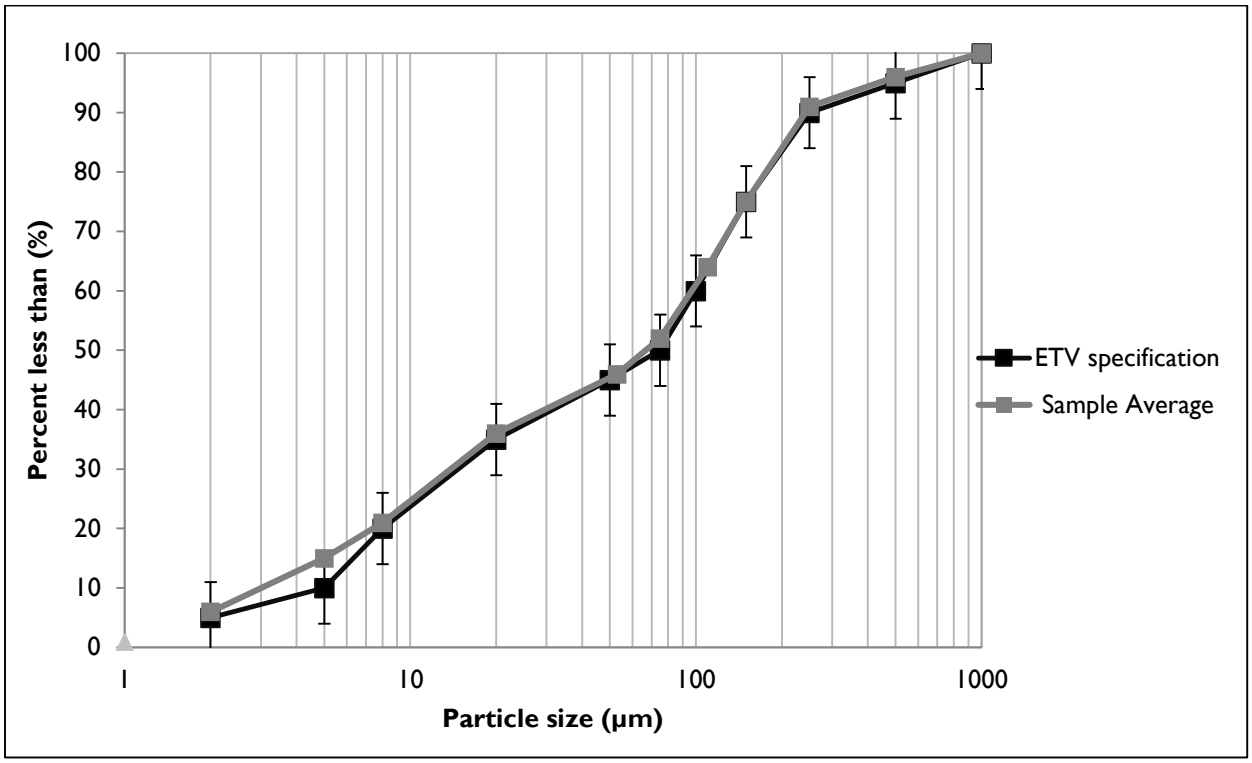


Figure 2. The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD.

The capacity of the device to retain sediment was determined at seven surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor at 0.15 m from the bottom, simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1).

In some instances, the removal efficiencies were above 100% for certain particle size fractions. These discrepancies are not unique to any one test laboratory and may be attributed to errors relating to the blending of sediment, collection of representative samples for laboratory submission, and laboratory analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for "all particle sizes by mass balance" (see Table 1 and 2) are based on measurements of the total injected and retained sediment mass, and are therefore not subject to blending, sampling or PSD analysis errors.

Table 1. Removal efficiencies (%) of the HS4 unit at specified surface loading rates.

Particle size fraction (µm)	Surface loading rate (L/min/m²)						
	40	80	200	400	600	1000	1400
>500	73	100*	98	67	100*	100*	26
250 - 500	100	100*	92	64	100*	98	48
150 - 250	100*	75	89	72	89	60	69
105 - 150	94	100*	100*	100*	78	99	91
75 - 105	96	76	79	95	68	54	46
53 - 75	87	100*	100*	100*	56	69	65
20 - 53	71	54	46	44	19	14	10
8 - 20	38	23	15	8	2	2	2
5 – 8	13	6	1	1	0	0	0
<5	8	0	0	0	0	0	0
All particle sizes by mass balance	**68.6**	**64.0**	**60.0**	**56.1**	**46.1**	**41.2**	**35.7**

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 103 and 194% (average 128%). See text and Bulletin # CETV 2016-11-0001 for more information.

Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the sediment retained by the HS4 unit at each of the tested surface loading rates. As expected, the capture efficiency for fine particles in the unit was generally found to decrease as surface loading rates increased.

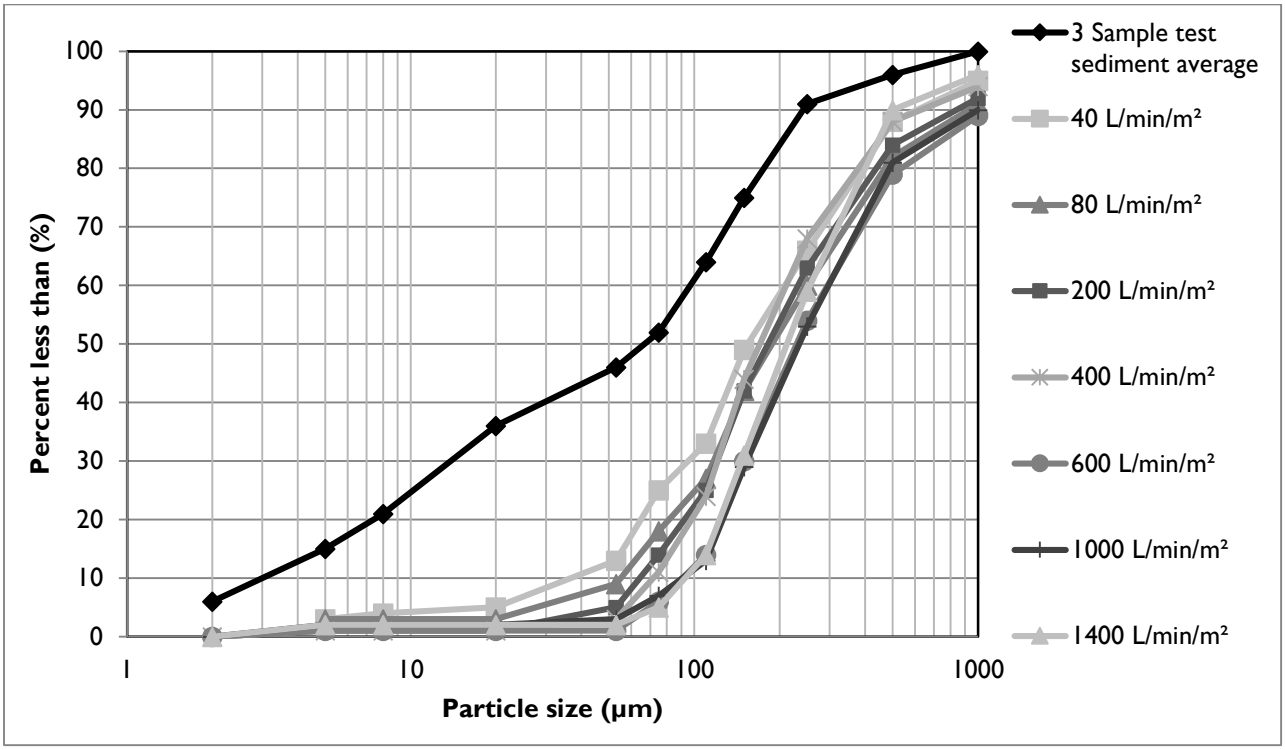


Figure 3. Particle size distribution of sediment retained in the HS4 unit in relation to the injected test sediment average.

For the sediment scour and re-suspension test, two tests were conducted. The first test was conducted with the secondary plate used in the capture tests. The second used a perforated secondary plate. Since sediment during the capture tests was found to settle in the pre-treatment channel, and in roughly the same quantities on the secondary plate and collection sump, all three of these surfaces were preloaded with sediment during the first test. The pre-treatment channel only captures coarse sediment. Therefore, this area was pre-loaded with sediment having a PSD similar to the PSD of the sediment that settled in this area during the 40 L/min/m^2 SLR sediment capture test. The pre-loaded sediment in the pre-treatment channel was shaped and leveled to correspond with sedimentation patterns and depths observed by the laboratory technician during the 40 L/min/m^2 SLR capture test. It should be noted that the actual sediment preloaded in this area was finer than the PSD of sediment captured in the same area during the 40 L/min/m^2 SLR capture test, particularly for particle sizes less than the median size. Both the sump and secondary plate were pre-loaded with the 1-1000 µm sediment mix to a depth of 10.2 cm. The preloaded sediment in the lower sump was placed on a false floor to mimic a device filled to 50% of the manufacturer's maximum recommended sediment storage depth.

After pre-loading the sediment, clean water was run through the device at five SLRs over a 25 minute period. At each SLR, five effluent samples were collected over a four minute interval (one per minute) with the first sample collected at the beginning of each flow rate, and the last collected just prior to the one minute transition to the next flow rate or end of the test. Effluent samples were analyzed for Suspended Sediment Concentration (SSC) and PSD by methods prescribed in the *Procedure*. The effluent samples were subsequently adjusted based on the background concentration of the influent water and the smallest 5% of particles captured during the 40 L/min/m^2 sediment capture test (7 um), as per the method described in Bulletin # CETV 2016-09-0001.

Measurements of sediment depths in the sump after the first test showed that most of the sediment from the secondary plate was carried into the lower sump. During this process, the fine sediment was likely re-suspended and carried out of the unit with the flow. The average adjusted effluent suspended sediment concentrations for each SLR ranged from 11.3 mg/L at the 200 L/min/m2 SLR to 196.7 mg/L at the 1400 L/min/m2 SLR. Effluent SSCs declined after the 1400 L/min/m2 SLR because the unit begins to bypass flow at this rate. It should be noted that this was a very conservative test as sediment was preloaded in three areas, rather than in the lower sump alone, and the preloaded sediment on the pre-treatment channel and secondary plate had a finer PSD than the sediment found to settle in these areas during the lowest SLR capture test.

The second sediment scour test was conducted on an identical unit but with a 32% open-area perforated secondary plate of the same size and orientation as the solid plate used in the first test. The perforated plate was intended to allow most of the sediment to settle in the lower sump, while still protecting against sediment scour, and not affecting the capacity of the unit to capture sediment. A second capture test was run at the 600 L/min/m^2 SLR to confirm that the perforated plate would have the same flow characteristics and removal efficiencies as the solid plate. Results of this comparison presented in Table 2 show that removal efficiencies were not affected and that the collection sump was receiving the majority of sediment transported into the lower chamber. Based on the observed sediment deposition zones, the second repeat test with the perforated plate had sediment preloaded in the pre-treatment channel and the lower collection sump only (*i.e.* the major deposition zones). The collection sump was preloaded with 10.2 cm of the 1- 1000 µm test sediment mix, as in the first test, and the pre-treatment channel was preloaded in much the same way as the first test, but with a sediment PSD that more closely mimicked the PSD of sediment observed to settle in this area during the 40 L/min/m^2 sediment capture test.

Table 2: Injected mass captured at the 600 L/min/m² SLR for two different configurations of the secondary plate

Secondary Plate type	Target Surface Loading Rate (L/min/m²)	Tested Flow Rate (L/min)	Removal Efficiency (%)	Pre-treatment Channel (%)	Secondary Plate (%)	Outlet Dispersion Plate (%)	Collection Sump (%)
Solid Plate	600	736.2	46.1	24.7	8.5	3.1	9.9
Perforated Plate	600	740.9	45.9	25.8	2.7	3.0	14.5

Results of the second test are presented in Table 3. Background concentrations were maintained below 10.5 mg/L. The average adjusted effluent suspended sediment concentrations ranged from 19.1 to 28.5 mg/L. Since the commercially available unit will have a perforated secondary plate, these concentrations are the appropriate values to consider for approvals. The verifier acknowledges that the sediment capture removal efficiencies were not all tested with the perforated plate (see variance notes below), but that the repeat test results at the 600 L/min/m² SLR and a statement from the independent test laboratory were sufficient to provide reasonable confidence that the added perforations in the secondary plate would have negligible influence on sediment removal efficiencies.

Table 3. Scour test adjusted effluent sediment concentrations

Run	Surface loading rate (L/min/m²)	Run time (min)	Background sample concentration (mg/L)[a]	Average adjusted effluent suspended sediment concentration (mg/L)[b]
1	200	5	3.6	22.4
2	800	5	8.9	28.5
3	1400	5	7.6	20.0
4	2000	5	10.4	19.1
5	2600	5	6.0	24.4

[a] Background concentrations shown here are approximate values based on graphical interpolation

[b] The adjusted effluent suspended sediment concentration represents the actual measured effluent concentration minus the background concentration. For more information see Bulletin # CETV 2016-09-0001. Adjusted concentrations were only calculated for the average of the five samples collected per surface loading rate.

The results of the light liquid re-entrainment test used to evaluate the unit's capacity to prevent re-entrainment of light liquids are reported in Table 4. The test involved preloading 58.3 L (corresponding to a 5 cm depth over the collection sump area of 1.17m²) of surrogate low-density polyethylene beads (Dow Chemical Dowlex™ 2517) within the inner chamber and running clean water through the device continuously at five surface loading rates (200, 800, 1400, 2000, and 2600 L/min/m²). Each flow rate was maintained for 5 minutes with approximately 1 minute transition time between flow rates (30 minutes total). The effluent flow was screened to capture all re-entrained pellets throughout the test. Results showed maximum re-entrainment of 4.6% at 1400 L/min/m², which is the highest SLR without bypass. Re-entrainment decreased at subsequent SLRs as bypass volumes increased.

Table 4. Light liquid re-entrainment test results for the HS4

Surface Loading Rate (L/min/m²)	Time Stamp (min)	Amount of Beads Re-entrained			
		Mass (g)	Volume (L)	% of Pre-loaded Mass Re-entrained	% of Pre-loaded Mass Retained
200	1:00 – 6:00	0	0	0.00	100
800	7:00 – 12:00	49	0.1	0.1	99.9
1400	13:00 – 18:00	1523	2.7	4.6	95.4
2000	19:00 – 24:00	1445	2.5	4.3	95.7
2600	25:00 – 30:00	847	1.5	2.5	97.5
Interim Collection Net		39	0.1	0.1	99.9
Total Re-entrained		3902	6.8	11.7	--
Total Retained		29,497	51.5	--	88.3
Total Loaded		33,399	58.3	--	--

Variances from testing Procedure

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

1. The Procedure stipulates that the tested device "must be a full scale, commercially available device with the same configuration and components that would be typical for an actual installation." As noted above, the sediment capture tests were conducted with a solid secondary plate. The solid secondary plate was later modified to a 32% open area perforated plate to reduce sediment settling on the plate, while continuing to provide scour prevention. As described above, the scour test was repeated with the perforated secondary plate, but the sediment capture test was only repeated at the 600 L/min/m² SLR (i.e. one of seven tested SLRs). Removal efficiency results for the repeat test showed very close correspondence with the earlier test using the solid plate and much of the sediment that previously settled on the secondary plate was deposited in the lower collection sump (see Table 2). The independent laboratory provided the following statement regarding the potential for the added perforations to affect sediment removal efficiencies: "Taking into account the close proximity of the plate to the collection sump, as well as our knowledge of sediment transport, it is expected that the deposited sediment would have settled in the lower sump, with no impact on removal efficiency, if the plate was removed." While the verifier acknowledges that stronger evidence would have been provided by additional repeat testing at a lower and higher SLR, the close correlation between the original and repeat test, combined with the statement from the lab were sufficient to provide reasonable confidence that adding the perforations would not likely have changed the capture test results significantly.

2. The repeat test at the 600 L/min/m² SLR had background concentrations exceeding the 20 mg/L threshold during the last half of the test. The exceedances occurred in 4 of the 8 samples collected, reaching a maximum of 28.4 mg/L. The experimental apparatus is a closed loop system. Therefore, the sediment in the background samples consists of fine particles not captured by the device, and would therefore not likely bias the mass balance results.

3. It was necessary to change flow meters during the sediment scour and light liquid re-entrainment test, as the required flows exceeded the minimum and/or maximum range of any single meter. When the flow capacity of the selected meter was reached, the flow was shut down over a period of approximately 10 seconds and all flow data saved. The next data acquisition file was executed and flow increased at a rate that corresponded to reaching each previous target flow after a period of 1-minute. This procedure was approved by CETV prior to testing, in recognition that most particles susceptible to scour at low flows would not be in the sump at higher flows. Similarly, re-entrainment of the oil beads was not expected to be significantly affected by the flow meter change.

4. As part of the capture test, evaluation of the 40 and 80 L/min/m^2 surface loading rate was split into 3 and 2 parts, respectively, due to the long duration needed to feed the required minimum of 11.3 kg of test sediment into the unit. At the end of the first and second parts of the test, the flow rates were gradually shutdown to prevent capture of particles that would have been washed out under normal circumstances. The amended procedure was reviewed and approved by the verifier prior to testing.

Verification

The verification was completed by the Verification Expert, Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the International Standard ***ISO 14034:2016 Environmental management -- Environmental technology verification (ETV)***. Data and information provided by Hydroworks, LLC to support the performance claim included the following: Performance test report prepared by Alden Research Laboratory, Inc., and dated February 2018. This report is based on testing completed in accordance with the *Procedure for Laboratory Testing of Oil-Grit Separators* (Version 3.0, June 2014).

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

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

For more information on the Hydroworks® HS Hydrodynamic Separator please contact:

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07203 USA
Tel: 888-290-7900
Email: info@hydroworks.com
www.hydroworks.com

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

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V6C 3E2 Canada
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etv@globeperformance.com
www.globeperformance.com

Limitation of verification Registration: GPS-ETV_VR2024-05-31_HS
GLOBE Performance Solutions and the Verification Expert 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 D

WATER & WASTEWATER ANALYSIS INFORMATION

FIRE FLOW DEMAND REQUIREMENTS - FIRE UNDERWRITERS SURVEY (FUS GUIDELINES)

Project Number: 25090
Project Name: 1376 & 1382 Plains Road East
Date: 21-Jan-26

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 2020).

An estimate of the fire flow required is given by the following formula:

$$F = 220\,C\sqrt{A} \qquad (1)$$

where:

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for Type V wood frame construction (structure essentially all combustible)
= 0.8 for Type IV-A mass timber construction (encapsulated mass timber)
= 0.9 for Type IV-B mass timber construction (rated mass timber)
= 1.0 for Type IV-C mass timber construction (ordinary mass timber)
= 1.5 for Type IV-D mass timber construction (un-rated mass timber)
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
= 0.6 for fire-resistive construction (fully protected frame, floors, roof)
A = Total floor area in square metres

	Building Area				(1)		(2)			(3)		(4)		Final Adjusted Fire Flow	
Building / Location	Footprint Area (m^2)	# of Storeys	**Total GFA (m^2)**	Type of Construction	***Fire Flow "F"*** (l/min)	(l/s)	***Occupancy*** %	Adjustment (l/min)	**Adjusted Fire Flow (l/min)**	***Sprinkler*** %	Adjustment (l/min)	***Exposure*** %	Adjustment (l/min)	**(l/min)**	**(l/s)**
1376 & 1382 Plains Road East	**5239.0**	**-**	**5239.0**	**0.8**	13000	216.7	**-15**	-1950.0	**11050.0**	**-50**	-5525.0	35	3867.5	**9000**	**150**

Total Area Calculation

Two largest ajoinding floors plus 50% of any floors immediately above them up to eight floors

Floor	Area	Tot. Area	Cumm. Area
2	1099	1099	1099.0
3	1164	1164	2263.0
4-11	744	2976	5239.0

(2) Occupancy

Non-Combustible	-25%
Limited Combustible	-15%
Combustible	No charge
Free Burning	15%
Rapid Burning	25%

(3) Sprinkler

Minimum credit for systems designed to NFPA 13 is 30%.

If the domestic and fire services are supplied by the same municipal water system, then take an additional 10%.

If the sprinkler system is fully supervised (ie. annunciator panel that alerts the Fire Dept., such as a school), then an additional 10% can be taken. Maximum credit = 50%.

(4) Exposure

0 to 3m	25%	
3.1 to 10m	20%	Calculate for all
10.1 to 20m	15%	sides. Maximum
20.1 to 30m	10%	charge shall not
>30m	0%	exceed 75%

Side	Exposure (m)	Charge (%)
North =	**30m+**	**0**
South =	**30m+**	**0**
East =	**10.1 to 20m**	**15**
West =	**3.1 to 10m**	**20**
Total Exposure =		***35***

*exposed building is fully protected with an automatic sprinkler system = 50% of total exposure
**subject and exposed buildings are fully protected with an automatic sprinkler system = no adjustment
***subject building and the area between the buildings are fully protected with an automatic sprinkler system = no adjustment
****exposed building face of a Type V building has an exterior cladding with min. 1 hour FRR, than the exposure charge may be treated as a Type III/IV building

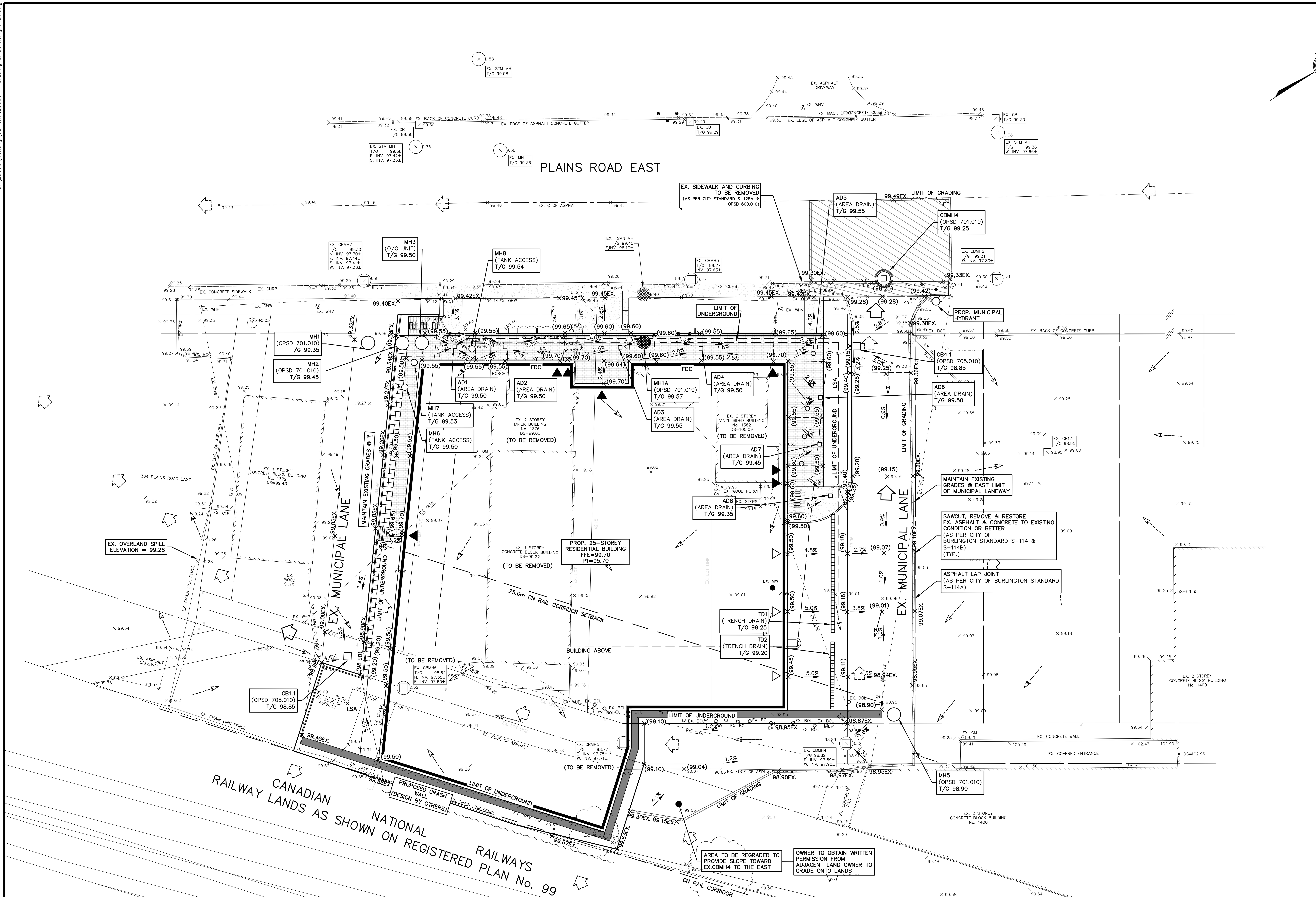
APPENDIX E

ENGINEERING DRAWINGS

DWG No.: C100

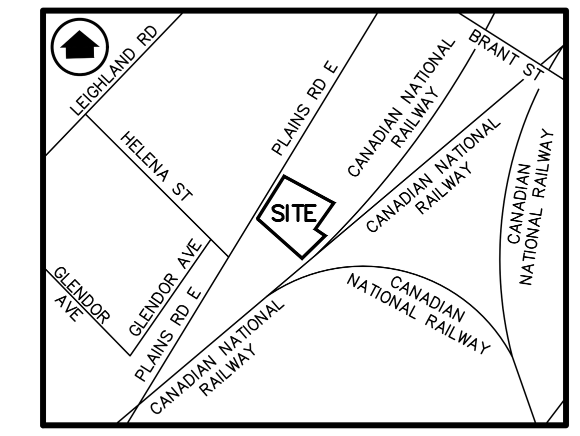
GRADING & EROSION CONTROL PLAN

S:\25090\Working\Current\25090 – Grading & Servicing Plan.dwg



NOTES TO CONTRACTOR:

1. INSPECTION
   CONTRACTOR IS RESPONSIBLE FOR CONTACTING ENGINEER 48 HRS PRIOR TO COMMENCING WORK TO ARRANGE FOR INSPECTION. ENGINEER TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION AS MANDATED BY ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2, GENERAL REVIEW. FAILURE TO NOTIFY ENGINEER WILL RESULT IN EXTENSIVE POST CONSTRUCTION INSPECTION AT CONTRACTORS EXPENSE.
2. CONFIRMATION OF EXISTING INVERTS
   72 HOURS PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS TO LOCATE, EXPOSE AND VERIFY INVERTS OF EXISTING SEWERS AT CONNECTION POINTS. SHOULD THE CONTRACTOR PROCEED WITHOUT COMPLETING THESE LOCATES, EXTRA COSTS RESULTING FROM DELAYS AND STANDBY TIME WILL NOT BE CONSIDERED.



KEY MAP

N.T.S.

LEGEND:

Symbol	Description
209.00	EXISTING GROUND ELEVATION
(209.00)	PROPOSED GROUND ELEVATION
209.00EX	PROPOSED ELEVATION TO MATCH EXISTING
2.0%	PROPOSED DIRECTION OF SHEET FLOW
	EXISTING CATCHBASIN
	EXISTING STORM/SANITARY MANHOLE
	PROPOSED CATCHBASIN
	PROPOSED STORM/SANITARY MANHOLE
	PROPOSED CURB STOP/GATE VALVE
	EXISTING DIRECTION OF DRAINAGE
	PROPOSED DIRECTION OF SWALE FLOW
	EXISTING OVERLAND FLOW ROUTE
	PROPOSED OVERLAND FLOW ROUTE
	PROPOSED SILTATION CONTROL FENCE
	PROPOSED CATCHBASIN SILT SACK

BENCH MARK NOTE:

CITY OF BURLINGTON BENCHMARK No. 446
ELEVATION = 100.192 METRES (CGVD28:78 ADJUSTMENT)
BRASS PLAQUE SET ON EAST FACE OF CONCRETE BOX CULVERY ON PLAINS ROAD APPROXIMATELY 150 METRES EAST OF BRANT STREET AND 0.20 METRES BELOW TOP OF WALL WEST OF THE COURT HOUSE

NO.	DATE	BY	REVISIONS
.	.	.	.

NOTES TO CONTRACTOR:

1. CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
2. ANY INCONSISTENCIES AND OMISSIONS FOUND ON THE DRAWINGS MUST BE REPORTED TO THE ENGINEER FOR CLARIFICATION BEFORE COMMENCING THE WORK.
3. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ALL FINDINGS TO THE ENGINEER. ONCE CONSTRUCTION HAS COMMENCED, THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ALL DIMENSIONS, ELEVATIONS, AND SITE CONDITIONS.
4. THE POSITIONS OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVER–GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS. WHERE SHOWN ON THE DRAWING, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
5. ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED, REUSED, OR REVISED WITHOUT THE WRITTEN CONSENT OF S. LLEWELLYN AND ASSOCIATES LIMITED.

DESIGN	SJD	CHK'D	SF	DATE
DRAWN	SJD	CHK'D	SF	Jan. 8, 2026

SCALE 1:200 (0 5 10 20)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER – S.V. FRANKOVICH – 2/17/2026 – PROVINCE OF ONTARIO

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS
Tel. (905) 631–6978
Website: www.sla.on.ca
email: info@sla.on.ca
3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

CLIENT

2731119 ONTARIO INC.
1376 PLAINS RD E, BURLINGTON, ONTARIO

PROJECT NAME

1376 & 1382 PLAINS ROAD EAST
BURLINGTON, ONTARIO

TITLE

PRELIMINARY GRADING PLAN

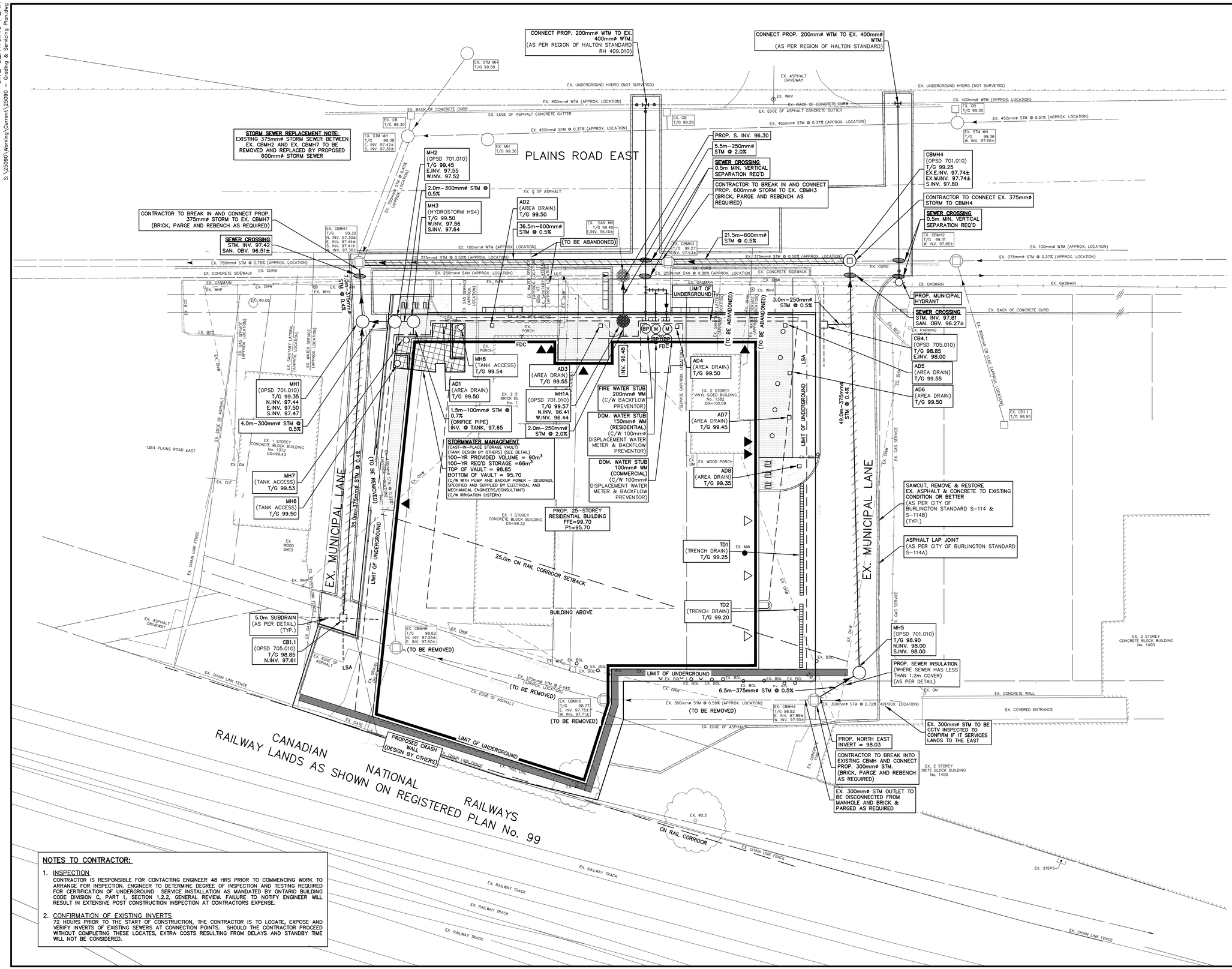
PROJECT No. 25090

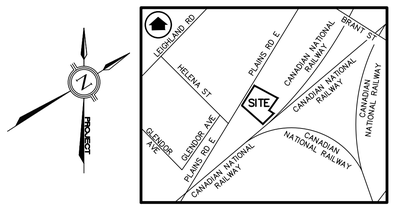
DRAWING No. C100

DWG No.: C101

SITE SERVICING PLAN

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KEY MAP
N.T.S.

LEGEND:

- EXISTING CATCHBASIN
- EXISTING STORM/SANITARY MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED STORM/SANITARY MANHOLE
- PROPOSED CURB STOP/GATE VALVE
- PROPOSED WATER METER
- PROPOSED BACKFLOW PREVENTOR
- SEWER CROSSING
- PROPOSED SEWER INSULATION

BENCH MARK NOTE:

CITY OF BURLINGTON BENCHMARK No. 446
ELEVATION = 100.192 METRES (CGVD28:78 ADJUSTMENT)
BRASS PLAQUE SET ON EAST FACE OF CONCRETE BOX CULVERY ON PLAINS ROAD APPROXIMATELY 150 METRES EAST OF BRANT STREET AND 0.20 METRES BELOW TOP OF WALL WEST OF THE COURT HOUSE

NO.	DATE	BY	REVISIONS

NOTES TO CONTRACTOR:

1. CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
2. ANY INCONSISTENCIES AND OMISSIONS FOUND ON THE DRAWINGS MUST BE REPORTED TO THE ENGINEER FOR CLARIFICATION BEFORE COMMENCING THE WORK.
3. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS AND ELEVATIONS AND REPORT ALL FINDINGS TO THE ENGINEER. ONCE CONSTRUCTION HAS COMMENCED, THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ALL DIMENSIONS, ELEVATIONS, AND SITE CONDITIONS.
4. THE POSITIONS OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVER-GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS. WHERE SHOWN ON THE DRAWING, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
5. ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED, REUSED, OR REVISED WITHOUT THE WRITTEN CONSENT OF S. LLEWELLYN AND ASSOCIATES LIMITED.

DESIGN	SJD	CHK'D	SF
DRAWN	SJD	CHK'D	SF

DATE: Jan. 8, 2026

SCALE 1:200 (0, 5, 10, 20)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER — S.V. FRANKOVICH — 2/17/2026 — PROVINCE OF ONTARIO

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS
Tel. (905) 631-6978
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email: info@sla.on.ca
3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

CLIENT

2731119 ONTARIO INC.
1376 PLAINS RD E, BURLINGTON, ONTARIO

PROJECT NAME

1376 & 1382 PLAINS ROAD EAST
BURLINGTON, ONTARIO

TITLE

PRELIMINARY SITE SERVICING PLAN

PROJECT No.	DRAWING No.
25090	C101

NOTES TO CONTRACTOR:

1. INSPECTION
   CONTRACTOR IS RESPONSIBLE FOR CONTACTING ENGINEER 48 HRS PRIOR TO COMMENCING WORK TO ARRANGE FOR INSPECTION. ENGINEER TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION AS MANDATED BY ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2. GENERAL REVIEW. FAILURE TO NOTIFY ENGINEER WILL RESULT IN EXTENSIVE POST CONSTRUCTION INSPECTION AT CONTRACTORS EXPENSE.
2. CONFIRMATION OF EXISTING INVERTS
   72 HOURS PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS TO LOCATE, EXPOSE AND VERIFY INVERTS OF EXISTING SEWERS AT CONNECTION POINTS. SHOULD THE CONTRACTOR PROCEED WITHOUT COMPLETING THESE LOCATES, EXTRA COSTS RESULTING FROM DELAYS AND STANDBY TIME WILL NOT BE CONSIDERED.

DWG No.: C102
NOTES AND DETAILS PLAN
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GENERAL NOTES

1. THIS/THESE PLAN(S) IS/ARE NOT TO BE USED FOR CONSTRUCTION UNTIL SEALED BY THE ENGINEER AND INDICATED ISSUED FOR CONSTRUCTION ON THE DRAWING.
2. THIS/THESE PLAN(S) IS/ARE NOT TO BE REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN PERMISSION OF S. LLEWELLYN AND ASSOCIATES LIMITED.
3. INFORMATION REGARDING ANY EXISTING SERVICES AND/OR UTILITIES SHOWN ON THE APPROVED SET OF CONSTRUCTION DRAWINGS ARE FURNISHED AS THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL INTERPRET THIS INFORMATION AS HE SEES FIT WITH THE UNDERSTANDING THAT THE OWNER AND HIS AGENTS DISCLAIM ALL RESPONSIBILITY FOR ITS ACCURACY AND /OR SUFFICIENCY. THE CONTRACTOR SHALL ASSUME LIABILITY FOR ANY DAMAGE TO EXISTING WORKS.
4. EXISTING TOPOGRAPHIC AND LEGAL INFORMATION TAKEN FROM PLANS PREPARED BY MACKAY, MACKAY & PETERS, DATED SEPTEMBER 15, 2023.
5. SITE PLAN INFORMATION TAKEN FROM PLANS PREPARED BY WZMH ARCHITECTS, DATED FEBRUARY 2026.
6. THIS/THESE PLAN(S) TO BE READ IN CONJUNCTION WITH THE STORM WATER MANAGEMENT (SWM) REPORT PREPARED BY S. LLEWELLYN AND ASSOCIATES LIMITED, DATED FEBRUARY 2026.
7. THIS (THESE) PLAN(S) TO BE USED FOR SERVICING AND GRADING ONLY, FOR BUILDING LOCATION REFER TO THE SITE PLAN.
8. MUNICIPAL APPROVAL OF THESE DRAWINGS IS FOR MATERIAL AND COMPLIANCE WITH CITY OF BURLINGTON AND PROVINCIAL SPECIFICATIONS AND STANDARDS ONLY. APPROVAL AND INSPECTION OF THE WORKS BY THE CITY OF BURLINGTON AND REGION OF HALTON STAFF DOES NOT CERTIFY THE LINE AND GRADE OF THE WORKS NOR RELIEVE THE CONTRACTOR OF CERTIFICATION OF ALL WORKS BY THE OWNER'S ENGINEER.
9. ALTERNATE MATERIALS MAY BE ACCEPTABLE PROVIDED WRITTEN APPROVAL HAS FIRST BEEN OBTAINED FROM THE CITY OF BURLINGTON, REGION OF HALTON AND THE THE ENGINEER.
10. THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNER'S BONDED CONTRACTOR FROM THE REQUIREMENTS TO OBTAIN THE VARIOUS PERMITS/APPROVALS NORMALLY REQUIRED TO COMPLETE A CONSTRUCTION PROJECT, SUCH AS, BUT NOT LIMITED TO THE FOLLOWING:
    - ROAD CUT PERMITS
    - SEWER PERMITS
    - APPROACH APPROVAL PERMITS
    - RELOCATION OF SERVICES
    - COMMITTEE OF ADJUSTMENT
    - ENCROACHMENT AGREEMENTS
12. PRIOR TO CONSTRUCTION THE CONTRACTOR MUST:
    i. CHECK AND VERIFY ALL DIMENSIONS AND EXISTING ELEVATIONS WHICH INCLUDE BUT ARE NOT LIMITED TO THE BENCHMARK ELEVATIONS, EXISTING SERVICE CONNECTIONS, EXISTING INVERTS AND REPORT FINDING IN WRITING TO THE ENGINEER.
    ii. OBTAIN ALL UTILITY LOCATES AND REQUIRED PERMITS AND LICENSES.
    iii. VERIFY ALL FINISHED FLOOR ELEVATIONS AND BASEMENT FLOOR ELEVATIONS WHICH MAY APPEAR ON THESE PLANS COMPLY WITH THE FINAL ARCHITECTURAL DRAWINGS.
    iv. CONFIRM ALL DRAWINGS USED FOR CONSTRUCTION ARE OF THE MOST RECENT REVISION.
    v. NOTIFY THE ENGINEER OF THE PROPOSED CONSTRUCTION SCHEDULE FOR COORDINATION OF NECESSARY INSPECTIONS.
13. **THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE ENGINEER 48 HOURS PRIOR TO THE COMMENCING SITE WORKS TO ARRANGE FOR INSPECTION. THE ENGINEER SHALL DETERMINE THE EXTENT OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF THE UNDERGROUND SERVICE INSTALLATION AS MANDATED BY THE ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2, GENERAL REVIEW. FAILURE TO MAKE SUITABLE ARRANGEMENTS FOR INSPECTION WILL LEAD TO POST CONSTRUCTION TESTING AND INSPECTION AS DETERMINED BY THE ENGINEER, THE COSTS OF WHICH INCLUDING ANY DELAYS IN CONSTRUCTION SHALL BE BORNE BY THE CONTRACTOR. FULL PAYMENT FOR UN-INSPECTED WORKS MAY BE WITHHELD UNTIL THE COMPLETION OF THE POST CONSTRUCTION INSPECTION AND TESTING TO THE SATISFACTION OF THE ENGINEER.**
14. INSPECTION BY THE OWNER'S ENGINEER IS FOR CERTIFICATION AND GENERAL CONFORMANCE PURPOSES AND DOES NOT CERTIFY LINE AND GRADE OR IMPLY AN ASSURANCE OF QUALITY CONTROL. THE CONTRACTOR SHALL BE RESPONSIBLE TO ENSURE THE INSTALLATION OF THE WORKS TO PROPER LINE, GRADE AND QUALITY TO CURRENT INDUSTRY STANDARDS.
15. ANY UTILITY RELOCATIONS AND RESTORATIONS DUE TO THE DEVELOPMENT TO BE UNDERTAKEN AT THE EXPENSE OF THE OWNER/DEVELOPER AND SHALL BE COORDINATED BY THE CONTRACTOR.
16. ALL RESTORATIONS AND RECONSTRUCTIONS SHALL BE TO COMPLETED TO MATCH EXISTING CONDITIONS OR BETTER AND ARE TO BE PERFORMED TO THE SATISFACTION OF THE ENGINEER AND THE CITY OF BURLINGTON.
17. SERVICING CONTRACTOR TO MAINTAIN A "CONFINED TRENCH CONDITION" IN ALL SEWER AND WATERMAIN INSTALLATION TRENCHES.
18. THE SITE SERVICING CONTRACTOR SHALL TERMINATE ALL SERVICES 1.0m FROM THE BUILDING FACE.
19. NO BLASTING WILL BE PERMITTED.

SEWERS

1. SANITARY AND STORM SEWERS
    A. CONSTRUCTION OF SANITARY & STORM SEWERS & PRIVATE DRAINS SHALL BE IN ACCORDANCE WITH CITY STANDARDS & SPECIFICATIONS (LATEST EDITION) AND MINISTRY OF ENVIRONMENT (MOE) GUIDELINES (LATEST EDITION).
    B. COVER AND BEDDING MATERIAL FOR CONCRETE PIPE SHALL BE GRANULAR 'A' MATERIAL AS PER OPSD 802.030 TO 802.033 AND 802.050 TO 802.053, CLASS 'B' BEDDING.
    C. COVER AND BEDDING MATERIAL FOR PVC PIPE SHALL BE GRANULAR 'A' MATERIAL AS PER OPSD 802.010 TO 802.014.
    D. PVC PIPE WILL REQUIRE SPECIAL CONSTRUCTION PROCEDURES AS PER CITY SPECIFICATIONS.
    E. ALL SEWERS TO BE VIDEO INSPECTED AS PER OPSS 409.
    F. ALL SEWERS TO BE FLUSHED PRIOR TO VIDEO INSPECTION.
    G. MANHOLE FRAMES AND COVERS SHALL BE AS PER OPSD 401.010 (STORM-OPEN) (SANITARY-CLOSED). THE WORDS "STORM" AND "SANITARY" ARE TO BE CAST INTO THEIR RESPECTIVE MANHOLE COVERS.
    H. CATCHBASIN FRAMES AND GRATES SHALL BE AS PER OPSD 400.010 OR 400.020 IN PAVED AREAS AND BEEHIVE GRATES AS PER COB STD. S-176 IN LANDSCAPED AREAS. DITCH INLET GRATES SHALL BE AS PER COB STD. S-173.
    I. ALL REAR LOT CATCHBASINS SHALL BE AS PER OPSD 705.010, AND SUMPLESS WITH NO GOSS TRAPS.
    J. SEWERS 100mm TO 150mm IN DIAMETER SHALL BE PVC PIPE, CSA B182.2, SDR-28.
    K. SANITARY SEWERS 200mm TO 375mm IN DIAMETER SHALL BE PVC PIPE, CSA B182.2, SDR-35.
    L. STORM SEWERS 250mm TO 375mm IN DIAMETER SHALL BE PVC PIPE, CSA B182.2, SDR-35.
    M. STORM SEWERS 450mm IN DIAMETER OR GREATER SHALL BE CONCRETE PIPE, CSA A257.2 (AS SPECIFIED).
    N. HORIZONTAL ELLIPTICAL STORM SEWER SHALL BE CONCRETE PIPE, ASTM C507M (AS SPECIFIED).
    O. ALL PVC STORM SEWERS ARE TO BE TESTED FOR DEFLECTION (MANDREL PASSAGE) AFTER INSTALLATION AS PER OPSS 410. SANITARY SEWERS SHALL BE TESTED FOR DEFLECTION (MANDREL PASSAGE) AND LEAKAGE (LOW AIR PRESSURE METHOD) AS PER OPSS 410. PRIOR TO ASSUMPTION BY THE CITY, PIPE DEFLECTION TESTING SHALL BE REPEATED.
    P. CLEANOUTS CAN ONLY BE PROVIDED FOR SEWERS CONTAINING A SIZE OF 150mm IN DIAMETER OR SMALLER. CLEANOUTS SHALL BE PROVIDED AT EACH CHANGE IN PIPE ALIGNMENT (VERTICAL AND HORIZONTAL), AND AT ANY CHANGE IN PIPE SIZE OR MATERIAL.
    Q. SEWER INSULATION SHALL BE XPS INSULATION BOARD DESIGNED FOR HEAVY LOAD APPLICATIONS WITH A MINIMUM R-10 THICKNESS (TYPICALLY 50-65mm) AND A MINIMUM COMPRESSIVE STRENGTH OF 40 psi.

2. PRIVATE DRAINS
    A. PRIVATE DRAINS TO BE 150mmø PVC PIPE, CSA B182.1 M-1983, SDR 28. STORM PIPE SHALL BE WHITE AND SANITARY SHALL BE GREEN. WOOD MARKING AT END OF SANITARY PRIVATE DRAIN SHALL BE PAINTED RED.
    B. PRIVATE DRAIN CONNECTIONS TO BE LOCATED AS PER COB STD. S-185.
    C. 'D' DENOTES DUAL PRIVATE DRAIN CONNECTION (SANITARY & STORM). 'SA' DENOTES SINGLE SANITARY PRIVATE DRAIN. 'ST' DENOTES SINGLE STORM PRIVATE DRAIN.
    D. COVER AND BEDDING MATERIAL FOR PRIVATE DRAINS SHALL BE GRANULAR 'A' INSTALLED AS PER OPSD 802.010 OR 802.013.
    E. MINIMUM FALL FOR PRIVATE DRAINS TO BE 2.0%.
    F. SANITARY PRIVATE DRAINS ARE TO CONTAIN A MIN. COVER OF 2.15m BELOW PROPERTY LINE OR AS DETAILED.
    G. STORM PRIVATE DRAINS ARE TO CONTAIN A MIN. COVER OF 1.50m BELOW PROPERTY LINE OR AS DETAILED.
    H. BUILDING RAINWATER LEADERS SHALL NOT BE CONNECTED TO THE STORM PRIVATE DRAIN BUT SHALL DISCHARGE ONTO THE GROUND SURFACE VIA SPLASH PADS.
    I. SUMP PUMPS WITH CHECK VALVES SHALL BE INSTALLED IN EACH DWELLING TO PUMP THE BUILDING WEEPING TILES TO A STORM PRIVATE DRAIN OR THE GROUND SURFACE. THE SUMP OUTLET PIPE IS TO CONTAIN A 'GOOSENECK' AND SHALL EXTEND A MINIMUM OF 150mm ABOVE THE PROPOSED GRADE AT THE DWELLING (BASEMENT CEILING) PRIOR TO DISCHARGING TO THE STORM PRIVATE DRAIN OR SURFACE.
    J. SUMP PUMP DISCHARGES SHOULD BE SEPARATED BY A MINIMUM OF 1.8m FROM ROOF LEADER/DOWNSPOUTS AND SHOULD NOT DISCHARGE TO A RESIDENTIAL SIDE YARD OF A DWELLING.

WATERMAINS AND WATER SERVICES

1. WATERMAINS
    A. CONSTRUCTION OF WATERMAINS & PRIVATE SERVICES SHALL BE IN ACCORDANCE WITH CITY STANDARDS & SPECIFICATIONS (LATEST EDITION) AND MINISTRY OF ENVIRONMENT (MOE) GUIDELINES (LATEST EDITION).
    B. TO BE INSTALLED TO A MINIMUM DEPTH OF 1.7m BELOW PROPOSED CENTERLINE ROAD GRADE ON ALL ROADS.
    C. PVC PIPE IN SIZES 100mm THROUGH 300mm SHALL BE CLASS 150 DR18 CONFORMING TO AWWA C900.
    D. TRACER WIRE SHALL BE INSTALLED ON ALL NEW WATERMAIN AND SERVICES GREATER THAN 50mm IN DIAMETRE. A SOLID 10 GAUGE TWU COPPER WIRE SHALL BE INSTALLED ALONG THE TOP OF THE PIPE, STRAPPED TO THE PIPE AT 6m INTERVALS.
    E. MOLDED PVC FITTINGS FOR PIPE SIZES 100mm TO 300mm SHALL CONFORM TO AWWA C900 AND CERTIFIED TO CSA B137.2.
    F. FABRICATED FITTINGS 250mm AND 300mm SHALL BE MANUFACTURED FROM SEGMENTS OF AWWA C900, CLASS 150 (DR18) PVC PIPE, BONDED TOGETHER AND OVER-WRAPPED WITH FIBREGLASS-REINFORCED POLYESTER TO MEET THE REQUIREMENTS OF CSA B137.3.
    G. WHERE METAL FITTINGS ARE TO BE USED ON PVC MAINS SUFFICIENT CATHODIC PROTECTION MUST BE PROVIDED AS PER THE FOLLOWING REQUIREMENTS:
        w. ONE (1) 5.4 kg ZINC ANODE WILL BE PROVIDED FOR EVERY 1000 m TRACER WIRE.
        ii. ONE (1) 5.4 kg ZINC ANODE IS TO BE INSTALLED ON ALL COPPER SERVICE CONNECTIONS, BY MEANS OF A SERVICE GROUND CLAMP, COATED WITH T.C. MASTIC OR WRAPPED WITH "SCOTCHFILL" ELECTRICAL PUTTY OR APPROVED EQUAL. THE ANODE IS TO BE PLACED AT LEAST 1.0 m AWAY FROM THE WATER SERVICE AND AS DEEP AS THE SERVICE AND WITHIN 1.0 m OF THE CURB STOP.
        iii. ONE (1) 10.8 kg ZINC ANODE IS TO BE INSTALLED ON EACH HYDRANT. IF PVC. PIPE IS USED BETWEEN THE HYDRANT TEE OR ANCHOR TEE AND THE HYDRANT BOOT, TWO (2) 10.8 kg ZINC ANODES SHALL BE USED.
        iv. ONE (1) 5.4 kg ZINC ANODE IS TO BE INSTALLED ON EVERY VALVE, AND EVERY METALLIC FITTING CONNECTED TO A PVC WATERMAIN. FITTINGS INCLUDE BENDS, TEES, CROSSES, SLEEVES, REDUCERS, PLUGS, CAPS, JOINT RESTRAINERS AND COUPLINGS.
        v. ONE (1) 14.5 KG MAGNESIUM ANODE IS TO BE CONNECTED TO THE FIRST LENGTH OF AN EXISTING METALLIC WATERMAIN PIPE WHEN CONNECTED TO A NEW PVC WATERMAIN.

    ALL SACRIFICIAL ZINC ANODES SHALL CONFORM TO ASTM B-418 TYPE II AND SHALL BE MADE OF HIGH GRADE ELECTROLYTIC ZINC, 99.99 % PURE. FOR ALL ANODES CONNECTED TO NEW PIPE, FITTINGS OR TO EXISTING METALLIC WATERMAINS, A CADWELDER AND CA-15 OR EQUIVALENT CARTRIDGE SHALL BE USED. ALL THERMITE WELD CONNECTIONS TO BE COATED WITH T.C. MASTIC (TAPECOAT OF CANADA), ROYBOND 747 PRIMER AND ROYSTON "HANDY CAP" OR APPROVED EQUAL.
    H. WATERMAIN SHALL CONTAIN A MINIMUM OF 150mm GRANULAR 'A' BEDDING AND SHALL CONFORM TO OPSS MUNI. 401. BACKFILL SHALL BE 100% SPMDD BENEATH ROADS, SIDEWALKS, CURB AND 95% SPMDD ELSEWHERE AND CONFORM TO OPSS MUNI. 401 GRANULAR 'B' TYPE I OR II OR APPROVED SELECT NATIVE. LOOSE MATERIAL SHALL BE COMPACTED TO 95% SPMDD BEFORE SUBSEQUENT LAYERS ARE PLACED.
    I. WATERMAIN DEFLECTION FOR PVC PIPE:
        i. MAXIMUM ALLOWABLE DEFLECTION OF 1.5 DEGREES PER JOINT UP TO 250mm DIAMETER (160mm PER 6.1m PIPE LENGTH) AND 1.2 DEGREES FOR 300mm DIAMETER (128mm PER 6.1m PIPE LENGTH) SHALL NOT BE EXCEEDED.
        ii. ALL JOINTS SHALL BE DEFLECTED AN EQUAL AMOUNT.
    J. MINIMUM HORIZONTAL SEPARATION BETWEEN WATERMAINS AND SEWERS AND WATER SERVICES SHALL BE 2.5m. VERTICAL SEPARATION BETWEEN WATERMAINS AND SEWERS WHICH CROSS MUST BE 500mm BETWEEN THE OUTSIDE OF THE WATERMAIN AND THE OUTSIDE OF THE SEWER, WITH THE LENGTH OF WATER PIPE BEING CENTRED AT THE POINT OF CROSSING SUCH THAT JOINTS IN THE WATERMAIN WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER, CROSSING PERPENDICULAR IF POSSIBLE.
    K. ALL EXISTING WATER METERS BEING ABANDONED AS PART OF THE PROPOSED DEVELOPMENT MUST BE REMOVED AND SALVAGED BY THE REGION OF HALTON. THE SERVICING CONTRACTOR SHOULD CONTACT THE PUBLIC WORKS DEPARTMENT AT (905) 825-6000 TO ARRANGE FOR THE WORK.

2. FLUSHING, SWABBING AND TESTING
    A. ALL NEW WATERMAINS ARE TO BE SWABBED IN ACCORDANCE WITH REGION SPECIFICATIONS.
    B. A REDUCED PRESSURE ZONE BACKFLOW PREVENTER (WATTS SERIES 909 OR APPROVED EQUAL) IS REQUIRED ON THE TEMPORARY SUPPLY LINES USED FOR FILLING AND FLUSHING OR SWABBING OF WATERMAINS.
    C. UPON COMPLETION OF INSTALLATION, THE CONTRACTOR SHALL PERFORM A PRESSURE TEST ON THE WATERMAINS AS PER REGION OF HALTON STANDARDS. WATERMAIN IS TO BE TESTED PRIOR TO CONNECTION TO EXISTING WATERMAINS USING TEMPORARY CAPS OR PLUGS. PIPE CLOSURES, WHERE REQUIRED, ARE TO BE SUPPLIED BY THE CONTRACTOR. THE CONTRACTOR WILL ALSO SUPPLY AND INSTALL ALL ADAPTOR PIECES IN ORDER TO CONNECT TO EXISTING WATERMAINS.

3. WATER SERVICES
    A. 'W' DENOTES WATER SERVICE CONNECTION. WATER SERVICE TO BE 25mm DIA. TYPE 'K' SOFT COPPER OR AS DETAILED.
    B. WATER SERVICES SHALL CONTAIN A MINIMUM OF 150mm GRANULAR 'A' BEDDING AND SHALL CONFORM TO OPSS MUNI. 401.
    C. WATER SERVICES SHALL BE LOCATED 0.5m OFFSET FROM THE LOT LINE AND ON THE OPPOSITE SIDE OF THE SANITARY AND STORM LATERALS.
    D. WATER SERVICES SHALL BE INSTALLED A MINIMUM OF 1.0m BEYOND THE CURB STOP ON PRIVATE PROPERTY.

4. VALVES & VALVE BOXES
    A. ALL VALVE BOXES TO BE SET TO PROPOSED GRADES.
    B. 100mm TO 300mm GATE VALVE & VALVE BOXES AS PER RH-406.020.
    C. TRACER WIRE SHALL BE INSTALLED BETWEEN EACH VALVE AND/OR THE END OF THE NEW WATERMAIN. JOINTS IN THE TRACER WIRE BETWEEN VALVES ARE DISCOURAGED, BUT WHEN NECESSARY, SPLICING MUST BE WATERPROOFED (OPSD 1109.025) OR USE OUTDOOR WATERPROOF ELECTRICAL CONNECTORS AND DONE IN SUCH A WAY TO ENSURE ELECTRICAL CONDUCTIVELY. AT EACH VALVE, A LOOP OF WIRE IS TO BE BROUGHT UP OUTSIDE THE VALVE BOX TO THE TOP OF THE BOX, AS PER RH-406.010.

5. ANCHOR BLOCKS,
    A. FOR 100mm TO 300mm WATERMAINS STANDARD CONCRETE ANCHOR BLOCKS AS PER OPSD 1103.010 AND 1103.020

6. HYDRANTS
    A. TO BE INSTALLED WITH SECONDARY VALVES AS PER RH-406.020 AS DETAILED. THEY SHALL OPEN COUNTER-CLOCKWISE (LEFT) AND HAVE A 'L' PAINTED ON THE BARREL SECTION. THE 100mm PUMPER 'STORZ' CONNECTION SHALL FACE THE ROADWAY AND BE PAINTED BLACK.
    B. ALL FIRE HYDRANTS SHALL CONFORM TO THE CITY OF BURLINGTON (MUNICIPALITY) FIRE DEPARTMENT'S REQUIREMENTS AND SHALL BE OF SAME MANUFACTURE.
    C. ALL HYDRANT LEADS ARE TO BE EQUIPPED WITH TRACER WIRE EXTERNAL TO THE RISER.
    D. ALL SECONDARY VALVE STEMS ARE TO BE EQUIPPED WITH TRACER WIRE EXTERNAL TO THE RISER.

GRADING NOTES

A. ALONG ADJOINING PROPERTIES GRADE TO MEET EXISTING OR PROPOSED ELEVATIONS WITH SODDED SLOPES (MIN. 3H TO 1V) AND/OR RETAINING WALLS AS SPECIFIED.
B. ALL RETAINING WALLS, WALKWAYS, CURBS, ETC., SHALL BE PLACED A MIN. OF 0.45m OFF THE PROPERTY LINE. ALL WALLS 1.0M OR HIGHER SHALL BE DESIGNED BY A P.ENG.
C. SHOULD A RETAINING WALL BE REQUIRED, THE TOP OF WALL ELEVATIONS SHALL BE SET 150mm ABOVE THE PROPOSED SIDE YARD SWALES.
D. RETAINING WALLS 0.6m IN HEIGHT OR GREATER REQUIRE CONSTRUCTION OF A FENCE OR GUARD RAIL AT THE TOP OF THE REAR OF THE WALL. GUARDS FOR RETAINING WALLS SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF EXTERIOR GUARDS AS CONTAINED IN THE ONTARIO BUILDING CODE.
E. TOP OF FOUNDATION WALLS FOR BUILDINGS SHALL BE 150mm (MIN) ABOVE FINISHED GRADE.
F. DRIVEWAY SLOPES SHALL NOT BE LESS THAN 2% AND NOT MORE THAN 5.0% UNLESS OTHERWISE SPECIFIED. REVERSED SLOPED DRIVEWAYS IN NEW DEVELOPMENTS ARE NOT PERMITTED.
G. IF GRADING IS REQUIRED ON LANDS ADJACENT TO THE DEVELOPMENT WHICH ARE NOT OWNED BY THE DEVELOPER, THEN THE DEVELOPER MUST OBTAIN WRITTEN PERMISSION FROM THE ADJACENT PROPERTY OWNER TO ALLOW THE DEVELOPER TO GRADE ON THE ADJACENT LANDS, OTHERWISE RETAINING WALLS MUST BE USED.
H. THE WRITTEN PERMISSION REQUIRED FROM THE ADJACENT LANDOWNER SHALL BE OBTAINED PRIOR TO ENTERING THE LANDS. SHOULD PERMISSION NOT BE OBTAINED OR IS WITHDRAWN PRIOR TO COMMENCING THE WORK, THEN THE DEVELOPER SHALL LIMIT HIS ACTIVITIES TO THE LIMITS OF THE DEVELOPMENT SITE.
I. DRIVEWAY AND DRIVEWAY APPROACHES SHALL BE LOCATED SUCH THAT HYDRO VAULTS AND OTHER STREET FURNITURE ARE A MIN. OF 1.2m FROM THE PROJECTIONS OF THE OUTSIDE GARAGE WALLS.
J. ANY CHANGES IN GRADES AND CATCH BASINS REQUIRE THE APPROVAL OF THE CITY'S MANAGER OF DEVELOPMENT ENGINEERING.
K. THE TOP OF ALL WINDOW WELLS ARE TO BE A MINIMUM OF 100mm ABOVE THE OUTSIDE GRADE.

COMPACTION REQUIREMENTS

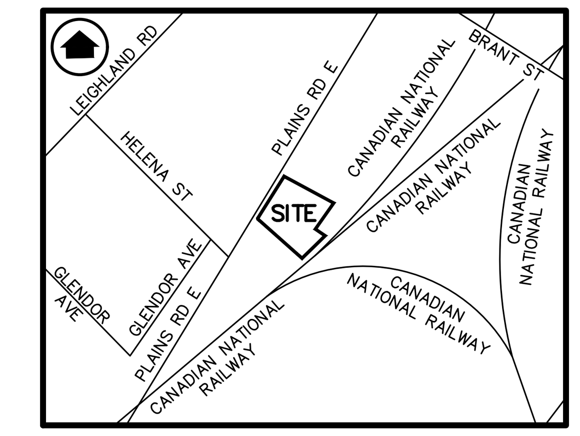
UNLESS OTHERWISE NOTED OR DIRECTED BY THE GEOTECHNICAL CONSULTANT, THE FOLLOWING SHALL APPLY:
A. ALL BEDDING AND BACKFILL MATERIAL, ROAD SUB-GRADES AND GENERALLY ALL MATERIAL USED FOR LOT GRADING AND FILL SECTIONS, ETC., SHALL BE COMPACTED TO MIN. 98% SPD. ALL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm LIFTS.
B. ALL GRANULAR ROAD BASE MATERIALS SHALL BE COMPACTED TO 98% SPD.
C. FOR ALL SEWERS AND WATERMAINS IN FILL SECTIONS, THE COMPACTION SHALL BE CERTIFIED BY A GEOTECHNICAL ENGINEER PRIOR TO LAYING OF PIPE.

SILTATION AND EROSION CONTROL

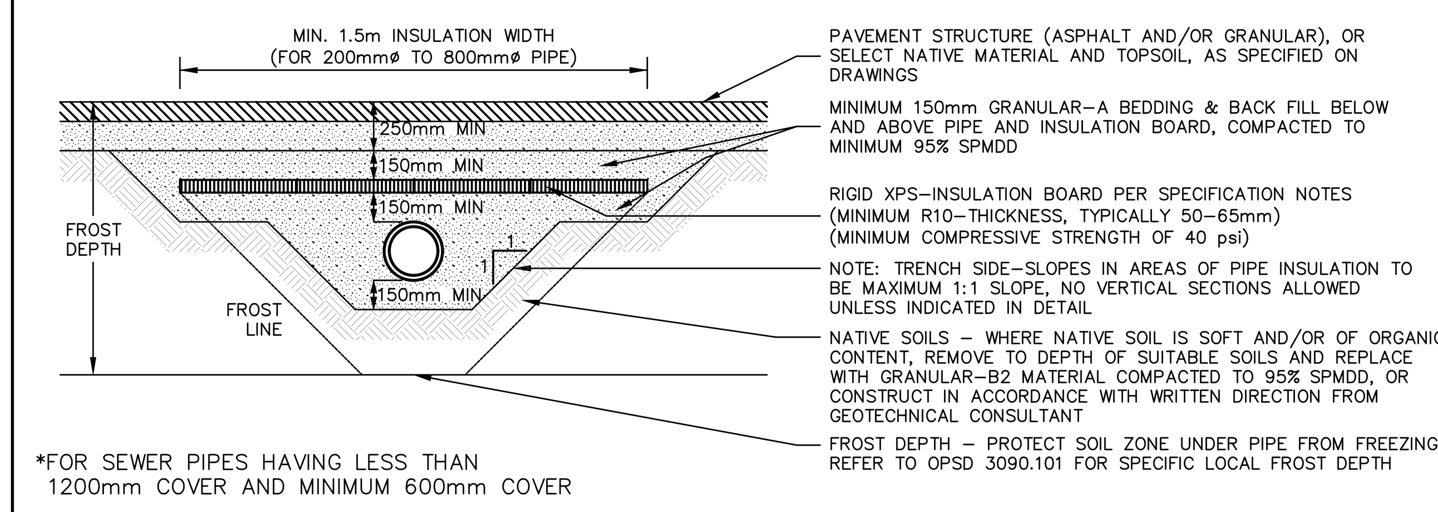
A. SILTATION CONTROL BARRIERS SHALL BE PLACED AS DETAILED.
B. ALL SILTATION CONTROL MEASURES SHALL BE CLEANED AND MAINTAINED AFTER EACH RAINFALL AS DIRECTED AND TO THE SATISFACTION OF THE CITY OF BURLINGTON AND/OR THE CONSERVATION AUTHORITY.
C. ADDITIONAL SILT CONTROL LOCATIONS MAY BE REQUIRED AS DETERMINED BY THE ENGINEER, THE CITY OF BURLINGTON AND/OR THE CONSERVATION AUTHORITY.
D. ALL EROSION AND SEDIMENT CONTROL DEVICES MUST BE INSTALLED PRIOR TO DEVELOPMENT AND MAINTAINED THROUGHOUT THE CONSTRUCTION PROCESS, UNTIL ALL DISTURBED AREAS HAVE BEEN RE-ESTABLISHED.
E. ALL EROSION AND SEDIMENT CONTROL DEVICES SHOULD BE INSPECTED MINIMUM WEEKLY, AFTER EVERY RAINFALL AND MAINTAINED AND CLEANED AS REQUIRED.
F. THE OWNER IS RESPONSIBLE FOR THE REMOVAL OF ALL MUD AND DEBRIS THAT ARE TRACKED ONTO THE ROADWAYS FROM VEHICLES ENTERING AND LEAVING THE CONSTRUCTION SITE. THE OWNER SHALL, UPON VERBAL AND/OR REQUEST BY THE CITY, IMMEDIATELY PROCEED WITH THE CLEANUP OPERATION AT THEIR EXPENSE. SHOULD THE OWNER FAIL TO MAINTAIN THE ROAD AS DIRECTED, THE CITY WILL HAVE THE CLEANING CARRIED OUT, AND DRAW ON THE SECURITY FOR COSTS AND/OR LAY CHARGES.

SEWER/WATER ABANDONMENT

1. ALL EXISTING UNUSED SEWERS MUST BE PROPERLY ABANDONED BY DISCONNECTING SEWER AT THE MAIN AND GROUTING EITHER END OF THE SEWER WITH A MINIMUM 300mm OF CONCRETE.
2. UNUSED MAINTENANCE HOLES AND CATCHBASINS MUST BE COMPLETELY REMOVED.
3. OPENINGS IN MAINTENANCE HOLES AND CATCHBASINS WHERE SERVICES WERE REMOVED OR ABANDONED MUST BE BRICKED AND PARGED.
4. REMOVE VALVES IN CHAMBERS AND SALVAGE WHERE APPLICABLE.
5. WHEN ABANDONING A WATER SERVICE CONNECTION OR WATERMAIN CONNECTED TO A LIVE MAIN, THE PREFERRED METHOD IS TO REMOVE THE VALVE AND TEE AND INSERT A SLEEVE ON THE WATERMAIN.
6. REMOVE HYDRANTS FOR DISPOSAL OR SALVAGE AT DIRECTION OF THE REGION OF HALTON.
7. ALL ENDS OF THE ABANDONED WATERMAIN ARE TO BE CAPPED AND RESTRAINED BY MECHANICAL MEANS. CONCRETE PLUGGING IS NOT ACCEPTABLE.

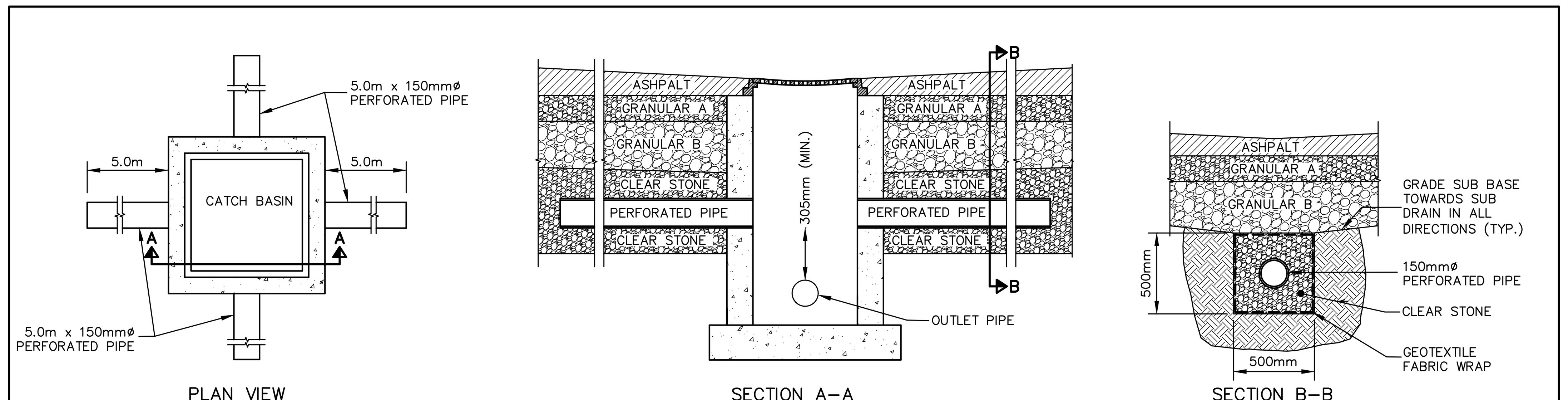


KEY MAP
N.T.S.

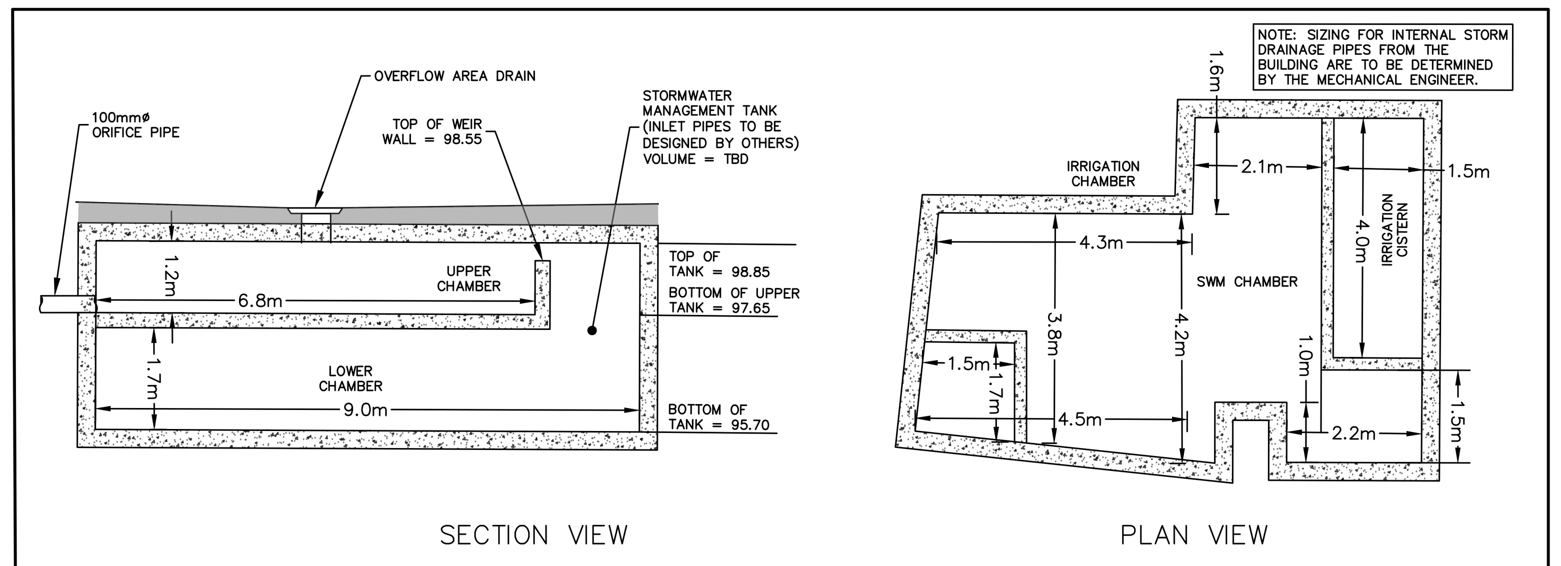


*FOR SEWER PIPES HAVING LESS THAN 1200mm COVER AND MINIMUM 600mm COVER

SEWER PIPE INSULATION DETAIL
SCALE: N.T.S.



SUBDRAIN DETAIL FOR CATCHBASINS AND CATCHBASIN/MANHOLES
SCALE: N.T.S.



CAST-IN-PLACE STORMWATER STORAGE TANK
SCALE: 1:100

BENCH MARK NOTE:

CITY OF BURLINGTON BENCHMARK No. 446
ELEVATION = 100.192 METRES (CGVD28:78 ADJUSTMENT)
BRASS PLAQUE SET ON EAST FACE OF CONCRETE BOX CULVERY ON PLAINS ROAD APPROXIMATELY 150 METRES EAST OF BRANT STREET AND 0.20 METRES BELOW TOP OF WALL WEST OF THE COURT HOUSE

NO.	DATE	BY	REVISIONS
.	.	.	.

NOTES TO CONTRACTOR:

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DESIGN	SJD	CHK'D	SF	DATE Jan. 8, 2026
DRAWN	SJD	CHK'D	SF	

SCALE 1:200 (0, 5, 10, 20)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER — S.V. FRANKOVICH — 2/17/2026 — PROVINCE OF ONTARIO

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS
Tel. (905) 631-6978
Website: www.sla.on.ca
email: info@sla.on.ca
3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

CLIENT
2731119 ONTARIO INC.
1376 PLAINS RD E, BURLINGTON, ONTARIO

PROJECT NAME
1376 & 1382 PLAINS ROAD EAST
BURLINGTON, ONTARIO

TITLE
PRELIMINARY NOTES AND DETAILS PLAN

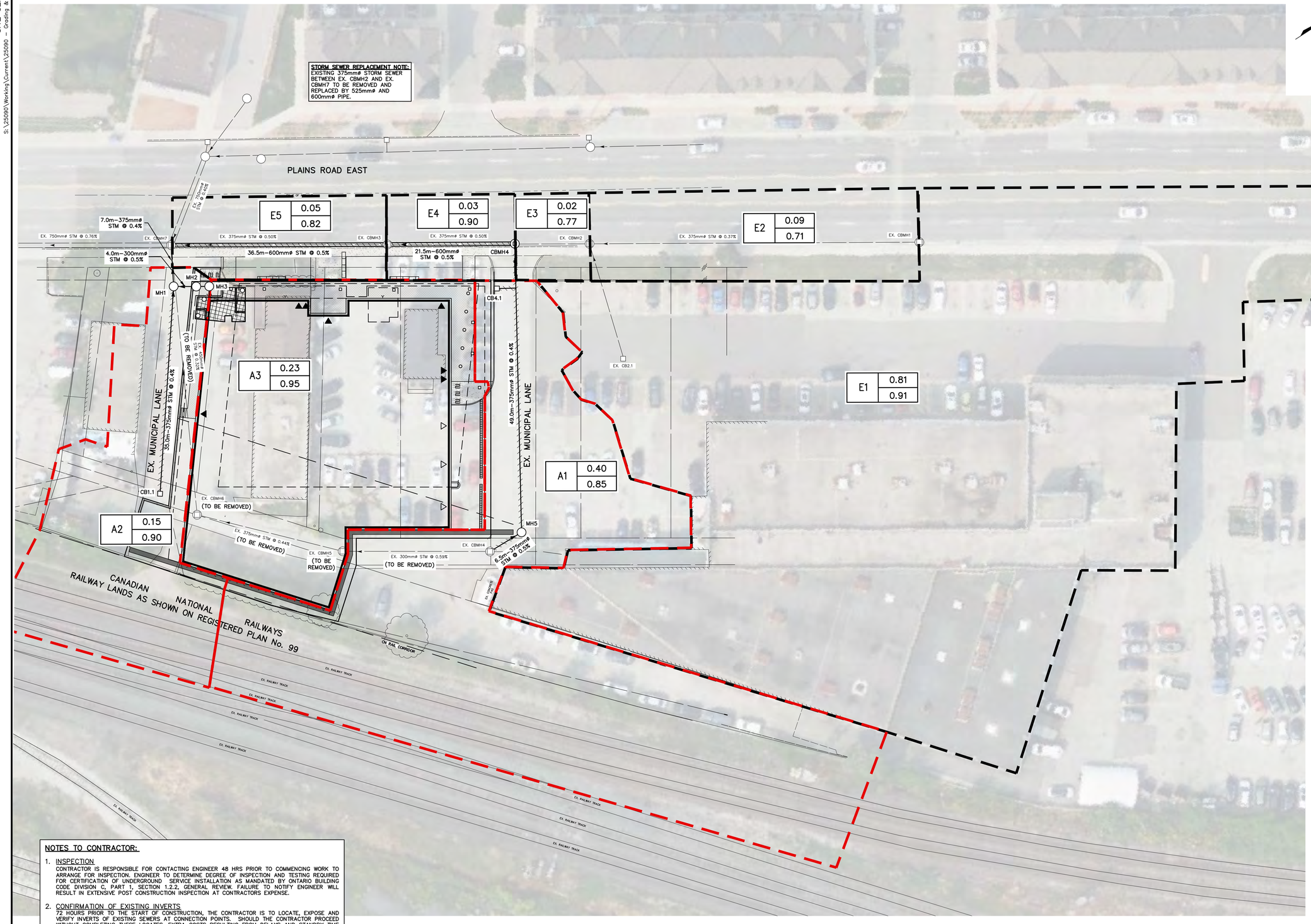
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DRAWING No. C102

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DWG No.: C103

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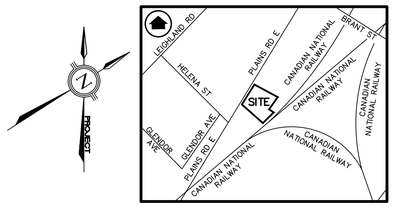
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KEY MAP
N.T.S.

LEGEND:

PROPOSED DRAINAGE BOUNDARY

EXISTING DRAINAGE BOUNDARY

A1 | 0.16 / 0.75 — AREA IN HECTARES; RUNOFF COEFFICIENT; AREA NUMBER

BENCH MARK NOTE:
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DESIGN	LF	CHK'D	SF	DATE Jan. 8, 2026
DRAWN	LF	CHK'D	SF	

SCALE 1:300 (0, 5, 10, 20, 30)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER — S.V. FRANKOVICH — 2/17/2026 — PROVINCE OF ONTARIO

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Website: www.sla.on.ca
email: info@sla.on.ca
3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

CLIENT
2731119 ONTARIO INC.
1376 PLAINS RD E, BURLINGTON, ONTARIO

PROJECT NAME
1376 & 1382 PLAINS ROAD EAST
BURLINGTON, ONTARIO

TITLE
PRELIMINARY STORM DRAINAGE AREA PLAN

PROJECT No. 25090

DRAWING No. C103

DWG No.: C104

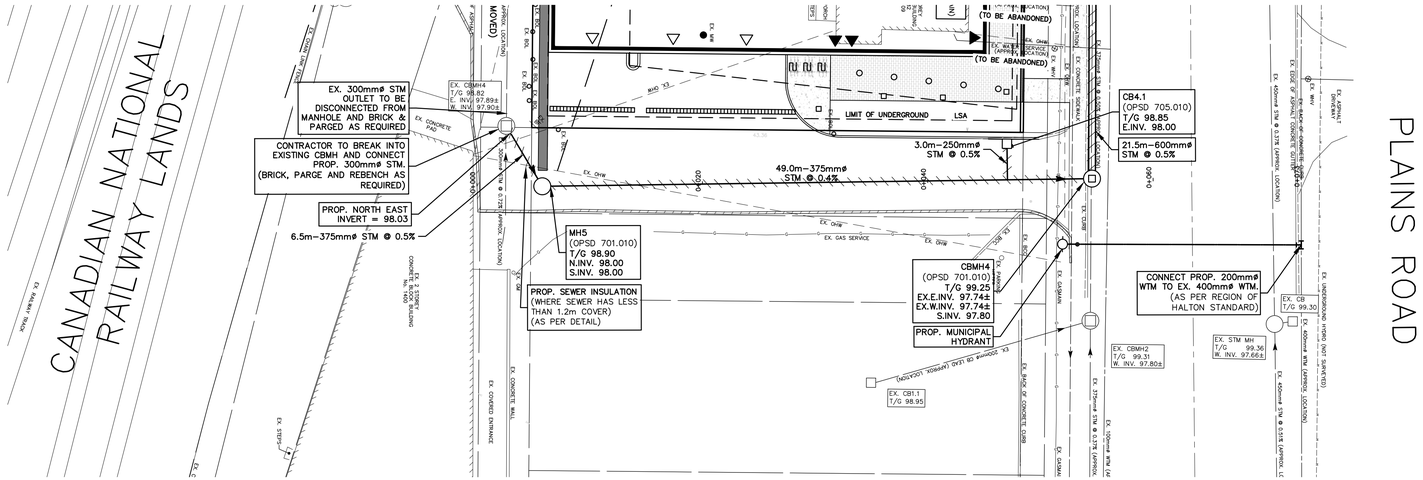
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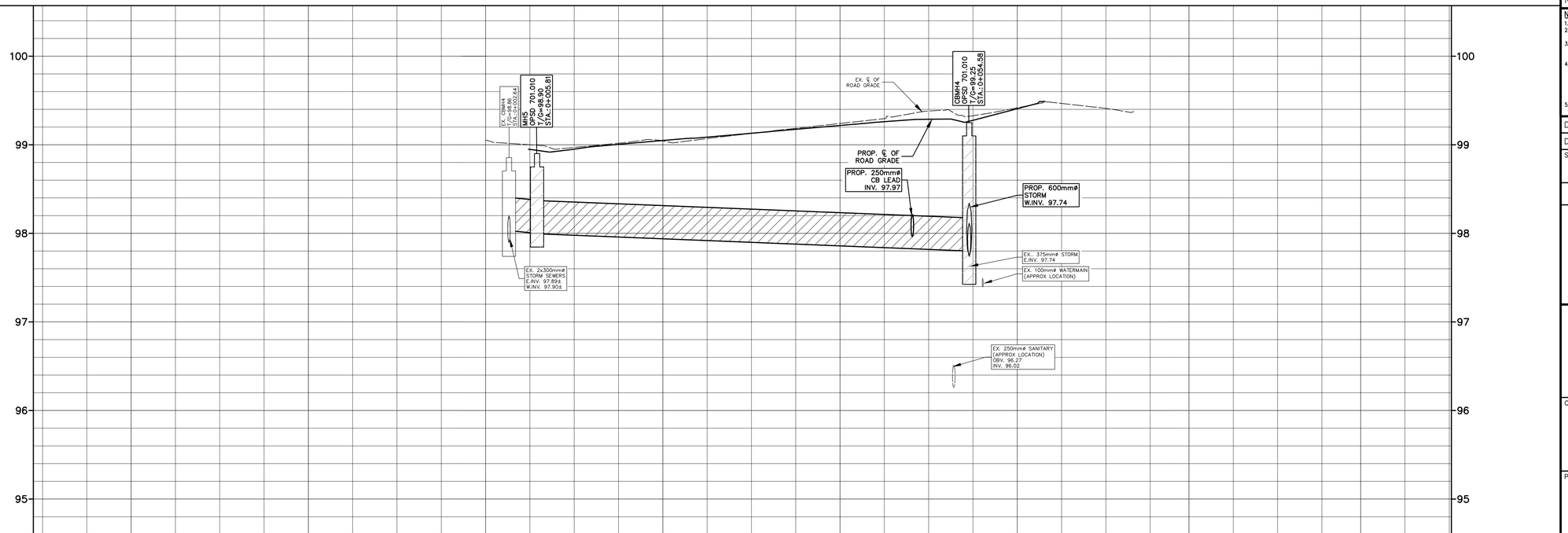
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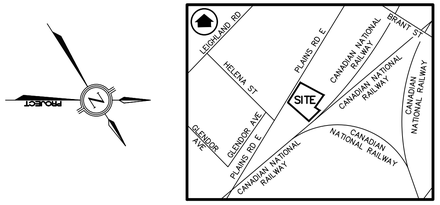
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KEY MAP
N.T.S.

LEGEND:

- EXISTING CATCHBASIN
- EXISTING STORM/SANITARY MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED STORM/SANITARY MANHOLE
- PROPOSED CURB STOP/GATE VALVE
- (M) PROPOSED WATER METER
- (BP) PROPOSED BACKFLOW PREVENTOR
- SEWER CROSSING
- PROPOSED SEWER INSULATION

BENCH MARK NOTE:
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DESIGN	LF	CHK'D	SF	DATE
DRAWN	LF	CHK'D	SF	Jan. 8, 2026

SCALE
HORIZ. 1:250 (0, 2.5, 5, 12.5)
VERT. 1:50 (0, 0.5, 1, 2.5)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER — S.V. FRANKOVICH — 2/17/2026 — PROVINCE OF ONTARIO

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1376 PLAINS RD E, BURLINGTON, ONTARIO

PROJECT NAME
1376 & 1382 PLAINS ROAD EAST
BURLINGTON, ONTARIO

TITLE
LANEWAY #1
PLAN AND PROFILE

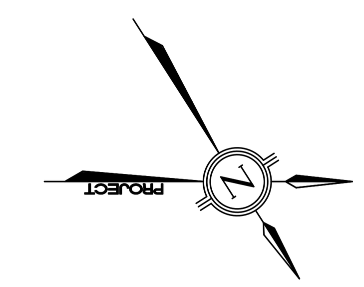
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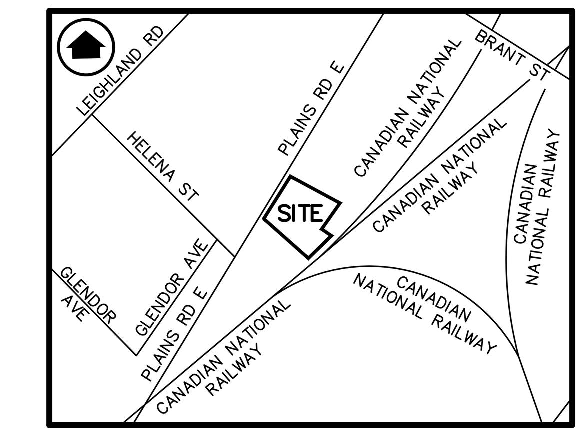
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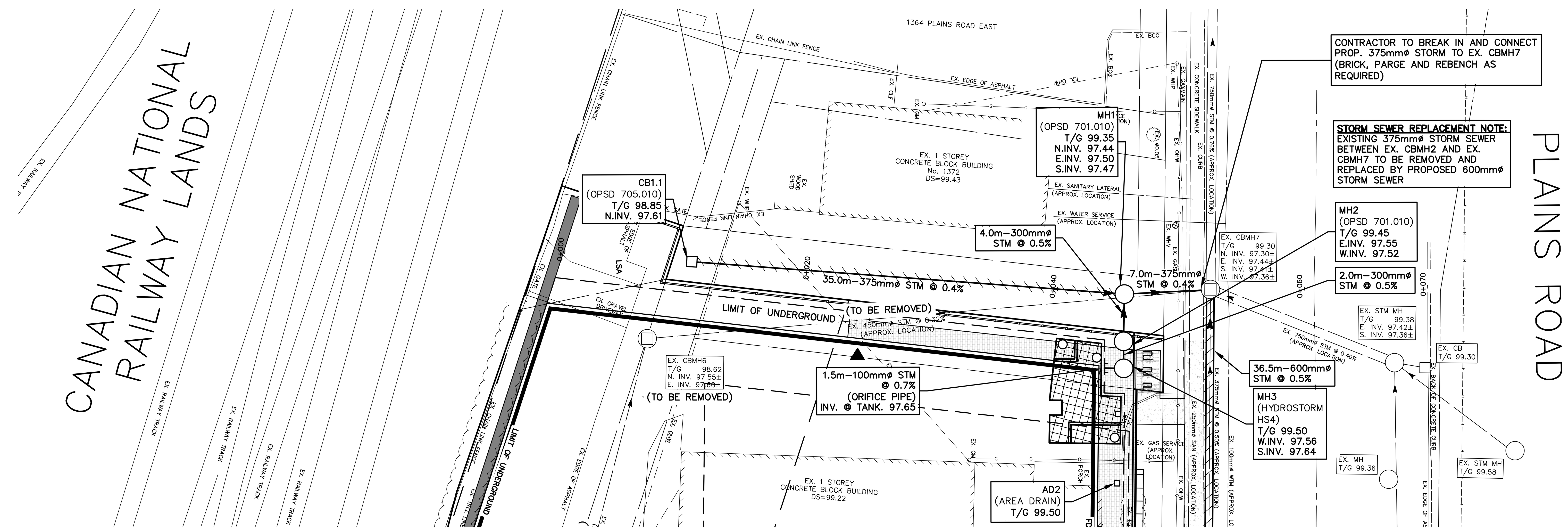




KEY MAP
N.T.S.

LEGEND:

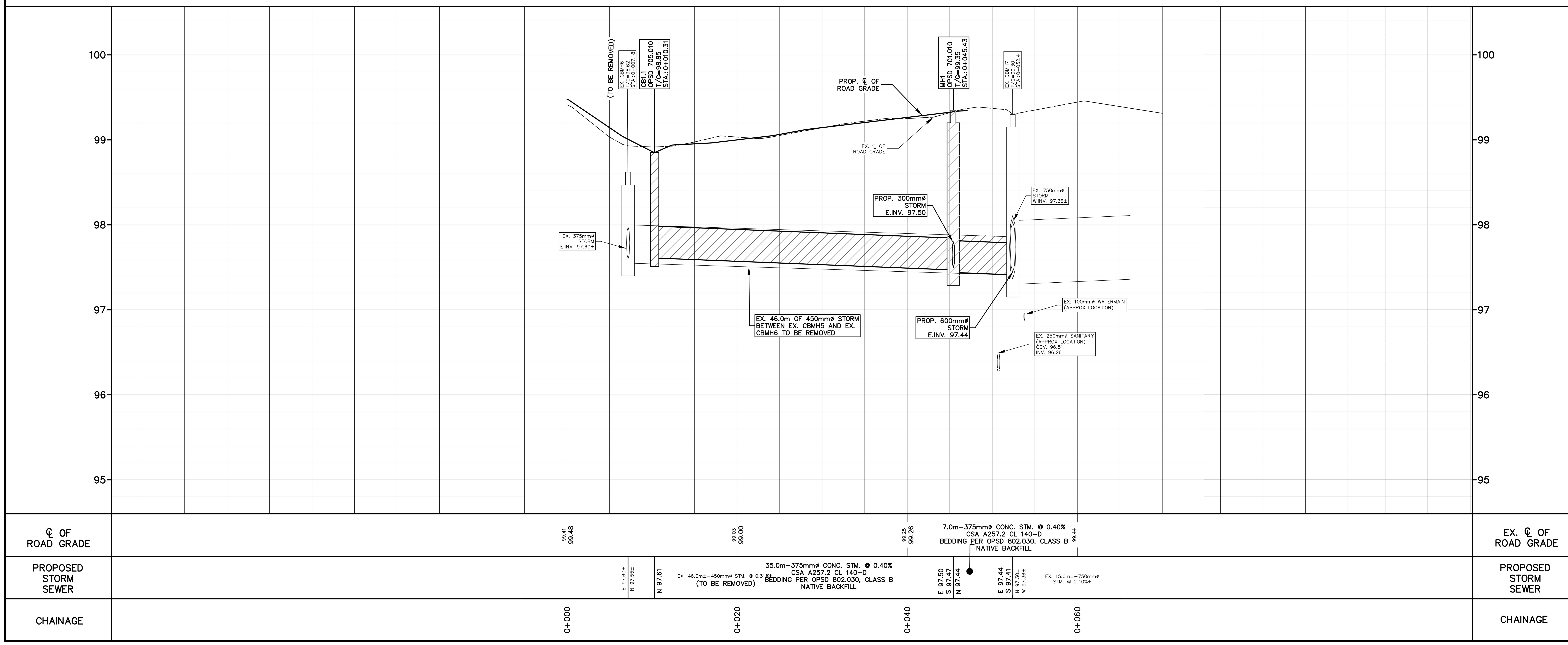
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- PROPOSED CURB STOP/GATE VALVE
- PROPOSED WATER METER
- PROPOSED BACKFLOW PREVENTOR
- SEWER CROSSING
- PROPOSED SEWER INSULATION



BENCH MARK NOTE:
CITY OF BURLINGTON BENCHMARK No. 446
ELEVATION = 100.192 METRES (CGVD28:78 ADJUSTMENT)
BRASS PLAQUE SET ON EAST FACE OF CONCRETE BOX CULVERY ON PLAINS ROAD APPROXIMATELY 150 METRES EAST OF BRANT STREET AND 0.20 METRES BELOW TOP OF WALL WEST OF THE COURT HOUSE

NO.	DATE	BY	REVISIONS
.	.	.	.

NOTES TO CONTRACTOR:
1. CONTRACTORS AND SUBCONTRACTORS SHALL NOT SCALE FROM THIS DRAWING.
2. ANY INCONSISTENCIES AND OMISSIONS FOUND ON THE DRAWINGS MUST BE REPORTED TO THE ENGINEER FOR CLARIFICATION BEFORE COMMENCING THE WORK.
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4. THE POSITIONS OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVER–GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS. WHERE SHOWN ON THE DRAWING, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM THEMSELVES OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
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DESIGN	LF	CHK'D	SF	DATE
DRAWN	LF	CHK'D	SF	Jan. 8, 2026

SCALE: HORIZ. 1:250 (0, 2.5, 5, 12.5); VERT. 1:50 (0, 0.5, 1, 2.5)

APPROVALS

NOT FOR CONSTRUCTION

STAMP: LICENSED PROFESSIONAL ENGINEER — S.V. FRANKOVICH — 2/17/2026 — PROVINCE OF ONTARIO

S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS
Tel. (905) 631–6978
Website: www.sla.on.ca
email: info@sla.on.ca
3228 South Service Road, Suite #105 East Wing, Burlington, Ont., L7N 3H8

CLIENT
2731119 ONTARIO INC.
1376 PLAINS RD E, BURLINGTON, ONTARIO

PROJECT NAME
1376 & 1382 PLAINS ROAD EAST
BURLINGTON, ONTARIO

TITLE
LANEWAY #2
PLAN AND PROFILE

PROJECT No. 25090
DRAWING No. C105

S:\25090\Working\Current\25090 – Grading & Servicing Plan.dwg
Plotted: February 17, 2026 8:42:31 PM By: Steven DeGrow

DWG No.: C106

SITE SERVICING PLAN

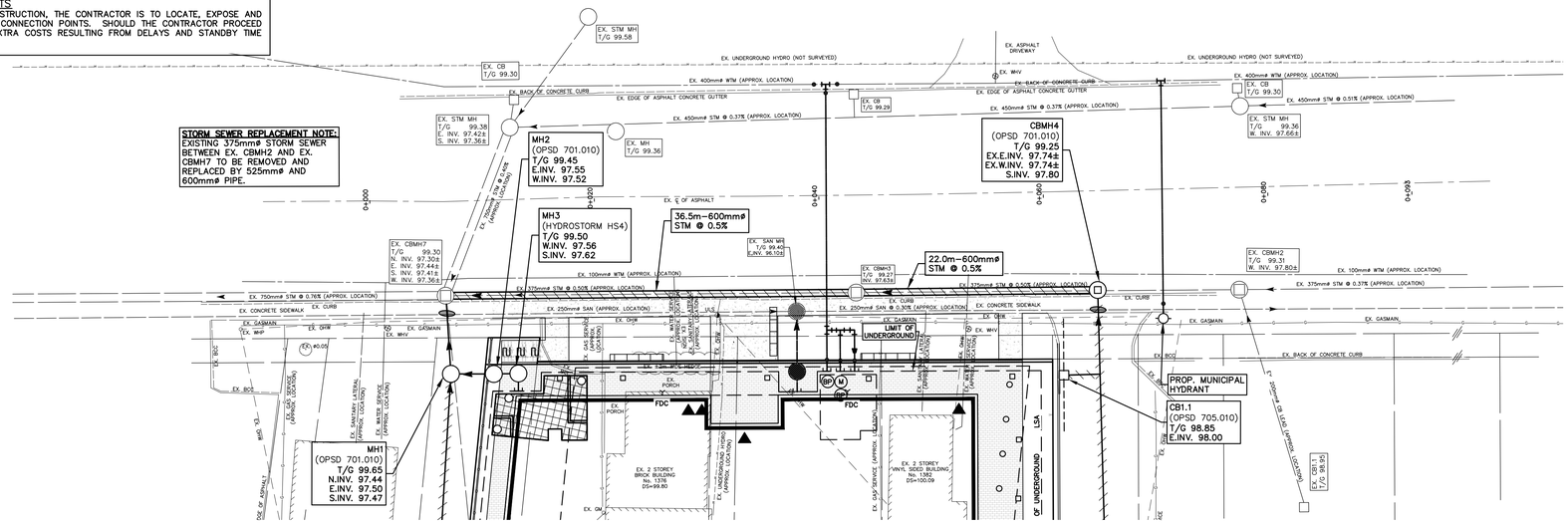
S:\25090\Working\Current\25090 - Grading & Servicing Plan.dwg

NOTES TO CONTRACTOR:

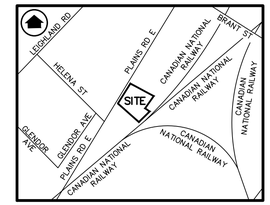
1. INSPECTION
CONTRACTOR IS RESPONSIBLE FOR CONTACTING ENGINEER 48 HRS PRIOR TO COMMENCING WORK TO ARRANGE FOR INSPECTION. ENGINEER TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION AS MANDATED BY ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2, GENERAL REVIEW. FAILURE TO NOTIFY ENGINEER WILL RESULT IN EXTENSIVE POST CONSTRUCTION INSPECTION AT CONTRACTORS EXPENSE.

2. CONFIRMATION OF EXISTING INVERTS
72 HOURS PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS TO LOCATE, EXPOSE AND VERIFY INVERTS OF EXISTING SEWERS AT CONNECTION POINTS. SHOULD THE CONTRACTOR PROCEED WITHOUT COMPLETING THESE LOCATES, EXTRA COSTS RESULTING FROM DELAYS AND STANDBY TIME WILL NOT BE CONSIDERED.

PLAINS ROAD



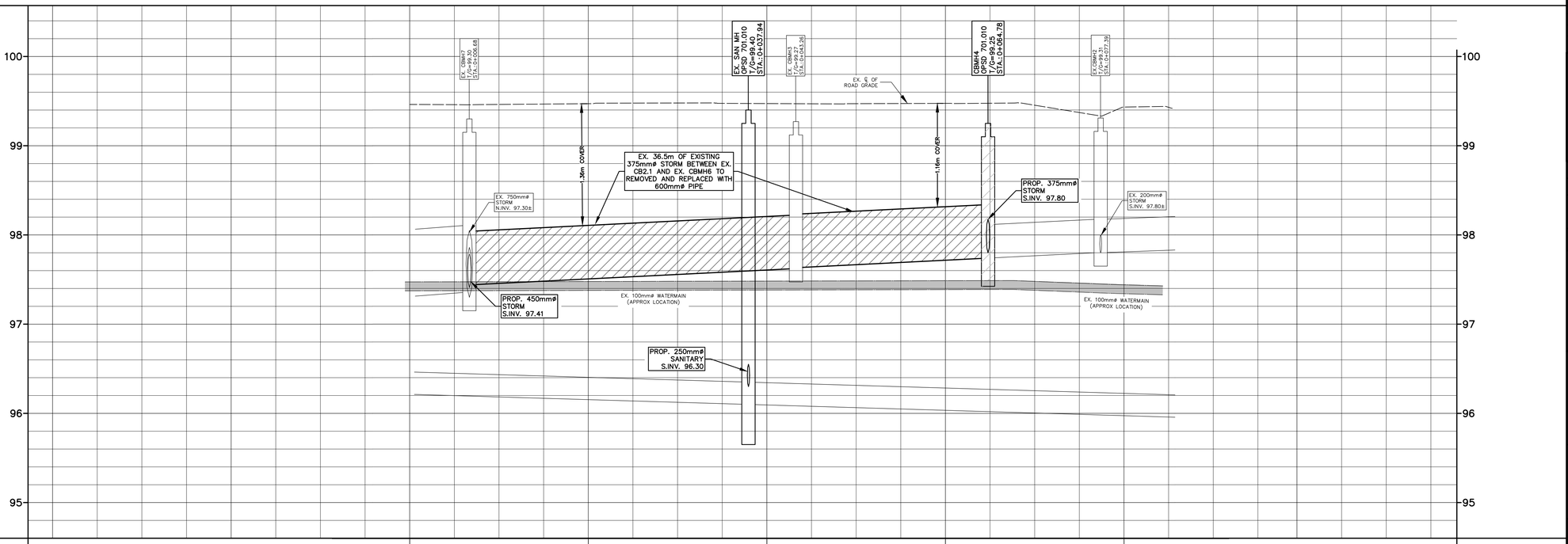




KEY MAP
N.T.S.

LEGEND:

- EXISTING CATCHBASIN
- EXISTING STORM/SANITARY MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED STORM/SANITARY MANHOLE
- PROPOSED CURB STOP/GATE VALVE
- PROPOSED WATER METER
- PROPOSED BACKFLOW PREVENTOR
- SEWER CROSSING
- PROPOSED SEWER INSULATION



℄ OF ROAD GRADE		99.46	99.47	99.47	99.47	99.43	EX. ℄ OF ROAD GRADE
PROPOSED STORM SEWER	EX. 6.0m±–750mmø STM. @ 0.76%±	W 97.36± E 97.44± S 97.41	36.5m–600mmø CONC. STM. @ 0.50% CSA A257.2 CL 140–D BEDDING PER OPSD 802.030, CLASS B NATIVE BACKFILL	W 97.63± E 97.63±	21.5m–600mmø CONC. STM. @ 0.50% CSA A257.2 CL 140–D BEDDING PER OPSD 802.030, CLASS B NATIVE BACKFILL	W 97.74 E 97.74 S 97.80	W 97.80± E 97.80±	EX. 55.5m±–375mmø STM. @ 0.37%±	PROPOSED STORM SEWER
EXISTING SANITARY SEWER	EX. 37.5m±–250mmø SAN. @ 0.30%±		S 96.30 W 96.10 E 96.10		EX. 91.5m±–250mmø SAN. @ 0.30%±				EXISTING SANITARY SEWER
CHAINAGE	0+000	0+020	0+040	0+060	0+080				CHAINAGE

BENCH MARK NOTE:
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SCALE
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VERT. 1:50 (0, 0.5, 1, 2.5)

APPROVALS

NOT FOR CONSTRUCTION

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BURLINGTON, ONTARIO

TITLE
PLAINS ROAD
PLAN AND PROFILE

PROJECT No. 25090
DRAWING No. C106

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Plotted: February 17, 2026 8:43:02 PM By: Steven DeGrow