



BROCKVILLE CORRECTIONAL COMPLEX

STORMWATER MANAGEMENT REPORT

MARCH 16, 2026

SITE PLAN CONTROL & ZONING BYLAW AMENDMENT SUBMISSION





BROCKVILLE CORRECTIONAL COMPLEX

STORMWATER MANAGEMENT REPORT

INFRASTRUCTURE ONTARIO AND
ONTARIO MINISTRY OF THE SOLICITOR
GENERAL

STORMWATER MANAGEMENT REPORT (SITE PLAN CONTROL &
ZONING BYLAW AMENDMENT)
1ST SUBMISSION

WSP PROJECT NO.: CA0044807.7361
CONTRACT NO.: 2502
DATE: MARCH 16, 2026

WSP
201-1224 GARDINERS ROAD
KINGSTON, ON
CANADA K7P 0G2

T: +1 613 634-7373
F: +1 613 634-3523
WSP.COM

SIGNATURES

PREPARED BY

APPROVED BY

Jared Delpellaro

Jared Delpellaro, E.I.T.
Designer, Kingston



Douglas Kerr, P.Eng.
Principal Engineer – Team Lead,
Kingston Ontario

WSP Canada Inc. (“WSP”) prepared this report solely for the use of the intended recipient, Infrastructure Ontario (“Client”), in accordance with the professional services agreement between the parties. In the event a contract has not been executed, the parties agree that the WSP General Terms for Consultant shall govern their business relationship which was provided to you prior to the preparation of this report.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

WSP disclaims any obligation to update this report if, after the date of this report, any conditions appear to differ significantly from those presented in this report; however, WSP reserves the right to amend or supplement this report based on additional information, documentation or evidence.

WSP makes no other representations whatsoever concerning the legal significance of its findings.

The intended recipient is solely responsible for the disclosure of any information contained in this report. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report.

WSP has provided services to the intended recipient in accordance with the professional services agreement between the parties and in a manner consistent with that degree of care, skill and diligence normally provided by members of the same profession performing the same or comparable services in respect of projects of a similar nature in similar circumstances. It is understood and agreed by WSP and the recipient of this report that WSP provides no warranty, express or implied, of any kind. Without limiting the generality of the foregoing, it is agreed and understood by WSP and the recipient of this report that WSP makes no representation or warranty whatsoever as to the sufficiency of its scope of work for the purpose sought by the recipient of this report.

In preparing this report, WSP has relied in good faith on information provided by others, as noted in the report. WSP has reasonably assumed that the information provided is correct and WSP is not responsible for the accuracy or completeness of such information.

Benchmark and elevations used in this report are primarily to establish relative elevation differences between the specific testing and/or sampling locations and should not be used for other purposes, such as grading, excavating, construction, planning, development, etc.

Design recommendations given in this report are applicable only to the project and areas as described in the text and then only if constructed in accordance with the details stated in this report. The comments made in this report on potential construction issues and possible methods are intended only for the guidance of the designer. The number of testing and/or sampling locations may not be sufficient to determine all the factors that may affect construction methods and costs. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

This limitations statement is considered an integral part of this report.

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	SCOPE	1
1.2	SITE LOCATION	1
1.3	OBJECTIVES	2
1.4	DESIGN CRITERIA	2
1.5	RAINFALL INFORMATION	2
1.6	STORMWATER DESIGN AND MODELLING APPROACH	3
2	PRE-DEVELOPMENT CONDITIONS	4
2.1	EXISTING LAND-USE AND DRAINAGE PATTERNS ..	4
2.2	APPROVED OUTLET & ALLOWABLE DISCHARGE RATES	4
2.3	FLOODPLAIN CONSIDERATIONS	6
3	POST-DEVELOPMENT CONDITIONS	7
3.1	PROPOSED MINOR STORM SYSTEM	7
3.2	GEOTECHNICAL CONSIDERATIONS	7
3.3	QUANTITY CONTROL & ATTENUATION	9
3.3.1	Outlet A	9
3.3.2	Outlet B	13
3.4	PEAK ELEVATION REVIEW AND OVERLAND FLOW ROUTING	14
3.5	FOUNDATION DRAINAGE	14
3.6	QUALITY CONTROL	14
4	SEDIMENT AND EROSION CONTROL	16
4.1	GENERAL	16

5	CONCLUSIONS	17
---	-------------------	----

APPENDICES

- A. CATCHMENT MAPS
- B. MINOR SYSTEM SIZING CALCULATIONS
- C. VISUAL OTTHYMO MODEL MAPS AND OUTPUTS
- D. OIL AND GRIT SEPARATOR
- E. CIVIL DESIGN DRAWINGS

1 INTRODUCTION

1.1 SCOPE

WSP Canada Inc. (WSP) was retained by Infrastructure Ontario (IO) on behalf of the Ministry of the Solicitor General (SolGen) to provide civil engineering consulting services to support the development of a new correctional complex located on the psychiatric hospital campus east of Oxford Avenue and north of County 2 Road in Brockville, Ontario. The stormwater management (SWM) report examines the potential water quality and quantity impacts of the proposed development and details SWM measures to be provided to address the impacts in accordance with applicable standards.

1.2 SITE LOCATION

The site of the proposed development is outlined below in Figure 1, which is located within the wider psychiatric hospital campus in Brockville, Ontario. The campus site is approximately 53.71 ha (developed area approximately 8.51 ha) and is bound by Oxford Crescent to the west, County 2 Road to the south, Eligh Road to the east, and a Canadian National Railway corridor to the north.

The site is located within Township of Elizabethtown-Kitley, but the site is currently serviced by infrastructure connected to systems owned and operated by the City of Brockville.



Figure 1: Site Location (Source: Google Earth)

1.3 OBJECTIVES

The objectives of this SWM plan are noted below:

- Determine the site-specific stormwater management requirements for the proposed development, as indicated by associated Provincial, Municipal, and IO / SolGen regulations and guidelines.
- In collaboration with the design team and IO, develop a strategy to address the SWM criteria on-site. Complete calculations and analyses necessary to determine the required size of the SWM features and demonstrate compliance with the design criteria.
- Prepare a SWM report documenting the above tasks in a manner suitable for the development review department of the Township and City.
- Address review comments to refine and finalize the SWM report.

1.4 DESIGN CRITERIA

The SWM design criteria for the development are summarized as follows:

- The post-development stormwater management peak flows are to be controlled to pre-development conditions for the 5-Year, 50-Year, and 100-Year storm events (MECP, 2003). For pre-development, the MTO 2026 rainfall events were utilized. For post-development, the MTO 2026 rainfall events were used, as were 2090 rainfall events along with the 50-year storm event included in the Brockville Correctional (BCC) and St. Lawrence Correctional and Treatment Centre (SLVTC) Project – Climate Adjusted Design Criteria by Stantec Consulting Ltd. (September 19, 2025).
- Stormwater quality is to be controlled to a minimum of 80% Total Suspended Solids (TSS) removal (MECP, 2003 and Cataraqui Region Conservation Authority).
- Capture and slow the flow of stormwater by redirecting to designed areas for more gradual dispersion
- Store and convey stormwater to minimize peak flows and flooding through planned detention and distribution of water volumes.

In lieu of available Stormwater Management design criteria for the City of Brockville, the design will be based on Ministry of the Environment, Conservation, and Parks (MECP) guidelines and guidelines from adjacent municipalities (i.e. City of Ottawa).

1.5 RAINFALL INFORMATION

Design storms were gathered from the Ministry of Transportation Ontario (MTO) IDF Curve Data for Brockville, Ontario and the Brockville Correctional (BCC) and St. Lawrence Correctional and Treatment Centre (SLVTC) Project – Climate Adjusted Design Criteria by Stantec Consulting Ltd. (September 19, 2025). The 5-, 50-, and 100-year storm events were utilized in the stormwater management calculations and Visual Otthymo model, which can be found in **Appendix C**.

Table 1: MTO 2026 Rainfall Intensity (mm/hr)

DURATION	5-MIN	10-MIN	15-MIN	30-MIN	1-HR	2-HR	6-HR	12-HR	24-HR
5-year	155.4	95.9	72.3	44.6	27.5	17.0	7.9	4.9	3.0

50-year	235.5	145.2	109.5	67.5	41.6	25.7	12.0	7.4	4.6
100-year	258.8	159.6	120.3	74.2	45.7	28.2	13.1	8.1	5.0

Table 2: MTO 2090 Rainfall Intensity (mm/hr)

DURATION	5-MIN	10-MIN	15-MIN	30-MIN	1-HR	2-HR	6-HR	12-HR	24-HR
5-year	161.5	100.2	75.8	47.1	29.3	18.3	8.7	5.4	3.4
100-year	264.9	163.9	123.8	76.7	47.5	29.5	13.9	8.6	5.4

Table 3: Stantec 2090 Climate Adjusted Design Criteria Rainfall Intensity (mm/hr)

DURATION	5-MIN	10-MIN	15-MIN	30-MIN	1-HR	2-HR	6-HR	12-HR	24-HR
50-year	278.2	172.3	130.3	80.8	50.2	31.2	14.8	9.2	5.8

1.6 STORMWATER DESIGN AND MODELLING APPROACH

The proposed storm sewers were sized for the 5-year storm using the Rational Method. **Appendix A** delineates the receiving areas for all storm sewers. Detailed calculations can be found in **Appendix B**.

The proposed pond and outlet control structure were designed using Visual OTTHYMO, using the MTO rainfall data for Brockville and Climate Adjusted Design Criteria. The 5-year, 50-year, and 100-years return periods were assessed. Soil group for the subject set was assumed to be SCS Hydrological Soils Group (HSG) "BC" and "CD" as per the Ontario Soil Survey Complex GeoHub.

2 PRE-DEVELOPMENT CONDITIONS

2.1 EXISTING LAND-USE AND DRAINAGE PATTERNS

The subject site for the correctional complex is approximately 8.51 ha, with the entire campus having an approximate size of 53.71 ha, located along the west side of Oxford Avenue. The current use is developed space, which includes numerous existing buildings (including the Secure Treatment Unit (STU) of the St. Lawrence Valley Correctional and Treatment Centre (SLVCT)), asphalt parking, asphalt driving lanes, concrete sidewalks, and municipal infrastructure throughout the campus. In the current condition, runoff from the site sheds towards four (4) outlet locations; one (1) at the northwest corner of the campus (Outlet A), one (1) at the northeast corner of the campus (Outlet B), one (1) on the south side of the campus (Outlet C), and one (1) on the east side of the campus (Outlet D). The outlet at the northwest side of the campus (Outlet A) drains into an existing 400 mm diameter municipal culvert, crossing Oxford Avenue and then discharges into a ditch and ditch inlet catchbasin, west of Oxford Avenue, and into the existing storm sewer within Oxford Avenue. The outlet that drains to the northeast corner of the campus (Outlet B) outlets into a stormwater management pond, which then discharges into a low-lying area and watercourse that travels across the railway corridor. The outlet that drains to the south side of the campus (Outlet C) drains onto County 2 Road. The outlet that drains to the east side of the campus (Outlet D) drains east into low-lying areas and a wetland.

2.2 APPROVED OUTLET & ALLOWABLE DISCHARGE RATES

There are four (4) discharge locations for the site; one (1) at the northwest corner of the campus (Outlet A), one (1) at the northeast corner of the campus (Outlet B), one (1) on the south side of the campus (Outlet C), and one (1) on the east side of the campus (Outlet D). Refer to Figure 2 for the project site outlet locations. The discharge location at the northwest corner of the site (Outlet A) discharges flows from catchments A1.1, A1.2, and A1.3. The discharge location on the northeast corner of the campus discharges flows from B1.1, B1.2, and B1.3. The discharge location on the south and east sides of the site discharges flows from catchment C1.1. A pre-development Visual Otthymo model was created to define the existing peak flow rates from the site. The 5-, 50-, and 100-year MTO 2026 design storms were used to quantify the peak flow rates. The following parameters in Table 4 were used to define the Visual Otthymo model. Where the estimated time of concentration was less than 10 minutes, a minimum of 10 minutes has been used based on the City of Ottawa design standards.

Catchment C1.1 under existing conditions conveys flows to two (2) outlet locations noted as Outlet C & D. The proposed development will not impact this catchment or the discharge rates to Outlet C and D, and therefore was not considered in the stormwater analysis.

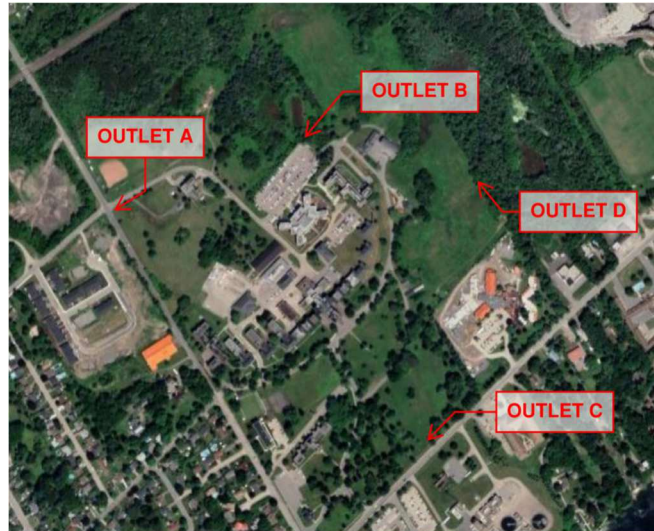


Figure 2: Project Site Outlets

Table 4: Model Parameters - Existing Conditions

CATCHMENT AREA	TYPE	SCS CURVE NUMBER	TIME TO PEAK (HOURS)	INITIAL ABSTRACTION (MM)	OUTLET LOCATION
A1.1 (2.64 ha)	Nash	82	0.09	5.3	Outlet A
A1.2 (1.04 ha)	Nash	82	0.04	5.0	Outlet A
A1.3 (1.71 ha)	Standard	95	N/A	5.0	Outlet A
A1.4 (1.16)	Standard	85	N/A	5.0	Outlet A
B1.1 (20.78 ha)	Nash	75	0.12	8.5	Outlet B
B1.2 (5.27 ha)	Standard	88	N/A	5.0	Outlet B
B1.3 (1.80 ha)	Standard	90	N/A	5.0	Outlet B
C1.1 (19.15 ha)	N/A	N/A	N/A	N/A	Outlet C & D

The modelled allowable discharge rates are shown in Table 5 below and are included in the Visual Otthymo model results in **Appendix C**.

Table 5: Allowable Discharge Rates

RETURN PERIOD	PEAK FLOW (L/S)
Outlet A - 5-year	661.8
Outlet A - 50-year	1,207.5

Outlet A - 100-year	1,379.6
Catchment B1.3 - 5-year	315.7
Catchment B1.3 - 50-year	545.1
Catchment B1.3 - 100-year	613.0
Outlet B - 5-year	1,312.2
Outlet B - 50-year	2,938.9
Outlet B - 100-year	3,479.1

2.3 FLOODPLAIN CONSIDERATIONS

The nearest waterbodies to the subject site are the St. Lawrence River, located approximately 0.6 km to the south, and an existing wetland, located approximately 0.3 km to the east. Given the separation distance and the notable elevation drop between the site and these waterbodies, they are not anticipated to influence site conditions. Accordingly, all outlet structures have been modeled under free-flow conditions.

3 POST-DEVELOPMENT CONDITIONS

The proposed development will consist of a new correctional complex, located along the east side of Oxford Avenue on the psychiatric hospital campus, in Brockville Ontario. At-grade features will include connection to the existing access laneways off of Oxford Avenue, vehicle parking (asphalt), concrete sidewalks, concrete curb, and perimeter landscape. Vehicle access to the site will be via the two (2) existing entrances off of Oxford Avenue. All stormwater runoff from the development area will ultimately drain through two (2) outlets. The existing 400 mm culvert on the southeast side of the intersection of Oxford Avenue and Broadway Avenue, which is collected in an existing ditch inlet and conveyed into the Oxford Avenue storm sewer (Outlet A). And the existing storm sewer outlet on the northeast side of the site (Outlet B). From a quantity control perspective, on-site stormwater detention measures (i.e. storage) will be included in the proposed development in the form of a dry pond stormwater management pond to restrict flow to the 400 mm culvert (Outlet A).

A portion of the stormwater from the proposed development area will also be collected via proposed catchbasins and conveyed through proposed storm sewer to the existing storm sewer infrastructure that drains towards the northeast corner of the site (Outlet B). The proposed flow towards Outlet B from catchment area B2.3 will be minimized such that the post-development peak flow is less than the pre-development peak flow that is currently conveyed to Outlet B via catchment area B1.3 during the 5- and 100-year storm events.

Catchment C1.1 under existing conditions conveys flows to two (2) outlet locations noted as Outlet C & D. The proposed development will not impact this catchment or the discharge rates to Outlet C and D, and therefore was not considered in the stormwater analysis.

3.1 PROPOSED MINOR STORM SYSTEM

The proposed minor system constitutes a gravity system comprised of swales, storm sewers, maintenance holes, and catch basins. Stormwater that falls on the sites will sheet flow from parking lots, laneways, and the roadway, where it is directed to catch basins. Catch basin leads located within the site areas will direct the flow to the gravity storm sewer system, which will route flow to the proposed dry pond, north of the proposed Brockville Correctional Complex, prior to discharging at a controlled rate to the site outlets.

The storm sewers (i.e. minor system) were sized using the Rational Method (to establish design flows) and the Mannings's equation (for hydraulics), based on the following criteria:

- Design Storm 1:5 years Return Period
- Initial Inlet Time of Concentration = 10 mins (City of Ottawa Design Standards)
- Pipe Velocities = 1.00 m/s to 6.0 m/s (full flow velocity)(per MOE Stormwater Guidelines)
- Minimum Pipe Size (Diameter) = 250 mm (Sewers), 200 mm (CB Leads), & 250 mm (Double CB Leads)

Refer to **Appendix A** for pre- and post-development catchment maps and **Appendix B** storm sewer sizing calculation sheet.

3.2 GEOTECHNICAL CONSIDERATIONS

A geotechnical investigation report has been prepared by GHD (November 1, 2024), with key findings pertaining to the civil engineering design are summarised as follows:

- Borehole Program
 - A total of 84 geotechnical boreholes were advanced across the site, with depths generally ranging from 0.3 m to over 10 m below ground surface (mbgs).

- Monitoring wells were installed in 23 locations to assess groundwater conditions.
- Subsurface Conditions
 - The site stratigraphy is generally consistent: topsoil/asphalt/concrete/gravel overlying earth fill, then native silty to gravelly sand extending to bedrock.
 - Fill thickness varies, up to 5 m in some areas, especially on the north side.
 - Native soils are typically compact to very dense silty to gravelly sand, with some clayey silt layers.
- Groundwater
 - Measured groundwater levels (Oct 2024) ranged from 0.49 to 7.59 m below ground surface.
 - Seasonal fluctuations are expected; groundwater can be shallow in some areas.
 - Significant groundwater inflow is anticipated for excavations below the water table; dewatering systems and permits may be required.
- Foundations
 - Conventional spread/strip footings or mat foundations are feasible, provided they are founded on competent native soils below frost depth.
 - Deep foundations (caissons) may be considered in areas with thick fill, especially on the north side.
 - Minimum frost protection: 1.4 m soil cover or equivalent insulation (per OPSD 3090.101).
- Slab-on-Grade and Drainage
 - Slab-on-grade construction is suitable where the finished floor is above exterior grade.
 - Subfloor drainage is required only if the slab is below exterior grade.
 - Perimeter foundation drainage is recommended for basement areas; not required for slab-on-grade if above grade.
- Pavement and Subdrains
 - Subdrains are recommended in pavement design, along with crowning of the subgrade to prevent water accumulation.
 - Flexible and rigid pavement structures are specified, with subgrade preparation and compaction requirements.
- Excavation and Backfill
 - Excavation below groundwater may be challenging due to inflow and soil instability.
 - Native inorganic overburden soils (free of organics) may be reused as trench backfill if within optimum moisture content.
 - Topsoil and organic-rich soils should not be used as backfill under structures.
- Frost Protection
 - Soil cover or insulation to at least 1.4 m is required for frost protection of foundations and utilities.
- Seismic Site Classification
 - The site is classified as Seismic Site Class ‘C’ (Very Dense Soil and Soft Rock) per the Ontario Building Code.
- Soil Corrosivity and Sulphate Content
 - Low sulphate levels: negligible risk of sulphate attack on concrete.

- Generally low corrosivity to ductile iron pipes, except at one location (BH23-20) where additional protection is recommended.
- Organic Content
 - Organic content in near-surface soils ranges from 0.6% to 8.4%; organic-rich soils should not be used beneath settlement-sensitive structures.
- Construction Monitoring
 - Full-time geotechnical inspection is recommended during subgrade preparation, foundation construction, and backfilling to ensure compliance with report recommendations.

3.3 QUANTITY CONTROL & ATTENUATION

To determine quantity control and attenuation for the site Visual Otthymo software was utilized to determine peak flows. Excel calculations were completed to determine pond outlet flow rates, and AutoCAD Civil 3D was used to determine pond stage storage, which were utilized in the Visual Otthymo model. Refer to **Appendix C** for Excel calculations and pond stage storage volumes.

3.3.1 OUTLET A

The site includes four (4) sub-catchment areas in the post-development conditions that will drain to the stormwater management pond and at a controlled rate to Outlet A. Catchment A2.5 includes the area around the exiting Powerhouse facility, which will continue to drain to Outlet A uncontrolled. Table 6 shows the area breakdown for the post-development conditions of Outlet A. Refer to **Appendix A** for the proposed post-development catchment map and drainage conditions.

Table 6: Outlet A - Area Breakdown and Parameters

CATCHMENT AREA	TYPE	SCS CURVE NUMBER	TIME TO PEAK (HOURS)	INITIAL ABSTRACTION (MM)
A2.1 (2.43 ha)	Nash	82	0.07	4.9
A2.2 (0.81 ha)	Standard	98	N/A	5.0
A2.3 (1.26 ha)	Standard	98	N/A	5.0
A2.4 (1.76 ha)	Standard	98	N/A	5.0
A2.5 (1.16 ha)	Standard	85	N/A	5.0

For Outlet A, three (3) scenarios were analyzed in Visual Otthymo to meet municipal and Solgen/IO requirements.

- Scenario #1: Post-development peak flows based on the MTO 2026 storm event are less than or equal to the pre-development peak flows based on the MTO 2026 storm event (5-year and 100-year storm events).
- Scenario #2: Post-development peak flows based on the MTO 2090 storm event are less than or equal to the pre-development peak flows based on the MTO 2026 storm event (5-year and 100-year storm events).

- Scenario #3: Post-development peak flows based on the Climate Adjusted Design Criteria 2090 storm event are less than or equal to the pre-development peak flows based on the MTO 2026 storm event (50-year storm events).

To achieve each target based on the scenarios noted above, a dry stormwater management pond will be implemented.

Visual Otthymo software was used to model the behaviour of the proposed SWM system. A schematic of the Visual Otthymo model is included in **Appendix C**.

The stormwater management pond size and overall release were determined through Visual Otthymo modeling using the SCS Type (II) method based on the hydrograph for the Brockville area and the time to peak. Refer to **Appendix C** for storage sizing information provided in the form of a model output.

To restrict the flow from the storage pond so the overall peak flow leaving Outlet A is less than pre-development peak flows for each scenario, the dry stormwater management pond will include an orifice structure with a 375 mm orifice tube.

3.3.1.1 SCENARIO #1

The peak flows leaving catchments A2.1, A2.2, A2.3, A2.4, and A2.5 were analyzed at Outlet A for Scenario #1. This scenario includes the utilization of the MTO 2026 storm event for pre-development and post-development conditions to analyze the peak flows. The overall site critical peak flows for Scenario #1 are shown in Table 7.

Table 7: Scenario #1 Outlet A Post-Development Peak Flows (Outlet Critical Duration)

RETURN PERIOD	MAXIMUM ALLOWABLE RELEASE RATE (L/S)	POST-DEVELOPMENT CONTROLLED PEAK FLOW (L/S)
Catchment A2.5 – 5-year (Uncontrolled)	N/A	82.2
Catchment A2.5 – 100-year (Uncontrolled)	N/A	179.5
Pond Outlet – 5-year	N/A	334.3
Pond Outlet – 100-year	N/A	420.4
Outlet A - 5-year	661.8	392.2
Outlet A - 100-year	1,379.6	584.8

As shown above, there will be an overall decrease in stormwater flow rates conveyed off-site to Outlet A during the minor and major storm events for Scenario #1.

The dry stormwater pond peak flows for Scenario #1, as well as the corresponding storage volumes and maximum hydraulic grade line (HGL), are shown in Table 8.

Table 8: Scenario #1 Post Development Peak Flows and Storage Volumes for Dry Stormwater Management Pond

FLOW EVENT	TIME TO PEAK (HRS)	POST-DEV CONTROLLED PEAK RELEASE (L/S)	PEAK STORAGE VOLUME (M ³)	PEAK STORAGE HGL (ABOVE BOTTOM OF POND) (M)
1:5 year – Free Flowing	0.42	334.3	813	0.95
1:100 year – Free Flowing	0.42	420.4	1793	1.45

The proposed SWM dry pond has a depth of 1.85 m. Based on the peak storage HGL, the dry pond will have an available free board of 0.90 m and 0.40 m during the 5-year and 100-year storm event, respectively.

3.3.1.2 SCENARIO #2

The peak flows leaving catchments A2.1, A2.2, A2.3, A2.4, and A2.5 were analyzed at Outlet A for Scenario #2. This scenario includes the utilization of the MTO 2026 storm event for pre-development conditions and MTO 2090 storm event for post-development conditions to analyze the peak flows. The overall site critical peak flows for Scenario #2 are shown in Table 9.

Table 9: Scenario #2 Outlet A Post-Development Peak Flows (Outlet Critical Duration)

RETURN PERIOD	MAXIMUM ALLOWABLE RELEASE RATE (L/S)	POST-DEVELOPMENT CONTROLLED PEAK FLOW (L/S)
Catchment A2.5 – 5-year (Uncontrolled)	N/A	86.6
Catchment A2.5 – 100-year (Uncontrolled)	N/A	187.2
Pond Outlet – 5-year	N/A	341.6
Pond Outlet – 100-year	N/A	425.3
Outlet A - 5-year	661.8	403.0
Outlet A - 100-year	1,379.6	596.7

As shown above, there will be an overall decrease in stormwater flow rates conveyed off-site to Outlet A during the minor and major storm events for Scenario #2.

The dry stormwater pond peak flows for Scenario #2, as well as the corresponding storage volumes and maximum hydraulic grade line (HGL), are shown in Table 10.

Table 10: Scenario #2 Post Development Peak Flows and Storage Volumes for Dry Stormwater Management Pond

FLOW EVENT	TIME TO PEAK (HRS)	POST-DEV CONTROLLED PEAK RELEASE (L/S)	PEAK STORAGE VOLUME (M ³)	PEAK STORAGE HGL (ABOVE BOTTOM OF POND) (M)
1:5 year – Free Flowing	0.17	341.6	862	1.00
1:100 year – Free Flowing	0.17	425.3	1858	1.50

The proposed SWM dry pond has a depth of 1.85 m. Based on the peak storage HGL, the dry pond will have an available free board of 0.85 m and 0.35 m during the 5-year and 100-year storm event, respectively.

3.3.1.3 SCENARIO #3

The peak flows leaving catchments A2.1, A2.2, A2.3, A2.4, and A2.5 were analyzed at Outlet A for Scenario #3. This scenario includes the utilization of the MTO 2026 storm event for pre-development conditions and the Climate Adjusted Design Criteria 2090 storm event for post-development conditions to analyze the peak flows. The overall site critical peak flows for Scenario #3 are shown in Table 11.

Table 11: Scenario #3 Outlet A Post-Development Peak Flows (Outlet Critical Duration)

RETURN PERIOD	MAXIMUM ALLOWABLE RELEASE RATE (L/S)	POST-DEVELOPMENT CONTROLLED PEAK FLOW (L/S)
Catchment A2.5 – 50-year (Uncontrolled)	N/A	203.0
Pond Outlet – 50-year	N/A	434.5
Outlet A - 50-year	1,207.5	621.1

As shown above, there will be an overall decrease in stormwater flow rates conveyed off-site to Outlet A during the minor and major storm events for Scenario #3.

The dry stormwater pond peak flows for Scenario #3, as well as the corresponding storage volumes and maximum hydraulic grade line (HGL), are shown in Table 12.

Table 12: Scenario #3 Post Development Peak Flows and Storage Volumes for Dry Stormwater Management Pond

FLOW EVENT	TIME TO PEAK (HRS)	POST-DEV CONTROLLED PEAK RELEASE (L/S)	PEAK STORAGE VOLUME (M ³)	PEAK STORAGE HGL (ABOVE BOTTOM OF POND) (M)
1:50 year – Free Flowing	0.17	434.5	1988	1.55

The proposed SWM dry pond has a depth of 1.85 m. Based on the peak storage HGL, the dry pond will have an available free board of 0.30 m during the 50-year storm event.

3.3.2 OUTLET B

The site includes three (3) catchment areas in the post-development conditions that will drain to Outlet B. Outlet B includes the utilization of the MTO 2026 storm event for the pre-development and post-development conditions to analyze the peak flows.

Table 13 shows the area breakdown for the post-development conditions of Outlet B. Refer to **Appendix A** for the proposed post-development catchment map and drainage conditions.

Table 13: Outlet B - Area Breakdown

CATCHMENT AREA	TYPE	SCS CURVE NUMBER	TIME TO PEAK (HOURS)	INITIAL ABSTRACTION (MM)
B2.1 (20.78 ha)	Nash	75	0.12	8.5
B2.2 (2.74 ha)	Standard	88	N/A	5.0
B2.3 (1.11 ha)	Standard	94	N/A	5.0

In post-development conditions only catchment area B2.3 will change. Catchment area B2.1 and B2.1 will not be impacted by the proposed development and will remain unchanged in post-development conditions. As noted previously, it is required that the post-development peak flow is less than or equal to the pre-development peak flow. To achieve these targets, catchment area B2.3 will have a lower runoff than B1.3, therefore resulting in a lower peak flow to Outlet B. This is achieved by reducing some of the area of this catchment, to reduce flows in the existing site infrastructure and to the existing SWM pond.

The peak runoff from the sub-catchment areas were determined through Visual Otthymo modeling using the SCS Type (II) method based on the hydrograph for the Brockville area and the time to peak. Refer to **Appendix C** for model outputs.

The peak flows leaving catchments B2.1, B2.2, and B2.3 were analyzed at the Outlet B. The overall site critical peak flows are shown in Table 14.

Table 14: Outlet B Post-Development Peak Flows (Outlet Critical Duration)

RETURN PERIOD	MAXIMUM ALLOWABLE RELEASE RATE (L/S)	POST-DEVELOPMENT PEAK FLOW (L/S)
Catchment B2.3 - 5-year	315.7	274.3
Catchment B2.3 - 100-year	613.0	527.6
Outlet B2 - 5-year	1,312.2	1,263.8
Outlet B2 - 100-year	3,479.1	3,364.9

As shown above, there will be an overall decrease in stormwater flow rates conveyed off-site from Catchment B2.3 and to Outlet B during the minor and major storm events.

3.4 PEAK ELEVATION REVIEW AND OVERLAND FLOW ROUTING

The peak elevation in the pond was reviewed in conjunction with the grading plan to check if any flooding will occur during the 100-year storm event. Based on the review the stormwater management pond will have a minimum 0.3 m freeboard during the 100-year storm event.

The site was graded such that during major storm events greater than the 100-year storm event there is adequate overland flow routing for stormwater. The parking lot was graded such that if flooding were to occur a maximum of 0.3 m of ponding will occur prior to the runoff being directed down Broadway Avenue. Broadway Avenue was designed with new curb and gutter, a new spillway, a new double catchbasin, and swale to direct the overland flow into the stormwater management pond.

3.5 FOUNDATION DRAINAGE

Based on the Geotechnical investigation by GHD (November 1st, 2024), foundation drainage will be required for any buildings below exterior ground level. A perimeter drainage system is also recommended with weeping tile at the base of the footings, surrounded by clear stone and geotextile, which is proposed to drain to the north side of the building, to avoid draining into sumps.

3.6 QUALITY CONTROL

As presented in Section 1.4, stormwater quality is to be controlled to a minimum of 80% Total Suspended Solids (TSS) removal. In order to meet this treatment requirement, the following is proposed:

- Stormceptor or approved equivalent

After flow outlets from the dry stormwater management pond the flow shall be routed through the proposed Oil and Grit Separator (OGS). The OGS was sized to achieve 80% TSS removal and handle the flow from the 100-year storm event. Refer to **Appendix D** for proposed OGS product details, drawings, and specifications.

The OGS unit will require periodic cleaning to remove collected pollutants, such as sediment and oils. Routine semi-annual inspection for SWM systems could be completed with routine annual maintenance. The OGS unit inspection and maintenance is to be in accordance with the manufacture's recommendations.

4 SEDIMENT AND EROSION CONTROL

4.1 GENERAL

During construction, existing storm sewer system can be exposed to sediment loadings. A number of construction techniques designed to reduce unnecessary construction sediment loadings will be used, including:

- Filter cloths, which will remain on open surface structures such as maintenance holes and catch basins until these structures are commissioned and put into use;
- Installation of silt fence, where applicable, around the perimeter of the proposed work area;
- The installation of straw bales within existing drainage features surround the site; and
- Bulkhead barriers will be installed in the outlet pipes.

During construction of the services, any trench dewatering using pumps will be fitted with a “filter sock.” Thus, any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filter sock as needed including sediment removal and disposal.

All catchbasins, and to a lesser degree, maintenance holes, convey surface water to sewers. Consequently, until the surrounding surface has been completed, these structures will be covered to prevent sediment from entering the minor storm sewer system. These measures will stay in place and be maintained during construction and build-out until it is appropriate to remove them.

During construction of any development both imported and native soils are placed in stockpiles. Mitigative measures and proper management to prevent these materials entering the sewer system are needed. During construction of the deeper watermain and sewers, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally placed before any catch basins are installed.

Refer to the Sediment and Erosion Control Plan provided in the Servicing Report.

5 CONCLUSIONS

This report has provided an analysis of the stormwater management requirements for the proposed Correctional Complex developments east of Oxford Avenue, on the Psychiatric Hospital Campus in Brockville Ontario. The proposed works include a 295 bed Correctional Complex, connection to two (2) access laneways, asphalt parking, concrete sidewalk, and concrete curb.

Water Quantity Control

Water quantity control is required to reduce the peak flows from the site due to the added impervious area of the proposed development. Water quantity control will be provided by a dry stormwater management pond with an orifice tube to control the stormwater release rate from the site.

Water Quality Control

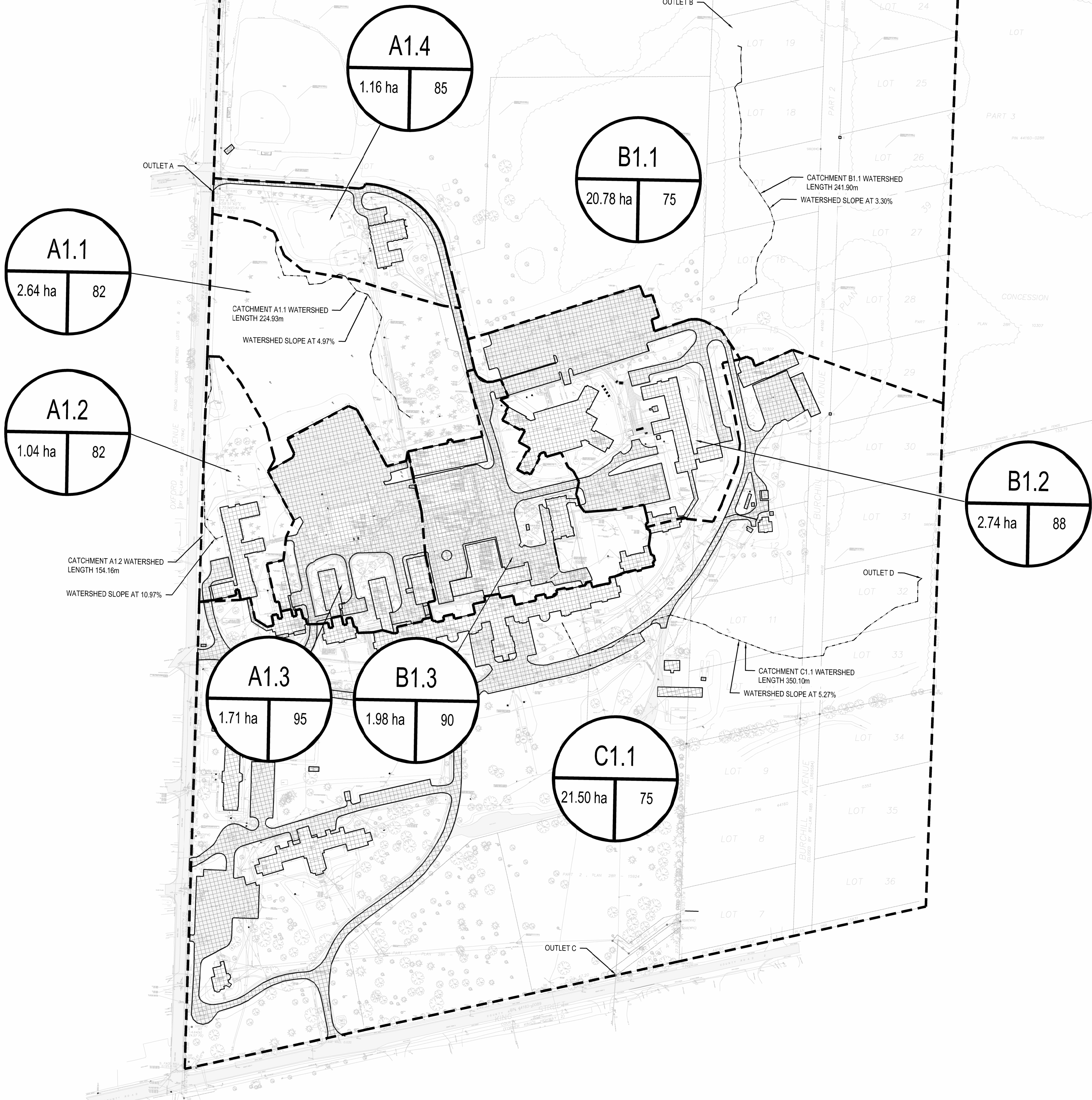
Water quality control will be provided by an OGS downstream of the dry stormwater management pond.

APPENDIX

A

CATCHMENT MAPS

CATCHMENT CHARACTERISTICS			
	GRASSED @ C-FACTOR BELOW 0.25	PAVEMENT/ ROOFED @ C-FACTOR BELOW 0.95	
CATCHMENT ID	GRASSED AREA (ha)	PAVEMENT/ ROOF AREA (ha)	TOTAL AREAS (ha)
A1.1	2.61	0.03	2.64
A1.2	0.88	0.16	1.04
A1.3	0.32	1.38	1.71
A1.4	0.92	0.24	1.16
B1.1	20.78	0.00	20.78
B1.2	1.31	1.43	2.74
B1.3	0.98	0.99	1.98
C1.1	18.82	2.68	21.50
TOTAL	46.64	6.91	53.55



WSP CANADA INC.
1224 GARDINERS ROAD, SUITE 201
KINGSTON, ONTARIO
CANADA K7P 0G2
PHONE: 613-634-7373
WWW.WSP.COM

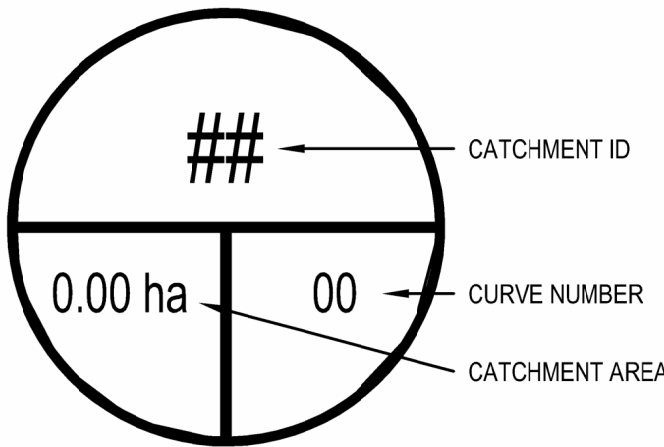
PROJECT NUMBER: CA0044807.7361

CLIENT:

CLIENT REF. # RFP No. 24-1004

LEGEND:

--- CATCHMENT AREA
--- WATERSHED LENGTH
--- ROOF/PAVEMENT AREA



REVISION:

REV	DATE	DESCRIPTION	BY
0	2026-03-13	ISSUED FOR SPA	JD
0	2026-01-23	ISSUED FOR 100% DD	JD

SEAL:

DISCLAIMER: THIS DRAWING AND DESIGN IS COPYRIGHT PROTECTED WHICH SHALL NOT BE USED, REPRODUCED OR REVISED WITHOUT WRITTEN PERMISSION BY WSP. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND UTILITY LOCATIONS AND REPORT ALL ERRORS AND OMISSIONS PRIOR TO COMMENCING WORK.

ORIGINAL SCALE: 1:1750	DATE: 2026-03-13
DRAWN BY: JD	
CHECKED BY: DK	
APPROVED BY: KC	

IF THIS BAR IS NOT
25mm LONG, ADJUST
YOUR PLOTTING SCALE.

25mm

DISCIPLINE: CIVIL

PROJECT:

BROCKVILLE CORRECTIONAL
COMPLEX

TITLE:

PRE-DEVELOPMENT
CATCHMENT MAP

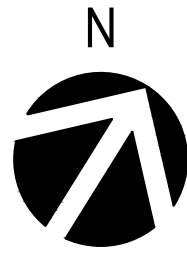
DRAWING NUMBER:

SK1

REV.

0

CATCHMENT CHARACTERISTICS			
	GRASSED ● C-FACTOR BELOW 0.25	PAVEMENT/ ROOFED ● C-FACTOR BELOW 0.95	
CATCHMENT ID	GRASSED AREA (ha)	PAVEMENT/ ROOF AREA (ha)	TOTAL AREAS (ha)
A2.1	1.96	0.47	2.43
A2.2	0.00	0.81	0.81
A2.3	0.00	1.26	1.26
A2.4	0.02	1.74	1.76
A2.5	0.92	0.24	1.16
B2.1	20.78	0.00	20.78
B2.2	1.31	1.43	2.74
B2.3	0.29	0.82	1.11
C2.1	18.69	2.81	21.50
TOTAL	43.97	9.58	53.55



WSP CANADA INC.
1224 GARDINERS ROAD, SUITE 201
KINGSTON, ONTARIO
CANADA K7P 0G2
PHONE: 613-634-7373
WWW.WSP.COM

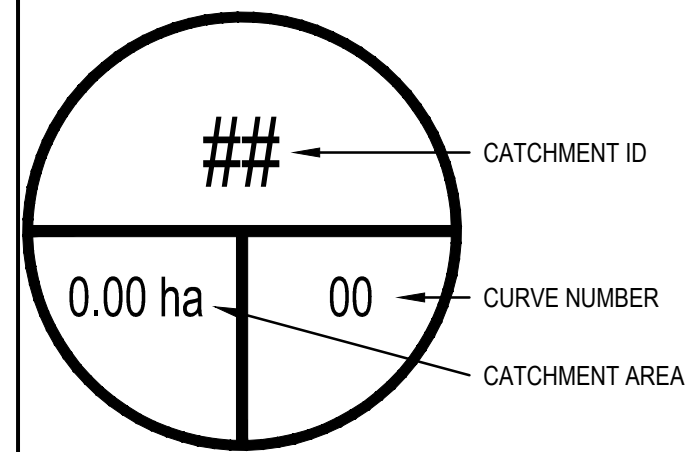
PROJECT NUMBER: CA0044807.7361

CLIENT:

CLIENT REF: # RFP No. 24-1004

LEGEND:

--- CATCHMENT AREA
--- WATERSHED LENGTH
--- ROOF/PAVEMENT AREA



REVISION:

REV	DATE	DESCRIPTION	BY
0	2026-03-13	ISSUED FOR SPA	JD
0	2026-01-23	ISSUED FOR 100% DD	JD

SEAL:

DISCLAIMER: THIS DRAWING AND DESIGN IS COPYRIGHT PROTECTED WHICH SHALL NOT BE USED, REPRODUCED OR REVISED WITHOUT WRITTEN PERMISSION BY WSP. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND UTILITY LOCATIONS AND REPORT ALL ERRORS AND OMISSIONS PRIOR TO COMMENCING WORK.

ORIGINAL SCALE: 1:1750	DATE: 2026-03-13
DRAWN BY: JD	
CHECKED BY:	
APPROVED BY:	
KC	

IF THIS BAR IS NOT
25mm LONG, ADJUST
YOUR PLOTTING SCALE.

25mm

DISCIPLINE: CIVIL

PROJECT:

BROCKVILLE CORRECTIONAL
COMPLEX

TITLE:

POST-DEVELOPMENT
CATCHMENT MAP

DRAWING NUMBER:

SK2

REV.

0

APPENDIX

B

MINOR SYSTEM SIZING CALCULATIONS

Table A1 - Storm Sewer Calculation Sheet
BROCKVILLE CORRECTIONAL COMPLEX - SLVCTC



SITE INFORMATION					FLOW GENERATION						OUTLET PIPE DATA									
Area Description			Contributing Area		Runoff Coefficient	Slope %	Length m	Tc min	5-year Rainfall Intensity mm/hr	Q (L/s)	SIZE (mm)	SLOPE (%)	CAPACITY (L/s)	Q/Qfull	VELOCITY (m/s)	LENGTH (m)	FALL (m)	OUTLET PIPE DATA		
	FROM	TO	CB's	Ha														U/S	D/S	
WEST Pipe Run (STM CB 307 to Pond Inlet)																				
	STM CBMH 307	STM CBMH 310	CB306, CB3065, CBMH307 CB308, CB309	0.112	0.95	2.00	33	15	71.42	71.42	300	1.80%	129.74	0.55	1.84	32.51	0.585	118.83	118.24	
	STM CBMH 310	STM CBMH 316	CBMH 310, CB311, CB312	1.312	0.95	2.00	82	15.59	69.53	351.85	525	1.80%	576.99	0.61	2.67	81.57	1.468	118.18	116.72	
	STM CBMH 316	STM MH 319	CB313, CBMH314, CB315, CB317, CB318	0.138	0.95	2.00	82	17.05	65.29	518.29	600	1.80%	823.78	0.63	2.91	81.96	1.475	116.72	115.24	
	STM MH 319	STM MH 320	CBMH319	0.237	0.95	2.00	38	18.53	61.61	556.88	600	5.82%	1480.86	0.38	5.24	36.26	2.109	115.21	113.10	
	STM MH 320	STM MH 321	N/A	0.000	0.95	2.00	78	20.64	57.14	556.88	600	1.55%	764.44	0.73	2.70	80.52	1.248	113.07	111.82	
	STM MH 321	STM MH 322	N/A	0.000	0.95	2.00	78	21.89	54.84	556.88	600	4.00%	1228.02	0.45	4.34	87.82	3.513	109.82	106.31	
	STM MH 322	Pond Outlet	N/A	0.000	0.95	2.00	53	25.40	49.42	556.88	675	0.75%	727.97	0.76	2.03	54.20	0.490	106.28	105.79	
Branch	Trench Drain	MH 339	Trench Drain	0.025	0.95	N/A	N/A	15.00	71.42	4.68	200	1.50%	40.17	0.12	1.28	4.14	0.062	118.60	118.54	
Branch	MH 339	STM CB318		0.000	0.95	N/A	N/A	15.00	71.42	4.68	200	1.50%	40.17	0.12	1.28	25.96	0.389	118.48	118.09	
Branch	STM CB318	Pipe (316 to 319)	CB318	0.237	0.95	N/A	N/A	15.00	71.42	49.41	250	2.00%	84.10	0.59	1.71	2.72	0.054	118.06	118.00	
Branch	STM CB317	Pipe (316 to 319)	CB317	0.166	0.95	N/A	N/A	15.00	71.42	31.33	200	2.00%	46.38	0.68	1.48	4.84	0.097	118.92	118.83	
Branch	STM CB315	STM CBMH316	STM CB315	0.068	0.95	N/A	N/A	15.00	71.42	12.90	200	2.00%	46.38	0.28	1.48	30.10	0.602	119.32	118.72	
Branch	STM CB313	STM CBMH314	STM CB313	0.192	0.95	N/A	N/A	15.00	71.42	36.18	200	2.00%	46.38	0.78	1.48	18.42	0.368	119.20	118.83	
	STM CBMH314	STM CBMH316	STM CBMH314	0.068	0.95	N/A	N/A	15.00	71.42	49.07	250	2.00%	84.10	0.58	1.71	14.31	0.286	118.80	118.52	
Branch	STM CB311	STM CBMH312	STM CB311	0.141	0.95	N/A	N/A	15.00	71.42	26.52	200	2.00%	46.38	0.57	1.48	21.25	0.425	119.47	119.05	
	STM CBMH312	Pipe (310 to 316)	STM CBMH 312	0.068	0.95	N/A	N/A	15.00	71.42	39.42	250	2.00%	84.10	0.47	1.71	11.92	0.238	119.02	118.78	
Branch	STM CB309	Pipe (307 to 310)	STM CB309	0.058	0.95	N/A	N/A	15.00	71.42	10.87	200	2.00%	46.38	0.23	1.48	4.92	0.098	119.11	119.01	
Branch	STM CB308	Pipe (307 to 310)	STM CB308	0.052	0.95	N/A	N/A	15.00	71.42	9.75	200	2.00%	46.38	0.21	1.48	28.47	0.569	119.22	118.65	
Branch	STM CB305	STM CBMH 307	STM CB305	0.072	0.95	N/A	N/A	15.00	71.42	13.49	200	2.00%	46.38	0.29	1.48	14.44	0.289	119.15	118.86	
Branch	STM CB306	CBMH321	STM CB306	0.086	0.95	N/A	N/A	15.00	71.42	16.18	200	2.00%	46.38	0.35	1.48	19.15	0.383	119.56	119.17	
Branch	CBMH321	STM CBMH 307	STM CBMH321	0.086	0.95	N/A	N/A	15.00	71.42	16.18	200	1.00%	32.80	0.49	1.04	22.33	0.223	119.11	118.89	
Branch	Build. Connection	STM CBMH 310	Building Roof	1.199	0.95	N/A	N/A	15.00	71.42	226.07	350	3.78%	283.49	0.80	2.95	22.41	0.846	119.78	118.93	
Branch (Court Yard)	CB 328	CBMH 327	CB 328	0.019	0.95	N/A	N/A	15.00	71.42	3.58	200	4.00%	65.60	0.05	2.09	25.84	1.034	109.22	108.19	
	CBMH 327	Pipe	CBMH 327	0.070	0.95	N/A	N/A	15.00	71.42	16.76	200	3.00%	56.81	0.29	1.81	25.84	0.775	108.16	107.38	
NORTH Pipe Runs (Pond Inlet)																				
	Build. Connect. E	STM MH324	Building Roof	0.405	0.95	N/A	N/A	15.00	71.42	76.39	250	10.25%	190.39	0.40	3.88	25.84	2.649	109.84	107.19	
	STM MH324	Pond Inlet		0.405	0.95	N/A	N/A	15.00	71.42	95.96	300	1.90%	133.19	0.72	1.88	41.19	0.781	107.13	106.35	
East of Mens Unit	CB 336	CBMH 333		0.018	0.30	N/A	N/A	15.00	71.42	1.06	200	17.50%	137.21	0.01	4.37	38.88	6.804	115.82	109.01	
	CBMH 333	CBMH 335		0.048	0.30	N/A	N/A	15.00	71.42	3.94	200	2.50%	51.86	0.08	1.65	24.89	0.622	108.98	108.36	
	CBMH 335	MH 324		0.065	0.30	N/A	N/A	15.00	71.42	19.58	200	3.00%	56.81	0.34	1.81	37.92	1.138	108.30	107.16	
Branch (Court Yard)	CB 334	Pipe		0.197	0.30	N/A	N/A	15.00	71.42	11.74	200	2.00%	46.38	0.25	1.48	6.50	0.130	109.56	109.43	
	Build. Connect. W	STM MH323	Building Roof	0.405	0.95	N/A	N/A	15.00	71.42	82.17	375	8.50%	511.17	0.16	4.63	30.49	2.592	109.67	107.08	
	STM MH323	Pond Inlet		0.405	0.95	N/A	N/A	15.00	71.42	90.46	375	4.43%	369.07	0.25	3.34	15.76	0.698	107.05	106.35	
North of Mens Unit	CB 325	CBMH 326		0.035	0.30	N/A	N/A	15.00	71.42	2.09	200	2.00%	46.38	0.05	1.48	14.00	0.280	109.13	108.85	
	CBMH 326	CBMH 331		0.043	0.30	N/A	N/A	15.00	71.42	4.65	200	2.25%	49.20	0.09	1.57	27.89	0.628	108.82	108.20	
	CBMH 331	MH 323		0.069	0.30	N/A	N/A	15.00	71.42	11.41	200	3.00%	56.81	0.20	1.81	26.23	0.787	108.14	107.35	
Branch (Court Yard)	CB 332	CBMH 331		0.016	0.85	N/A	N/A	15.00	71.42	2.66	200	6.50%	83.62	0.03	2.66	16.76	1.089	109.25	108.17	
Branch	CB 330	Pipe		0.037	0.30	N/A	N/A	15.00	71.42	2.20	200	2.00%	46.38	0.05	1.48	3.58	0.072	108.38	108.31	
Branch (Court Yard)	CB 329	Pipe		0.021	0.85	N/A	N/A	15.00	71.42	3.58	200	10.00%	103.72	0.03	3.30	5.93	0.593	109.18	108.59	
	CB 338	DCBMH 325		0.238	0.70	N/A	N/A	15.00	71.42	33.07	250	1.00%	59.47	0.56	1.21	19.54	0.195	109.87	109.67	
	DCBMH 325	Outlet to Swale			0.85	N/A	N/A	15.00	71.42	33.07	375	0.50%	123.98	0.27	1.12	16.53	0.083	109.61	109.53	
EAST Pipe Run (STM CB 300 to Existing Structure)																				
	STM CB 300	STM CBMH 303	CB301	0.423	0.95	N/A	N/A	15	71.42	79.84	300	1.50%	118.43	0.67	1.68	106.42	1.596	118.70	117.10	
	STM CBMH 303	STM CBMH 304	CB302	0.150	0.95	2.50	89	16.60	66.54	155.77	375	3.50%	328.01	0.47	2.97	88.95	3.113	117.04	113.93	
	STM CBMH 304	Existing Structure	STM CBMH 304	1.110	0.95	2.50	30	19.71	59.01	328.75	450	2.75%	472.79	0.70	2.97	30.48	0.838	113.83	112.99	
Branch	STM CB301	Pipe (300 to 303)	STM CB301	0.237	0.95	N/A	N/A	15												

APPENDIX

C

VISUAL OTTHYMO MODEL MAPS AND OUTPUTS



Summary of Existing and Proposed Conditions Hydrologic Modelling Parameters

Brockville Correctional Complex

Sub-Catchment ID	IUH Class	Drainage Area (ha)	Imperviousness (%)					SCS Curve Number	Initial Abstraction (mm)		Manning's 'n'		Time to Peak (hours)	Number of Linear Reservoirs	Flow Length (m)		Slope (%)		CN AMC II
			Direct	+	Indirect	=	Total		Pervious	Impervious	Pervious	Impervious			Pervious	Impervious	Pervious	Impervious	
		Area	TIMP					CN	IA	DPSI	MNP	MNI	TP	N	LGP	LGI	SLPP	SLPI	
A1.1	Nash	2.64	1	+	0	=	1.1	82	5.5	n/a	n/a	n/a	0.09	3.0	n/a	n/a	n/a	n/a	82.9
A1.2	Nash	1.04	15	+	0	=	15.4	82	5.0	n/a	n/a	n/a	0.04	3.0	n/a	n/a	n/a	n/a	82.9
A1.3	Standard	1.71	81	+	0	=	80.7	95	5.0	2.0	0.35	0.013	n/a	n/a	40	106.77	2.0	1.0	95.0
A1.4	Standard	1.16	21	+	0	=	20.7	85	5.0	2.0	0.35	0.013	n/a	n/a	40	87.94	2.0	1.0	85.0
B1.1	Nash	20.78	0	+	0	=	0.0	75	8.5	n/a	n/a	n/a	0.12	3.0	n/a	n/a	n/a	n/a	#N/A
B1.2	Standard	2.74	52	+	0	=	52.2	88	5.0	2.0	0.35	0.013	n/a	n/a	40	135.15	2.0	1.0	88.0
B1.3	Standard	1.98	50	+	0	=	50.0	90	5.0	2.0	0.35	0.013	n/a	n/a	40	114.89	2.0	1.0	90.0
A2.1	Nash	2.43	19	+	0	=	19.3	82	4.9	n/a	n/a	n/a	0.07	3.0	n/a	n/a	n/a	n/a	82.9
A2.2	Standard	0.81	100	+	0	=	100.0	98	5.0	2.0	n/a	0.013	n/a	n/a	40	73.48	2.0	1.0	98.0
A2.3	Standard	1.26	100	+	0	=	100.0	98	5.0	2.0	n/a	0.013	n/a	n/a	40	91.65	2.0	1.0	98.0
A2.4	Standard	1.76	99	+	0	=	98.9	98	5.0	2.0	0.35	0.013	n/a	n/a	40	108.32	2.0	1.0	98.0
A2.5	Standard	1.16	21	+	0	=	20.7	85	5.0	2.0	0.35	0.013	n/a	n/a	40	87.94	2.0	1.0	85.0
B2.1	Nash	20.78	0	+	0	=	0.0	75	8.5	n/a	n/a	n/a	0.12	3.0	n/a	n/a	n/a	n/a	#N/A
B2.2	Standard	2.74	52	+	0	=	52.2	88	5.0	2.0	0.35	0.013	n/a	n/a	40	135.15	2.0	1.0	88.0
B2.3	Standard	1.11	74	+	0	=	73.9	94	5.0	2.0	0.35	0.013	n/a	n/a	40	86.02	2.0	1.0	94.0

Current Pond - Stage/Storage (Active)

PP Elev	Bottom elev.	104.9
---------	--------------	-------

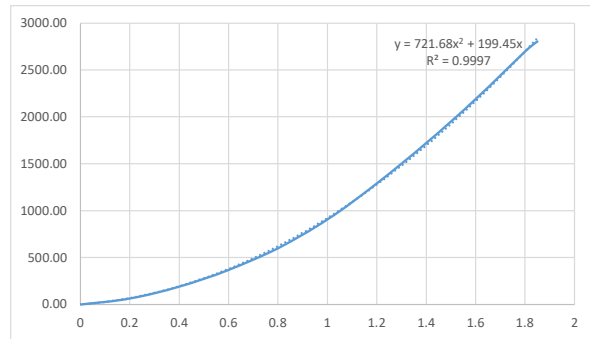
Depth (m)	Water Level (m)	Surface Area (m2)	Cum. Storage (m3)	Discharge - Orifice 1 (l/s)	Combo Discharge (l/s)
0	104.9	763	0.00	0.0	0.0
0.2	105.10	932	64.30	43.8	43.8
0.4	105.30	1101	191.56	180.4	180.4
0.6	105.50	1271	370.66	251.4	251.4
0.8	105.70	1440	602.33	306.3	306.3
1	105.90	1609	906.29	352.8	352.8
1.2	106.10	1778	1293.32	393.8	393.8
1.4	106.30	1947	1721.79	431.0	431.0
1.6	106.50	2117	2190.26	465.1	465.1
1.8	106.70	2286	2699.90	497.0	497.0
1.85	106.75	2328	2805.53	504.6	504.6

Orifice 1

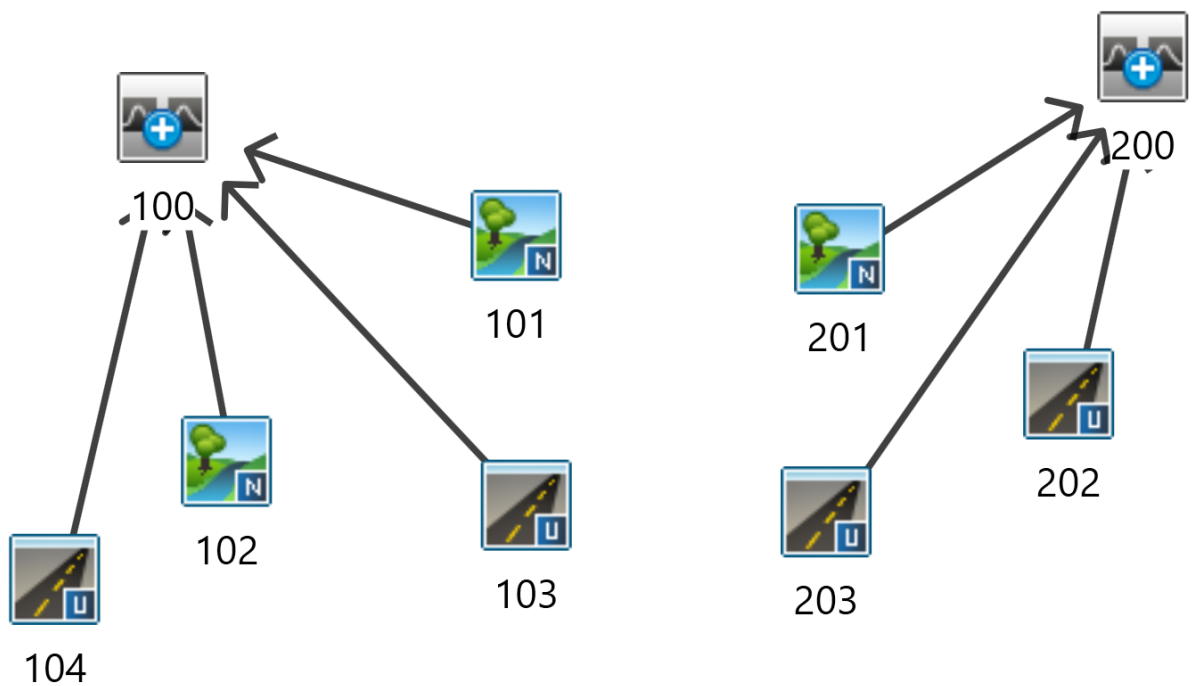
C	0.8
Diameter	375 mm
Area	0.1104 m ²
Invert	104.90 m
C/L	105.09 m

$$Q_{\text{orifice}} = C \times A \times (2 \times g \times H)^{0.5}$$

A	2829.4
B	12672
C	0



VISUAL OTTHYMO 5-YEAR PRE-DEVELOPMENT RESULTS (2026 MTO Storm Event)



=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\18408c1b-605a-40fd-8e2f-eea616897a43\s

Summary filename:

C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\18408c1b-605a-40fd-8e2f-eea616897a43\s

DATE: 03-05-2026

TIME: 03:19:04

USER:

COMMENTS: _____

** SIMULATION : 5-yr 2026 **

| READ STORM |

Filename: C:\Users\CAJD070997\AppData\Local\Temp\

Ptotal= 35.71 mm	b6e2391f-1e86-4a36-9bd1-63a429caed9e\48d04f35 Comments: 5-yr Storm (2026)
------------------	--

TIME	RAIN	TIME	RAIN	'	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	'	hrs	mm/hr	hrs	mm/hr
0.00	0.00	6.08	0.00		12.17	0.00	18.25	0.00
0.08	155.40	6.17	0.00		12.25	0.00	18.33	0.00
0.17	95.90	6.25	0.00		12.33	0.00	18.42	0.00
0.25	72.30	6.33	0.00		12.42	0.00	18.50	0.00
0.33	0.00	6.42	0.00		12.50	0.00	18.58	0.00
0.42	0.00	6.50	0.00		12.58	0.00	18.67	0.00
0.50	44.60	6.58	0.00		12.67	0.00	18.75	0.00
0.58	0.00	6.67	0.00		12.75	0.00	18.83	0.00
0.67	0.00	6.75	0.00		12.83	0.00	18.92	0.00
0.75	0.00	6.83	0.00		12.92	0.00	19.00	0.00
0.83	0.00	6.92	0.00		13.00	0.00	19.08	0.00
0.92	0.00	7.00	0.00		13.08	0.00	19.17	0.00
1.00	27.50	7.08	0.00		13.17	0.00	19.25	0.00
1.08	0.00	7.17	0.00		13.25	0.00	19.33	0.00
1.17	0.00	7.25	0.00		13.33	0.00	19.42	0.00
1.25	0.00	7.33	0.00		13.42	0.00	19.50	0.00
1.33	0.00	7.42	0.00		13.50	0.00	19.58	0.00
1.42	0.00	7.50	0.00		13.58	0.00	19.67	0.00
1.50	0.00	7.58	0.00		13.67	0.00	19.75	0.00
1.58	0.00	7.67	0.00		13.75	0.00	19.83	0.00
1.67	0.00	7.75	0.00		13.83	0.00	19.92	0.00
1.75	0.00	7.83	0.00		13.92	0.00	20.00	0.00
1.83	0.00	7.92	0.00		14.00	0.00	20.08	0.00
1.92	0.00	8.00	0.00		14.08	0.00	20.17	0.00
2.00	17.00	8.08	0.00		14.17	0.00	20.25	0.00
2.08	0.00	8.17	0.00		14.25	0.00	20.33	0.00
2.17	0.00	8.25	0.00		14.33	0.00	20.42	0.00
2.25	0.00	8.33	0.00		14.42	0.00	20.50	0.00
2.33	0.00	8.42	0.00		14.50	0.00	20.58	0.00
2.42	0.00	8.50	0.00		14.58	0.00	20.67	0.00
2.50	0.00	8.58	0.00		14.67	0.00	20.75	0.00
2.58	0.00	8.67	0.00		14.75	0.00	20.83	0.00
2.67	0.00	8.75	0.00		14.83	0.00	20.92	0.00
2.75	0.00	8.83	0.00		14.92	0.00	21.00	0.00
2.83	0.00	8.92	0.00		15.00	0.00	21.08	0.00
2.92	0.00	9.00	0.00		15.08	0.00	21.17	0.00
3.00	0.00	9.08	0.00		15.17	0.00	21.25	0.00
3.08	0.00	9.17	0.00		15.25	0.00	21.33	0.00
3.17	0.00	9.25	0.00		15.33	0.00	21.42	0.00
3.25	0.00	9.33	0.00		15.42	0.00	21.50	0.00
3.33	0.00	9.42	0.00		15.50	0.00	21.58	0.00
3.42	0.00	9.50	0.00		15.58	0.00	21.67	0.00
3.50	0.00	9.58	0.00		15.67	0.00	21.75	0.00
3.58	0.00	9.67	0.00		15.75	0.00	21.83	0.00
3.67	0.00	9.75	0.00		15.83	0.00	21.92	0.00

3.75	0.00	9.83	0.00	15.92	0.00	22.00	0.00
3.83	0.00	9.92	0.00	16.00	0.00	22.08	0.00
3.92	0.00	10.00	0.00	16.08	0.00	22.17	0.00
4.00	0.00	10.08	0.00	16.17	0.00	22.25	0.00
4.08	0.00	10.17	0.00	16.25	0.00	22.33	0.00
4.17	0.00	10.25	0.00	16.33	0.00	22.42	0.00
4.25	0.00	10.33	0.00	16.42	0.00	22.50	0.00
4.33	0.00	10.42	0.00	16.50	0.00	22.58	0.00
4.42	0.00	10.50	0.00	16.58	0.00	22.67	0.00
4.50	0.00	10.58	0.00	16.67	0.00	22.75	0.00
4.58	0.00	10.67	0.00	16.75	0.00	22.83	0.00
4.67	0.00	10.75	0.00	16.83	0.00	22.92	0.00
4.75	0.00	10.83	0.00	16.92	0.00	23.00	0.00
4.83	0.00	10.92	0.00	17.00	0.00	23.08	0.00
4.92	0.00	11.00	0.00	17.08	0.00	23.17	0.00
5.00	0.00	11.08	0.00	17.17	0.00	23.25	0.00
5.08	0.00	11.17	0.00	17.25	0.00	23.33	0.00
5.17	0.00	11.25	0.00	17.33	0.00	23.42	0.00
5.25	0.00	11.33	0.00	17.42	0.00	23.50	0.00
5.33	0.00	11.42	0.00	17.50	0.00	23.58	0.00
5.42	0.00	11.50	0.00	17.58	0.00	23.67	0.00
5.50	0.00	11.58	0.00	17.67	0.00	23.75	0.00
5.58	0.00	11.67	0.00	17.75	0.00	23.83	0.00
5.67	0.00	11.75	0.00	17.83	0.00	23.92	0.00
5.75	0.00	11.83	0.00	17.92	0.00	24.00	3.00
5.83	0.00	11.92	0.00	18.00	0.00		
5.92	0.00	12.00	4.90	18.08	0.00		
6.00	7.90	12.08	0.00	18.17	0.00		

CALIB			
NASHYD (0201)	Area (ha)= 20.78	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 8.50	# of Linear Res.(N)= 3.00	
-----	U.H. Tp(hrs)= 0.12		

Unit Hyd Qpeak (cms)= 6.614

PEAK FLOW (cms)= 0.742 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 6.529

TOTAL RAINFALL (mm)= 35.708

RUNOFF COEFFICIENT = 0.183

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	

STANDHYD (0202)	Area (ha)= 2.74	
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 52.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.42	1.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	135.15	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	131.40	34.10	
over (min)	5.00	20.00	
Storage Coeff. (min)=	2.74 (ii)	16.03 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.28	0.06	
			TOTALS
PEAK FLOW (cms)=	0.44	0.06	0.439 (iii)
TIME TO PEAK (hrs)=	0.17	0.58	0.17
RUNOFF VOLUME (mm)=	33.71	14.43	24.45
TOTAL RAINFALL (mm)=	35.71	35.71	35.71
RUNOFF COEFFICIENT =	0.94	0.40	0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 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.

CALIB	
STANDHYD (0203)	Area (ha)= 1.98
ID= 1 DT= 5.0 min	Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.99	0.99	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	114.89	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	131.40	38.46	
over (min)	5.00	20.00	
Storage Coeff. (min)=	2.49 (ii)	15.15 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.29	0.07	
			TOTALS
PEAK FLOW (cms)=	0.31	0.05	0.316 (iii)

TIME TO PEAK	(hrs)=	0.17	0.58	0.17
RUNOFF VOLUME	(mm)=	33.71	16.00	24.85
TOTAL RAINFALL	(mm)=	35.71	35.71	35.71
RUNOFF COEFFICIENT	=	0.94	0.45	0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 90.0 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.

```

-----
| ADD HYD ( 0200) |
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0201):  20.78  0.742  0.33  6.53
+ ID2= 2 ( 0202):  2.74  0.439  0.17  24.45
=====
ID = 3 ( 0200):  23.52  1.076  0.33  8.62

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0200) |
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0200):  23.52  1.076  0.33  8.62
+ ID2= 2 ( 0203):  1.98  0.316  0.17  24.85
=====
ID = 1 ( 0200):  25.50  1.312  0.33  9.88

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB
| NASHYD ( 0101) |
| ID= 1 DT= 5.0 min |
-----
          Area      (ha)=  2.64  Curve Number (CN)= 82.0
          Ia      (mm)=  5.50  # of Linear Res.(N)= 3.00
          U.H. Tp(hrs)=  0.09

```

Unit Hyd Qpeak (cms)= 1.120

PEAK FLOW (cms)= 0.191 (i)
 TIME TO PEAK (hrs)= 0.333
 RUNOFF VOLUME (mm)= 10.215
 TOTAL RAINFALL (mm)= 35.708

RUNOFF COEFFICIENT = 0.286

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0102)	Area (ha)=	1.04	Curve Number (CN)= 82.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.04	

Unit Hyd Qpeak (cms)= 0.993

PEAK FLOW (cms)= 0.055 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 6.508

TOTAL RAINFALL (mm)= 35.708

RUNOFF COEFFICIENT = 0.182

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0103)	Area (ha)=	1.71	
ID= 1 DT= 5.0 min	Total Imp(%)=	81.00	Dir. Conn.(%)= 81.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.39	0.32
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	106.77	40.00
Mannings n =	0.013	0.350

Max.Eff.Inten.(mm/hr)= 131.40

64.15

over (min) 5.00

10.00

Storage Coeff. (min)= 2.38 (ii)

6.72 (ii)

Unit Hyd. Tpeak (min)= 5.00

10.00

Unit Hyd. peak (cms)= 0.30

0.14

TOTALS

PEAK FLOW (cms)= 0.44

0.04

0.450 (iii)

TIME TO PEAK (hrs)= 0.17

0.33

0.17

RUNOFF VOLUME (mm)= 33.71

21.39

31.37

TOTAL RAINFALL (mm)= 35.71

35.71

35.71

RUNOFF COEFFICIENT = 0.94

0.60

0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 95.0 Ia = Dep. Storage (Above)

-

.....

```

-----
| ADD HYD ( 0100)|
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
      ID1= 3 ( 0100):  3.68    0.246    0.33    9.17
+ ID2= 2 ( 0103):  1.71    0.450    0.17   31.37
=====
      ID = 1 ( 0100):  5.39    0.588    0.25   16.21

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

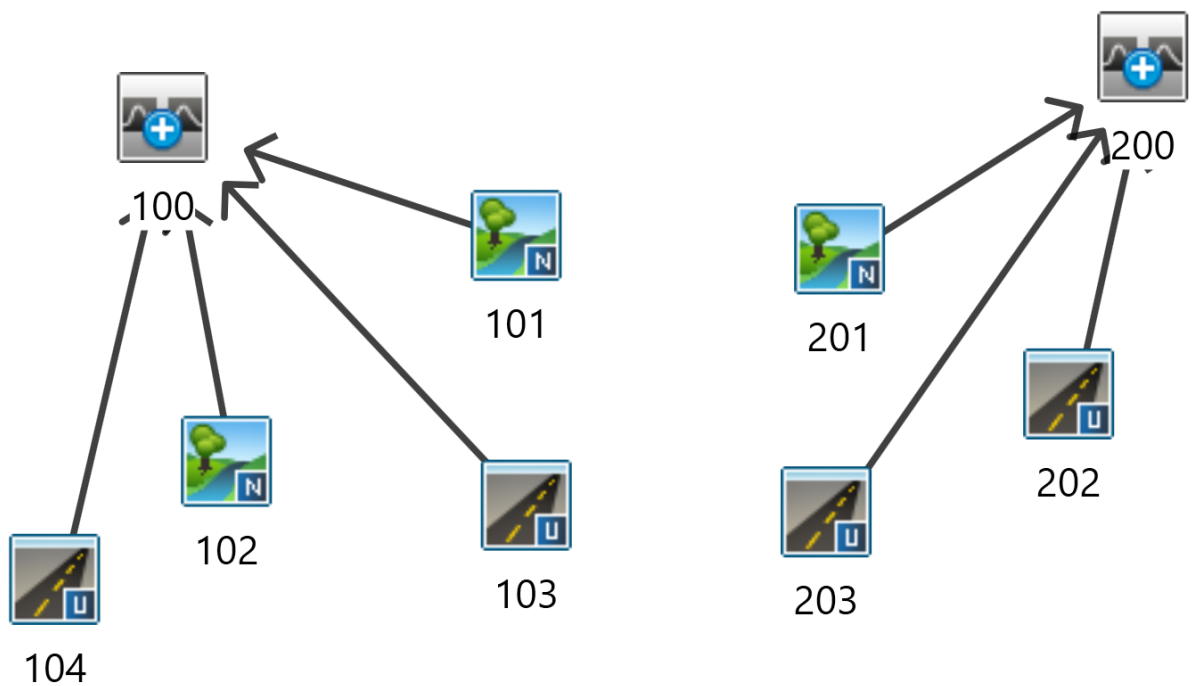
```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
      ID1= 1 ( 0100):  5.39    0.588    0.25   16.21
+ ID2= 2 ( 0104):  1.16    0.082    0.17   16.93
=====
      ID = 3 ( 0100):  6.55    0.662    0.25   16.34

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

VISUAL OTTHYMO 50-YEAR PRE-DEVELOPMENT RESULTS (2026 MTO Storm Event)



=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:
C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\4
c92a16f-9ffd-48ea-ae fd-93b02234a312\s
Summary filename:
C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\4
c92a16f-9ffd-48ea-ae fd-93b02234a312\s

DATE: 03-05-2026 TIME: 03:19:04

USER:

COMMENTS: _____

** SIMULATION : 50-yr 2026 **

| READ STORM | Filename: C:\Users\CAJD070997\AppData\Local\Temp\
|

Ptotal= 54.08 mm	b6e2391f-1e86-4a36-9bd1-63a429caed9e\52aee1f9
Comments: 50-yr Storm (2026)	

TIME	RAIN	TIME	RAIN	'	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	'	hrs	mm/hr	hrs	mm/hr
0.00	0.00	6.08	0.00		12.17	0.00	18.25	0.00
0.08	235.50	6.17	0.00		12.25	0.00	18.33	0.00
0.17	145.20	6.25	0.00		12.33	0.00	18.42	0.00
0.25	109.50	6.33	0.00		12.42	0.00	18.50	0.00
0.33	0.00	6.42	0.00		12.50	0.00	18.58	0.00
0.42	0.00	6.50	0.00		12.58	0.00	18.67	0.00
0.50	67.50	6.58	0.00		12.67	0.00	18.75	0.00
0.58	0.00	6.67	0.00		12.75	0.00	18.83	0.00
0.67	0.00	6.75	0.00		12.83	0.00	18.92	0.00
0.75	0.00	6.83	0.00		12.92	0.00	19.00	0.00
0.83	0.00	6.92	0.00		13.00	0.00	19.08	0.00
0.92	0.00	7.00	0.00		13.08	0.00	19.17	0.00
1.00	41.60	7.08	0.00		13.17	0.00	19.25	0.00
1.08	0.00	7.17	0.00		13.25	0.00	19.33	0.00
1.17	0.00	7.25	0.00		13.33	0.00	19.42	0.00
1.25	0.00	7.33	0.00		13.42	0.00	19.50	0.00
1.33	0.00	7.42	0.00		13.50	0.00	19.58	0.00
1.42	0.00	7.50	0.00		13.58	0.00	19.67	0.00
1.50	0.00	7.58	0.00		13.67	0.00	19.75	0.00
1.58	0.00	7.67	0.00		13.75	0.00	19.83	0.00
1.67	0.00	7.75	0.00		13.83	0.00	19.92	0.00
1.75	0.00	7.83	0.00		13.92	0.00	20.00	0.00
1.83	0.00	7.92	0.00		14.00	0.00	20.08	0.00
1.92	0.00	8.00	0.00		14.08	0.00	20.17	0.00
2.00	25.70	8.08	0.00		14.17	0.00	20.25	0.00
2.08	0.00	8.17	0.00		14.25	0.00	20.33	0.00
2.17	0.00	8.25	0.00		14.33	0.00	20.42	0.00
2.25	0.00	8.33	0.00		14.42	0.00	20.50	0.00
2.33	0.00	8.42	0.00		14.50	0.00	20.58	0.00
2.42	0.00	8.50	0.00		14.58	0.00	20.67	0.00
2.50	0.00	8.58	0.00		14.67	0.00	20.75	0.00
2.58	0.00	8.67	0.00		14.75	0.00	20.83	0.00
2.67	0.00	8.75	0.00		14.83	0.00	20.92	0.00
2.75	0.00	8.83	0.00		14.92	0.00	21.00	0.00
2.83	0.00	8.92	0.00		15.00	0.00	21.08	0.00
2.92	0.00	9.00	0.00		15.08	0.00	21.17	0.00
3.00	0.00	9.08	0.00		15.17	0.00	21.25	0.00
3.08	0.00	9.17	0.00		15.25	0.00	21.33	0.00
3.17	0.00	9.25	0.00		15.33	0.00	21.42	0.00
3.25	0.00	9.33	0.00		15.42	0.00	21.50	0.00
3.33	0.00	9.42	0.00		15.50	0.00	21.58	0.00
3.42	0.00	9.50	0.00		15.58	0.00	21.67	0.00
3.50	0.00	9.58	0.00		15.67	0.00	21.75	0.00
3.58	0.00	9.67	0.00		15.75	0.00	21.83	0.00
3.67	0.00	9.75	0.00		15.83	0.00	21.92	0.00

3.75	0.00	9.83	0.00	15.92	0.00	22.00	0.00
3.83	0.00	9.92	0.00	16.00	0.00	22.08	0.00
3.92	0.00	10.00	0.00	16.08	0.00	22.17	0.00
4.00	0.00	10.08	0.00	16.17	0.00	22.25	0.00
4.08	0.00	10.17	0.00	16.25	0.00	22.33	0.00
4.17	0.00	10.25	0.00	16.33	0.00	22.42	0.00
4.25	0.00	10.33	0.00	16.42	0.00	22.50	0.00
4.33	0.00	10.42	0.00	16.50	0.00	22.58	0.00
4.42	0.00	10.50	0.00	16.58	0.00	22.67	0.00
4.50	0.00	10.58	0.00	16.67	0.00	22.75	0.00
4.58	0.00	10.67	0.00	16.75	0.00	22.83	0.00
4.67	0.00	10.75	0.00	16.83	0.00	22.92	0.00
4.75	0.00	10.83	0.00	16.92	0.00	23.00	0.00
4.83	0.00	10.92	0.00	17.00	0.00	23.08	0.00
4.92	0.00	11.00	0.00	17.08	0.00	23.17	0.00
5.00	0.00	11.08	0.00	17.17	0.00	23.25	0.00
5.08	0.00	11.17	0.00	17.25	0.00	23.33	0.00
5.17	0.00	11.25	0.00	17.33	0.00	23.42	0.00
5.25	0.00	11.33	0.00	17.42	0.00	23.50	0.00
5.33	0.00	11.42	0.00	17.50	0.00	23.58	0.00
5.42	0.00	11.50	0.00	17.58	0.00	23.67	0.00
5.50	0.00	11.58	0.00	17.67	0.00	23.75	0.00
5.58	0.00	11.67	0.00	17.75	0.00	23.83	0.00
5.67	0.00	11.75	0.00	17.83	0.00	23.92	0.00
5.75	0.00	11.83	0.00	17.92	0.00	24.00	4.60
5.83	0.00	11.92	0.00	18.00	0.00		
5.92	0.00	12.00	7.40	18.08	0.00		
6.00	12.00	12.08	0.00	18.17	0.00		

CALIB			
NASHYD (0201)	Area (ha)=	20.78	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)=	8.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.12	

Unit Hyd Qpeak (cms)= 6.614

PEAK FLOW (cms)= 1.935 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 15.740

TOTAL RAINFALL (mm)= 54.083

RUNOFF COEFFICIENT = 0.291

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
-------	--

STANDHYD (0202)	Area (ha)= 2.74	
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 52.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.42	1.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	135.15	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	211.50	83.35	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.27 (ii)	11.56 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.30	0.09	
			TOTALS
PEAK FLOW (cms)=	0.74	0.17	0.761 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.17
RUNOFF VOLUME (mm)=	52.08	28.78	40.89
TOTAL RAINFALL (mm)=	54.08	54.08	54.08
RUNOFF COEFFICIENT =	0.96	0.53	0.76

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 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.

CALIB	
STANDHYD (0203)	Area (ha)= 1.98
ID= 1 DT= 5.0 min	Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.99	0.99	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	114.89	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	211.50	90.40	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.06 (ii)	11.05 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.09	
			TOTALS
PEAK FLOW (cms)=	0.53	0.14	0.545 (iii)

TIME TO PEAK	(hrs)=	0.17	0.42	0.17
RUNOFF VOLUME	(mm)=	52.08	31.16	41.62
TOTAL RAINFALL	(mm)=	54.08	54.08	54.08
RUNOFF COEFFICIENT	=	0.96	0.58	0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 90.0 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.

```

-----
| ADD HYD ( 0200) |
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0201):  20.78  1.935  0.33  15.74
+ ID2= 2 ( 0202):   2.74  0.761  0.17  40.89
=====
ID = 3 ( 0200):  23.52  2.516  0.33  18.67

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0200) |
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0200):  23.52  2.516  0.33  18.67
+ ID2= 2 ( 0203):   1.98  0.545  0.17  41.62
=====
ID = 1 ( 0200):  25.50  2.939  0.33  20.45

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 2.64 Curve Number (CN)= 82.0
| ID= 1 DT= 5.0 min | Ia (mm)= 5.50 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.09

```

Unit Hyd Qpeak (cms)= 1.120

PEAK FLOW (cms)= 0.414 (i)
 TIME TO PEAK (hrs)= 0.333
 RUNOFF VOLUME (mm)= 21.768
 TOTAL RAINFALL (mm)= 54.083

RUNOFF COEFFICIENT = 0.402

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB                                     |
| NASHYD ( 0102) | Area (ha)= 1.04 Curve Number (CN)= 82.0
| ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
|-----| U.H. Tp(hrs)= 0.04
```

Unit Hyd Qpeak (cms)= 0.993

PEAK FLOW (cms)= 0.113 (i)

TIME TO PEAK (hrs)= 0.250

RUNOFF VOLUME (mm)= 13.714

TOTAL RAINFALL (mm)= 54.083

RUNOFF COEFFICIENT = 0.254

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB                                     |
| STANDHYD ( 0103) | Area (ha)= 1.71
| ID= 1 DT= 5.0 min | Total Imp(%)= 81.00 Dir. Conn.(%)= 81.00
|-----|
```

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.39	0.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	106.77	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	211.50	110.83	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.97 (ii)	5.55 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.31	0.16	
			TOTALS
PEAK FLOW (cms)=	0.75	0.09	0.768 (iii)
TIME TO PEAK (hrs)=	0.17	0.33	0.17
RUNOFF VOLUME (mm)=	52.08	38.58	49.52
TOTAL RAINFALL (mm)=	54.08	54.08	54.08
RUNOFF COEFFICIENT =	0.96	0.71	0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 95.0 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.

```

-----
| CALIB |
| STANDHYD ( 0104) |
| ID= 1 DT= 5.0 min |
-----

```

Area (ha)=	1.16	
Total Imp(%)=	21.00	Dir. Conn.(%)= 21.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.24	0.92	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	87.94	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	211.50	74.00	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.75 (ii)	11.49 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.32	0.09	
			TOTALS
PEAK FLOW (cms)=	0.13	0.10	0.154 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.33
RUNOFF VOLUME (mm)=	52.08	25.65	31.20
TOTAL RAINFALL (mm)=	54.08	54.08	54.08
RUNOFF COEFFICIENT =	0.96	0.47	0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 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.

```

-----
| ADD HYD ( 0100) |
| 1 + 2 = 3 |
-----

```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0101):	2.64	0.414	0.33	21.77
+ ID2= 2 (0102):	1.04	0.113	0.25	13.71
=====				
ID = 3 (0100):	3.68	0.525	0.33	19.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
      ID1= 3 ( 0100):  3.68    0.525    0.33    19.49
+ ID2= 2 ( 0103):  1.71    0.768    0.17    49.52
=====
      ID = 1 ( 0100):  5.39    1.071    0.25    29.02

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

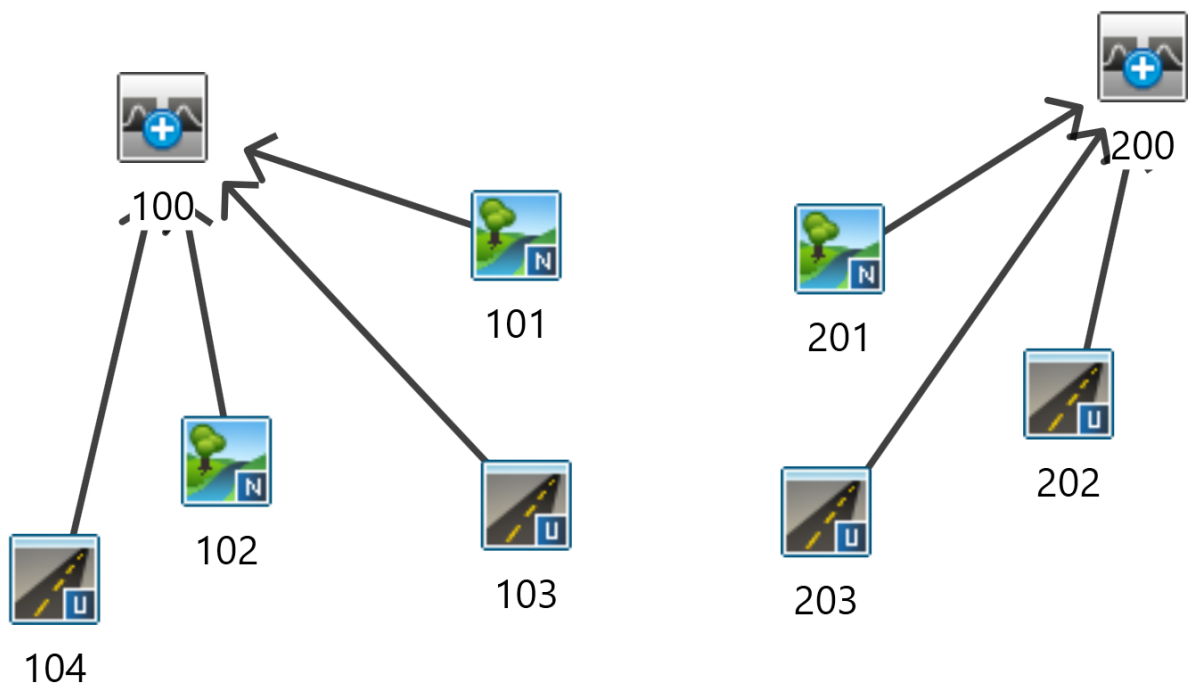
```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
      ID1= 1 ( 0100):  5.39    1.071    0.25    29.02
+ ID2= 2 ( 0104):  1.16    0.154    0.33    31.20
=====
      ID = 3 ( 0100):  6.55    1.207    0.25    29.40

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

VISUAL OTTHYMO 100-YEAR PRE-DEVELOPMENT RESULTS (2026 MTO Storm Event)



=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\CAJD070997\AppData\Local\Civica\XH5\6ab6c1b-52c7-43db-abbf-e705320d2511\6018903b-2e72-4e69-950d-428c60e9d2de\s

Summary filename:

C:\Users\CAJD070997\AppData\Local\Civica\XH5\6ab6c1b-52c7-43db-abbf-e705320d2511\6018903b-2e72-4e69-950d-428c60e9d2de\s

DATE: 03-05-2026

TIME: 03:19:05

USER:

COMMENTS: _____

** SIMULATION : 100-yr 2026 **

| READ STORM |

Filename: C:\Users\CAJD070997\AppData\Local\Temp\

| b6e2391f-1e86-4a36-9bd1-63a429caed9e\ a33414bf
| Ptotal= 59.42 mm | Comments: 100-yr Storm (2026)

TIME	RAIN	TIME	RAIN	'	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	'	hrs	mm/hr	hrs	mm/hr
0.00	0.00	6.08	0.00		12.17	0.00	18.25	0.00
0.08	258.80	6.17	0.00		12.25	0.00	18.33	0.00
0.17	159.60	6.25	0.00		12.33	0.00	18.42	0.00
0.25	120.30	6.33	0.00		12.42	0.00	18.50	0.00
0.33	0.00	6.42	0.00		12.50	0.00	18.58	0.00
0.42	0.00	6.50	0.00		12.58	0.00	18.67	0.00
0.50	74.20	6.58	0.00		12.67	0.00	18.75	0.00
0.58	0.00	6.67	0.00		12.75	0.00	18.83	0.00
0.67	0.00	6.75	0.00		12.83	0.00	18.92	0.00
0.75	0.00	6.83	0.00		12.92	0.00	19.00	0.00
0.83	0.00	6.92	0.00		13.00	0.00	19.08	0.00
0.92	0.00	7.00	0.00		13.08	0.00	19.17	0.00
1.00	45.70	7.08	0.00		13.17	0.00	19.25	0.00
1.08	0.00	7.17	0.00		13.25	0.00	19.33	0.00
1.17	0.00	7.25	0.00		13.33	0.00	19.42	0.00
1.25	0.00	7.33	0.00		13.42	0.00	19.50	0.00
1.33	0.00	7.42	0.00		13.50	0.00	19.58	0.00
1.42	0.00	7.50	0.00		13.58	0.00	19.67	0.00
1.50	0.00	7.58	0.00		13.67	0.00	19.75	0.00
1.58	0.00	7.67	0.00		13.75	0.00	19.83	0.00
1.67	0.00	7.75	0.00		13.83	0.00	19.92	0.00
1.75	0.00	7.83	0.00		13.92	0.00	20.00	0.00
1.83	0.00	7.92	0.00		14.00	0.00	20.08	0.00
1.92	0.00	8.00	0.00		14.08	0.00	20.17	0.00
2.00	28.20	8.08	0.00		14.17	0.00	20.25	0.00
2.08	0.00	8.17	0.00		14.25	0.00	20.33	0.00
2.17	0.00	8.25	0.00		14.33	0.00	20.42	0.00
2.25	0.00	8.33	0.00		14.42	0.00	20.50	0.00
2.33	0.00	8.42	0.00		14.50	0.00	20.58	0.00
2.42	0.00	8.50	0.00		14.58	0.00	20.67	0.00
2.50	0.00	8.58	0.00		14.67	0.00	20.75	0.00
2.58	0.00	8.67	0.00		14.75	0.00	20.83	0.00
2.67	0.00	8.75	0.00		14.83	0.00	20.92	0.00
2.75	0.00	8.83	0.00		14.92	0.00	21.00	0.00
2.83	0.00	8.92	0.00		15.00	0.00	21.08	0.00
2.92	0.00	9.00	0.00		15.08	0.00	21.17	0.00
3.00	0.00	9.08	0.00		15.17	0.00	21.25	0.00
3.08	0.00	9.17	0.00		15.25	0.00	21.33	0.00
3.17	0.00	9.25	0.00		15.33	0.00	21.42	0.00
3.25	0.00	9.33	0.00		15.42	0.00	21.50	0.00
3.33	0.00	9.42	0.00		15.50	0.00	21.58	0.00
3.42	0.00	9.50	0.00		15.58	0.00	21.67	0.00
3.50	0.00	9.58	0.00		15.67	0.00	21.75	0.00
3.58	0.00	9.67	0.00		15.75	0.00	21.83	0.00
3.67	0.00	9.75	0.00		15.83	0.00	21.92	0.00

3.75	0.00	9.83	0.00	15.92	0.00	22.00	0.00
3.83	0.00	9.92	0.00	16.00	0.00	22.08	0.00
3.92	0.00	10.00	0.00	16.08	0.00	22.17	0.00
4.00	0.00	10.08	0.00	16.17	0.00	22.25	0.00
4.08	0.00	10.17	0.00	16.25	0.00	22.33	0.00
4.17	0.00	10.25	0.00	16.33	0.00	22.42	0.00
4.25	0.00	10.33	0.00	16.42	0.00	22.50	0.00
4.33	0.00	10.42	0.00	16.50	0.00	22.58	0.00
4.42	0.00	10.50	0.00	16.58	0.00	22.67	0.00
4.50	0.00	10.58	0.00	16.67	0.00	22.75	0.00
4.58	0.00	10.67	0.00	16.75	0.00	22.83	0.00
4.67	0.00	10.75	0.00	16.83	0.00	22.92	0.00
4.75	0.00	10.83	0.00	16.92	0.00	23.00	0.00
4.83	0.00	10.92	0.00	17.00	0.00	23.08	0.00
4.92	0.00	11.00	0.00	17.08	0.00	23.17	0.00
5.00	0.00	11.08	0.00	17.17	0.00	23.25	0.00
5.08	0.00	11.17	0.00	17.25	0.00	23.33	0.00
5.17	0.00	11.25	0.00	17.33	0.00	23.42	0.00
5.25	0.00	11.33	0.00	17.42	0.00	23.50	0.00
5.33	0.00	11.42	0.00	17.50	0.00	23.58	0.00
5.42	0.00	11.50	0.00	17.58	0.00	23.67	0.00
5.50	0.00	11.58	0.00	17.67	0.00	23.75	0.00
5.58	0.00	11.67	0.00	17.75	0.00	23.83	0.00
5.67	0.00	11.75	0.00	17.83	0.00	23.92	0.00
5.75	0.00	11.83	0.00	17.92	0.00	24.00	5.00
5.83	0.00	11.92	0.00	18.00	0.00		
5.92	0.00	12.00	8.10	18.08	0.00		
6.00	13.10	12.08	0.00	18.17	0.00		

CALIB			
NASHYD (0201)	Area (ha)=	20.78	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)=	8.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.12	

Unit Hyd Qpeak (cms)= 6.614

PEAK FLOW (cms)= 2.350 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 18.866

TOTAL RAINFALL (mm)= 59.417

RUNOFF COEFFICIENT = 0.318

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
-------	--

STANDHYD (0202)	Area (ha)= 2.74	
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 52.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.42	1.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	135.15	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	234.80	95.95	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.18 (ii)	10.96 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.09	
			TOTALS
PEAK FLOW (cms)=	0.84	0.20	0.857 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.17
RUNOFF VOLUME (mm)=	57.42	33.25	45.82
TOTAL RAINFALL (mm)=	59.42	59.42	59.42
RUNOFF COEFFICIENT =	0.97	0.56	0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 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.

CALIB	
STANDHYD (0203)	Area (ha)= 1.98
ID= 1 DT= 5.0 min	Total Imp(%)= 50.00 Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.99	0.99	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	114.89	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	234.80	103.41	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.97 (ii)	10.49 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.09	
			TOTALS
PEAK FLOW (cms)=	0.59	0.17	0.613 (iii)

TIME TO PEAK	(hrs)=	0.17	0.42	0.17
RUNOFF VOLUME	(mm)=	57.42	35.83	46.62
TOTAL RAINFALL	(mm)=	59.42	59.42	59.42
RUNOFF COEFFICIENT	=	0.97	0.60	0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 90.0 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.

ADD HYD (0200)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0201):	20.78	2.350	0.33	18.87
+ ID2= 2 (0202):	2.74	0.857	0.17	45.82
=====				
ID = 3 (0200):	23.52	3.003	0.33	22.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0200)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1				
ID1= 3 (0200):	23.52	3.003	0.33	22.01
+ ID2= 2 (0203):	1.98	0.613	0.17	46.62
=====				
ID = 1 (0200):	25.50	3.479	0.33	23.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
NASHYD (0101)	Area (ha)=	2.64	Curve Number (CN)= 82.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.09	

Unit Hyd Qpeak (cms)= 1.120

PEAK FLOW	(cms)=	0.486 (i)
TIME TO PEAK	(hrs)=	0.333
RUNOFF VOLUME	(mm)=	25.505
TOTAL RAINFALL	(mm)=	59.417

RUNOFF COEFFICIENT = 0.429

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB                                     |
| NASHYD ( 0102) | Area (ha)= 1.04 Curve Number (CN)= 82.0
| ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
|-----| U.H. Tp(hrs)= 0.04
```

Unit Hyd Qpeak (cms)= 0.993

PEAK FLOW (cms)= 0.133 (i)

TIME TO PEAK (hrs)= 0.250

RUNOFF VOLUME (mm)= 16.040

TOTAL RAINFALL (mm)= 59.417

RUNOFF COEFFICIENT = 0.270

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB                                     |
| STANDHYD ( 0103) | Area (ha)= 1.71
| ID= 1 DT= 5.0 min | Total Imp(%)= 81.00 Dir. Conn.(%)= 81.00
|-----|
```

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.39	0.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	106.77	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	234.80	124.26	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.89 (ii)	5.33 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.16	
			TOTALS
PEAK FLOW (cms)=	0.84	0.10	0.863 (iii)
TIME TO PEAK (hrs)=	0.17	0.33	0.17
RUNOFF VOLUME (mm)=	57.42	43.68	54.81
TOTAL RAINFALL (mm)=	59.42	59.42	59.42
RUNOFF COEFFICIENT =	0.97	0.74	0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

CN* = 95.0 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.

```

-----
| CALIB |
| STANDHYD ( 0104) |
| ID= 1 DT= 5.0 min |
-----

```

Area (ha)=	1.16	
Total Imp(%)=	21.00	Dir. Conn.(%)= 21.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.24	0.92	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	87.94	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	234.80	85.88	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.68 (ii)	10.86 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.32	0.09	
			TOTALS
PEAK FLOW (cms)=	0.15	0.12	0.179 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.33
RUNOFF VOLUME (mm)=	57.42	29.84	35.63
TOTAL RAINFALL (mm)=	59.42	59.42	59.42
RUNOFF COEFFICIENT =	0.97	0.50	0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 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.

```

-----
| ADD HYD ( 0100) |
| 1 + 2 = 3 |
-----

```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0101):	2.64	0.486	0.33	25.51
+ ID2= 2 (0102):	1.04	0.133	0.25	16.04
=====				
ID = 3 (0100):	3.68	0.615	0.33	22.83

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.


```

-----
| ADD HYD ( 0100)|
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
      ID1= 3 ( 0100):  3.68    0.615    0.33    22.83
+ ID2= 2 ( 0103):  1.71    0.863    0.17    54.81
=====
      ID = 1 ( 0100):  5.39    1.224    0.25    32.97

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
      ID1= 1 ( 0100):  5.39    1.224    0.25    32.97
+ ID2= 2 ( 0104):  1.16    0.179    0.33    35.63
=====
      ID = 3 ( 0100):  6.55    1.380    0.25    33.44

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

```

=====
=====

```

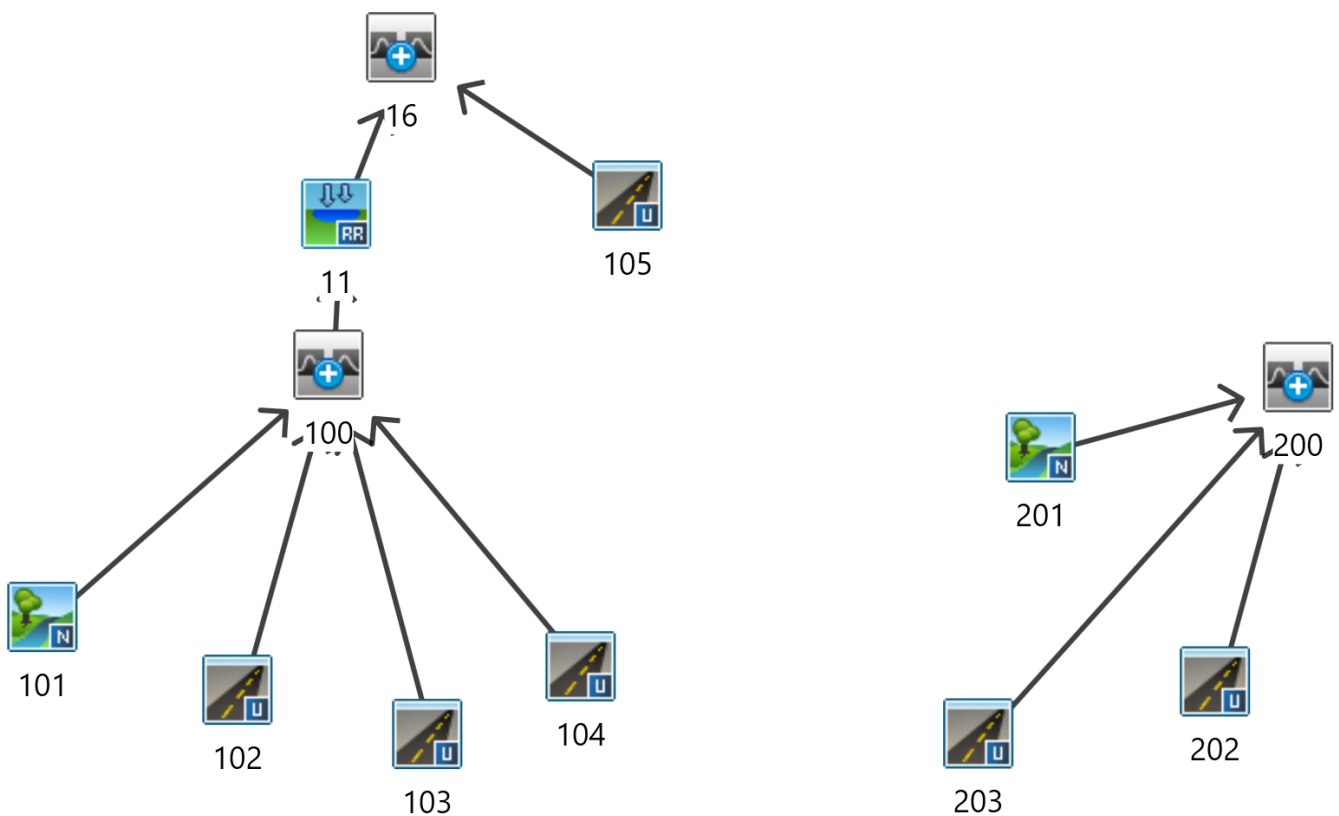
VISUAL OTTHYMO

5-YEAR

POST-DEVELOPMENT

RESULTS

(2026 MTO Storm Event)



=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:
C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\8
0dea350-efad-404d-a689-e966f84463d9\s
Summary filename:
C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\8
0dea350-efad-404d-a689-e966f84463d9\s

DATE: 03-12-2026 TIME: 12:05:56

USER:

COMMENTS: _____

** SIMULATION : 5-yr 2026 **

| READ STORM | Filename: C:\Users\CAJD070997\AppData\Local\Temp\
|

Ptotal= 35.71 mm	662c8c4a-a34e-4ff9-bafe-5680f7530c23\48d04f35
Comments: 5-yr Storm (2026)	

TIME	RAIN	TIME	RAIN	'	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	'	hrs	mm/hr	hrs	mm/hr
0.00	0.00	6.08	0.00		12.17	0.00	18.25	0.00
0.08	155.40	6.17	0.00		12.25	0.00	18.33	0.00
0.17	95.90	6.25	0.00		12.33	0.00	18.42	0.00
0.25	72.30	6.33	0.00		12.42	0.00	18.50	0.00
0.33	0.00	6.42	0.00		12.50	0.00	18.58	0.00
0.42	0.00	6.50	0.00		12.58	0.00	18.67	0.00
0.50	44.60	6.58	0.00		12.67	0.00	18.75	0.00
0.58	0.00	6.67	0.00		12.75	0.00	18.83	0.00
0.67	0.00	6.75	0.00		12.83	0.00	18.92	0.00
0.75	0.00	6.83	0.00		12.92	0.00	19.00	0.00
0.83	0.00	6.92	0.00		13.00	0.00	19.08	0.00
0.92	0.00	7.00	0.00		13.08	0.00	19.17	0.00
1.00	27.50	7.08	0.00		13.17	0.00	19.25	0.00
1.08	0.00	7.17	0.00		13.25	0.00	19.33	0.00
1.17	0.00	7.25	0.00		13.33	0.00	19.42	0.00
1.25	0.00	7.33	0.00		13.42	0.00	19.50	0.00
1.33	0.00	7.42	0.00		13.50	0.00	19.58	0.00
1.42	0.00	7.50	0.00		13.58	0.00	19.67	0.00
1.50	0.00	7.58	0.00		13.67	0.00	19.75	0.00
1.58	0.00	7.67	0.00		13.75	0.00	19.83	0.00
1.67	0.00	7.75	0.00		13.83	0.00	19.92	0.00
1.75	0.00	7.83	0.00		13.92	0.00	20.00	0.00
1.83	0.00	7.92	0.00		14.00	0.00	20.08	0.00
1.92	0.00	8.00	0.00		14.08	0.00	20.17	0.00
2.00	17.00	8.08	0.00		14.17	0.00	20.25	0.00
2.08	0.00	8.17	0.00		14.25	0.00	20.33	0.00
2.17	0.00	8.25	0.00		14.33	0.00	20.42	0.00
2.25	0.00	8.33	0.00		14.42	0.00	20.50	0.00
2.33	0.00	8.42	0.00		14.50	0.00	20.58	0.00
2.42	0.00	8.50	0.00		14.58	0.00	20.67	0.00
2.50	0.00	8.58	0.00		14.67	0.00	20.75	0.00
2.58	0.00	8.67	0.00		14.75	0.00	20.83	0.00
2.67	0.00	8.75	0.00		14.83	0.00	20.92	0.00
2.75	0.00	8.83	0.00		14.92	0.00	21.00	0.00
2.83	0.00	8.92	0.00		15.00	0.00	21.08	0.00
2.92	0.00	9.00	0.00		15.08	0.00	21.17	0.00
3.00	0.00	9.08	0.00		15.17	0.00	21.25	0.00
3.08	0.00	9.17	0.00		15.25	0.00	21.33	0.00
3.17	0.00	9.25	0.00		15.33	0.00	21.42	0.00
3.25	0.00	9.33	0.00		15.42	0.00	21.50	0.00
3.33	0.00	9.42	0.00		15.50	0.00	21.58	0.00
3.42	0.00	9.50	0.00		15.58	0.00	21.67	0.00
3.50	0.00	9.58	0.00		15.67	0.00	21.75	0.00
3.58	0.00	9.67	0.00		15.75	0.00	21.83	0.00
3.67	0.00	9.75	0.00		15.83	0.00	21.92	0.00

3.75	0.00	9.83	0.00	15.92	0.00	22.00	0.00
3.83	0.00	9.92	0.00	16.00	0.00	22.08	0.00
3.92	0.00	10.00	0.00	16.08	0.00	22.17	0.00
4.00	0.00	10.08	0.00	16.17	0.00	22.25	0.00
4.08	0.00	10.17	0.00	16.25	0.00	22.33	0.00
4.17	0.00	10.25	0.00	16.33	0.00	22.42	0.00
4.25	0.00	10.33	0.00	16.42	0.00	22.50	0.00
4.33	0.00	10.42	0.00	16.50	0.00	22.58	0.00
4.42	0.00	10.50	0.00	16.58	0.00	22.67	0.00
4.50	0.00	10.58	0.00	16.67	0.00	22.75	0.00
4.58	0.00	10.67	0.00	16.75	0.00	22.83	0.00
4.67	0.00	10.75	0.00	16.83	0.00	22.92	0.00
4.75	0.00	10.83	0.00	16.92	0.00	23.00	0.00
4.83	0.00	10.92	0.00	17.00	0.00	23.08	0.00
4.92	0.00	11.00	0.00	17.08	0.00	23.17	0.00
5.00	0.00	11.08	0.00	17.17	0.00	23.25	0.00
5.08	0.00	11.17	0.00	17.25	0.00	23.33	0.00
5.17	0.00	11.25	0.00	17.33	0.00	23.42	0.00
5.25	0.00	11.33	0.00	17.42	0.00	23.50	0.00
5.33	0.00	11.42	0.00	17.50	0.00	23.58	0.00
5.42	0.00	11.50	0.00	17.58	0.00	23.67	0.00
5.50	0.00	11.58	0.00	17.67	0.00	23.75	0.00
5.58	0.00	11.67	0.00	17.75	0.00	23.83	0.00
5.67	0.00	11.75	0.00	17.83	0.00	23.92	0.00
5.75	0.00	11.83	0.00	17.92	0.00	24.00	3.00
5.83	0.00	11.92	0.00	18.00	0.00		
5.92	0.00	12.00	4.90	18.08	0.00		
6.00	7.90	12.08	0.00	18.17	0.00		

CALIB			
NASHYD (0201)	Area (ha)=	20.78	Curve Number (CN)= 75.0
ID= 1 DT= 5.0 min	Ia (mm)=	8.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.12	

Unit Hyd Qpeak (cms)= 6.614

PEAK FLOW (cms)= 0.742 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 6.529

TOTAL RAINFALL (mm)= 35.708

RUNOFF COEFFICIENT = 0.183

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
-------	--

STANDHYD (0202)	Area (ha)= 2.74	
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 52.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.42	1.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	135.15	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	131.40	34.10	
over (min)	5.00	20.00	
Storage Coeff. (min)=	2.74 (ii)	16.03 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.28	0.06	
			TOTALS
PEAK FLOW (cms)=	0.44	0.06	0.439 (iii)
TIME TO PEAK (hrs)=	0.17	0.58	0.17
RUNOFF VOLUME (mm)=	33.71	14.43	24.45
TOTAL RAINFALL (mm)=	35.71	35.71	35.71
RUNOFF COEFFICIENT =	0.94	0.40	0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 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.

CALIB	
STANDHYD (0203)	Area (ha)= 1.11
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 74.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.82	0.29	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	86.02	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	131.40	50.55	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.09 (ii)	13.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.08	
			TOTALS
PEAK FLOW (cms)=	0.27	0.02	0.274 (iii)

TIME TO PEAK	(hrs)=	0.17	0.42	0.17
RUNOFF VOLUME	(mm)=	33.71	20.10	30.16
TOTAL RAINFALL	(mm)=	35.71	35.71	35.71
RUNOFF COEFFICIENT	=	0.94	0.56	0.84

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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.

```

-----
| ADD HYD ( 0200) |
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0201):  20.78  0.742  0.33  6.53
+ ID2= 2 ( 0202):  2.74  0.439  0.17  24.45
=====
ID = 3 ( 0200):  23.52  1.076  0.33  8.62

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0200) |
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0200):  23.52  1.076  0.33  8.62
+ ID2= 2 ( 0203):  1.11  0.274  0.17  30.16
=====
ID = 1 ( 0200):  24.63  1.264  0.33  9.59

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 2.43 Curve Number (CN)= 82.0
| ID= 1 DT= 5.0 min | Ia (mm)= 4.90 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.07

```

Unit Hyd Qpeak (cms)= 1.326

PEAK FLOW (cms)= 0.187 (i)
 TIME TO PEAK (hrs)= 0.333
 RUNOFF VOLUME (mm)= 10.000
 TOTAL RAINFALL (mm)= 35.708

RUNOFF COEFFICIENT = 0.280

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB |
| STANDHYD ( 0102) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 0.81
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

IMPervIOUS    PERVIOUS (i)
Surface Area (ha)= 0.80 0.01
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 1.00 2.00
Length (m)= 73.48 40.00
Mannings n = 0.013 0.350

Max.Eff.Inten.(mm/hr)= 131.40 77.76
over (min) 5.00 5.00
Storage Coeff. (min)= 1.90 (ii) 3.14 (ii)
Unit Hyd. Tpeak (min)= 5.00 5.00
Unit Hyd. peak (cms)= 0.32 0.27

*TOTALS*
PEAK FLOW (cms)= 0.27 0.00 0.273 (iii)
TIME TO PEAK (hrs)= 0.17 0.25 0.17
RUNOFF VOLUME (mm)= 33.71 26.27 33.63
TOTAL RAINFALL (mm)= 35.71 35.71 35.71
RUNOFF COEFFICIENT = 0.94 0.74 0.94
```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 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.

```
-----
| CALIB |
| STANDHYD ( 0103) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 1.26
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

IMPervIOUS    PERVIOUS (i)
Surface Area (ha)= 1.25 0.01
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 1.00 2.00
Length (m)= 91.65 40.00
Mannings n = 0.013 0.350
```


Max.Eff.Inten.(mm/hr)=	131.40	77.76	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.17 (ii)	3.41 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.31	0.26	
			TOTALS
PEAK FLOW (cms)=	0.41	0.00	0.411 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	33.71	26.27	33.63
TOTAL RAINFALL (mm)=	35.71	35.71	35.71
RUNOFF COEFFICIENT =	0.94	0.74	0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 98.0 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.

CALIB			
STANDHYD (0104)	Area (ha)=	1.76	
ID= 1 DT= 5.0 min	Total Imp(%)=	99.00	Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=		1.74	0.02	
Dep. Storage (mm)=		2.00	5.00	
Average Slope (%)=		1.00	2.00	
Length (m)=		108.32	40.00	
Mannings n =		0.013	0.350	
Max.Eff.Inten.(mm/hr)=	131.40	77.76		
over (min)	5.00	5.00		
Storage Coeff. (min)=	2.40 (ii)	3.63 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.30	0.25		
				TOTALS
PEAK FLOW (cms)=	0.56	0.00	0.559 (iii)	
TIME TO PEAK (hrs)=	0.17	0.25	0.17	
RUNOFF VOLUME (mm)=	33.71	26.27	33.63	
TOTAL RAINFALL (mm)=	35.71	35.71	35.71	
RUNOFF COEFFICIENT =	0.94	0.74	0.94	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 98.0 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.

ADD HYD (0100)				
1 + 2 = 3				

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0101):	2.43	0.187	0.33	10.00
+ ID2= 2 (0102):	0.81	0.273	0.17	33.63
=====				
ID = 3 (0100):	3.24	0.368	0.25	15.91

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0100)				
3 + 2 = 1				

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0100):	3.24	0.368	0.25	15.91
+ ID2= 2 (0103):	1.26	0.411	0.17	33.63
=====				
ID = 1 (0100):	4.50	0.735	0.17	20.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0100)				
1 + 2 = 3				

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0100):	4.50	0.735	0.17	20.87
+ ID2= 2 (0104):	1.76	0.559	0.17	33.63
=====				
ID = 3 (0100):	6.26	1.294	0.17	24.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0011)				
IN= 2---> OUT= 1				
DT= 5.0 min				

OVERFLOW IS OFF				
	OUTFLOW	STORAGE	OUTFLOW	STORAGE
	(cms)	(ha.m.)	(cms)	(ha.m.)
	0.0000	0.0000	0.3528	0.0906
	0.0438	0.0064	0.3938	0.1293
	0.1804	0.0192	0.4310	0.1722
	0.2514	0.0371	0.4651	0.2190
	0.3063	0.0602	0.4970	0.2700

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0100)	6.260	1.294	0.17	24.46
OUTFLOW: ID= 1 (0011)	6.260	0.334	0.42	24.45

PEAK FLOW REDUCTION [Qout/Qin](%)= 25.83
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0813

CALIB			
STANDHYD (0105)	Area (ha)= 1.16		
ID= 1 DT= 5.0 min	Total Imp(%)= 21.00	Dir. Conn.(%)= 21.00	

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.24	0.92	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	87.94	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	131.40	28.90	
over (min)	5.00	20.00	
Storage Coeff. (min)=	2.12 (ii)	16.31 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.31	0.06	
			TOTALS
PEAK FLOW (cms)=	0.08	0.04	0.082 (iii)
TIME TO PEAK (hrs)=	0.17	0.58	0.17
RUNOFF VOLUME (mm)=	33.71	12.48	16.93
TOTAL RAINFALL (mm)=	35.71	35.71	35.71
RUNOFF COEFFICIENT =	0.94	0.35	0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

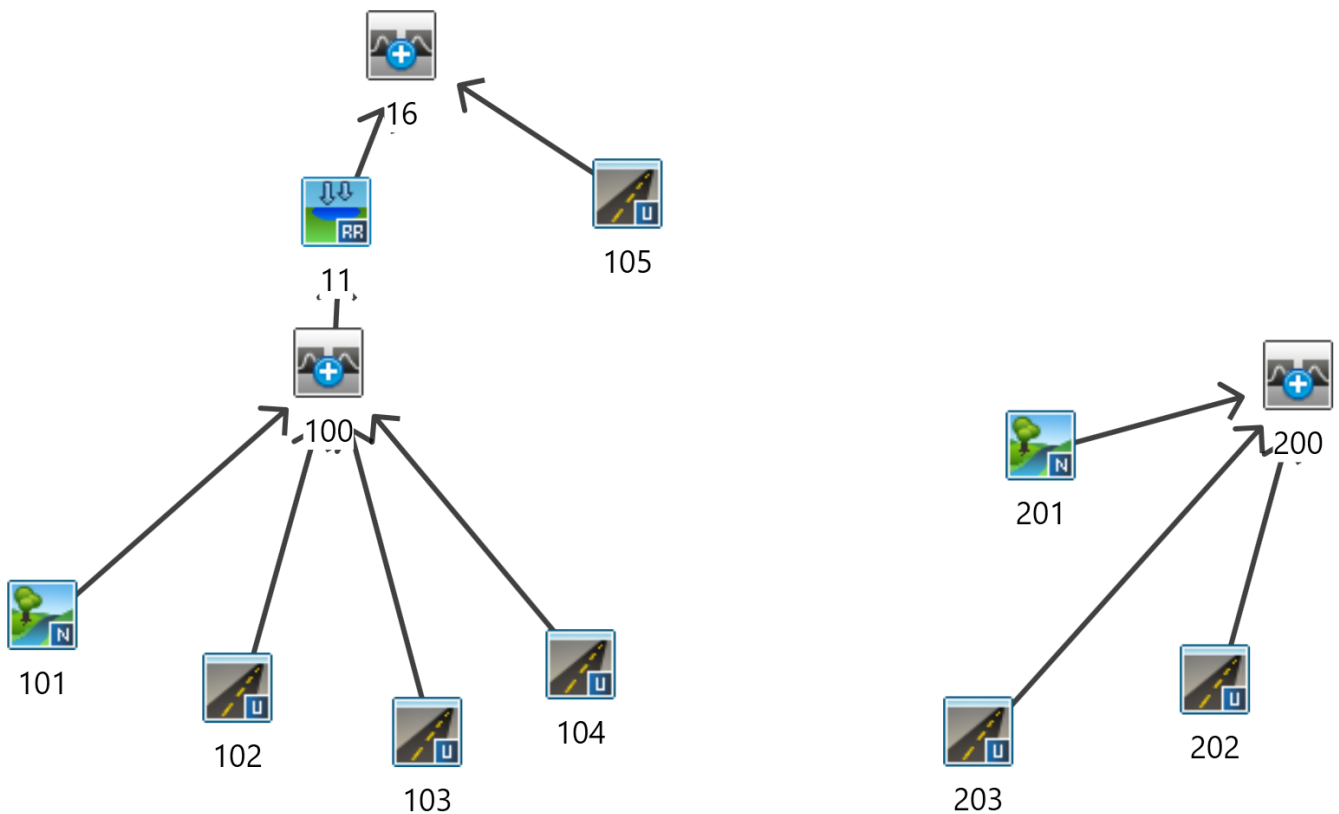
- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)				
1 + 2 = 3				
ID1= 1 (0105):	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	1.16	0.082	0.17	16.93

+ ID2= 2 (0011):	6.26	0.334	0.42	24.45
=====				
ID = 3 (0016):	7.42	0.392	0.33	23.28

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

VISUAL OTTHYMO 100-YEAR POST-DEVELOPMENT RESULTS (2026 MTO Storm Event)



```

=====
=====
V   V   I   SSSSS U   U   A   L           (v 6.2.2015)
V   V   I   SS    U   U   A A   L
V   V   I   SS    U   U   AAAAA L
V   V   I   SS    U   U   A   A   L
  VV    I   SSSSS UUUUU A   A   LLLLL

```

```

000   TTTTT TTTTT H   H   Y   Y   M   M   000   TM
O   O   T       T   H   H   Y Y   MM MM   O   O
O   O   T       T   H   H   Y   M   M   O   O
000     T       T   H   H   Y   M   M   000

```

Developed and Distributed by Smart City Water Inc
 Copyright 2007 - 2022 Smart City Water Inc
 All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:
 C:\Users\CAJD070997\AppData\Local\Civica\XH5\6ab6c1b-52c7-43db-abbf-e705320d2511\4963c36-0de4-409f-b604-07c5b7eb85cf\s
 Summary filename:
 C:\Users\CAJD070997\AppData\Local\Civica\XH5\6ab6c1b-52c7-43db-abbf-e705320d2511\4963c36-0de4-409f-b604-07c5b7eb85cf\s

DATE: 03-12-2026

TIME: 12:05:56

USER:

COMMENTS: _____

```

-----
*****
** SIMULATION : 100-yr 2026          **
*****

```

READ STORM

Filename: C:\Users\CAJD070997\AppData\Local\Temp\

Ptotal= 59.42 mm	662c8c4a-a34e-4ff9-bafe-5680f7530c23\ a33414bf
Comments: 100-yr Storm (2026)	

TIME	RAIN	TIME	RAIN	'	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	'	hrs	mm/hr	hrs	mm/hr
0.00	0.00	6.08	0.00		12.17	0.00	18.25	0.00
0.08	258.80	6.17	0.00		12.25	0.00	18.33	0.00
0.17	159.60	6.25	0.00		12.33	0.00	18.42	0.00
0.25	120.30	6.33	0.00		12.42	0.00	18.50	0.00
0.33	0.00	6.42	0.00		12.50	0.00	18.58	0.00
0.42	0.00	6.50	0.00		12.58	0.00	18.67	0.00
0.50	74.20	6.58	0.00		12.67	0.00	18.75	0.00
0.58	0.00	6.67	0.00		12.75	0.00	18.83	0.00
0.67	0.00	6.75	0.00		12.83	0.00	18.92	0.00
0.75	0.00	6.83	0.00		12.92	0.00	19.00	0.00
0.83	0.00	6.92	0.00		13.00	0.00	19.08	0.00
0.92	0.00	7.00	0.00		13.08	0.00	19.17	0.00
1.00	45.70	7.08	0.00		13.17	0.00	19.25	0.00
1.08	0.00	7.17	0.00		13.25	0.00	19.33	0.00
1.17	0.00	7.25	0.00		13.33	0.00	19.42	0.00
1.25	0.00	7.33	0.00		13.42	0.00	19.50	0.00
1.33	0.00	7.42	0.00		13.50	0.00	19.58	0.00
1.42	0.00	7.50	0.00		13.58	0.00	19.67	0.00
1.50	0.00	7.58	0.00		13.67	0.00	19.75	0.00
1.58	0.00	7.67	0.00		13.75	0.00	19.83	0.00
1.67	0.00	7.75	0.00		13.83	0.00	19.92	0.00
1.75	0.00	7.83	0.00		13.92	0.00	20.00	0.00
1.83	0.00	7.92	0.00		14.00	0.00	20.08	0.00
1.92	0.00	8.00	0.00		14.08	0.00	20.17	0.00
2.00	28.20	8.08	0.00		14.17	0.00	20.25	0.00
2.08	0.00	8.17	0.00		14.25	0.00	20.33	0.00
2.17	0.00	8.25	0.00		14.33	0.00	20.42	0.00
2.25	0.00	8.33	0.00		14.42	0.00	20.50	0.00
2.33	0.00	8.42	0.00		14.50	0.00	20.58	0.00
2.42	0.00	8.50	0.00		14.58	0.00	20.67	0.00
2.50	0.00	8.58	0.00		14.67	0.00	20.75	0.00
2.58	0.00	8.67	0.00		14.75	0.00	20.83	0.00
2.67	0.00	8.75	0.00		14.83	0.00	20.92	0.00
2.75	0.00	8.83	0.00		14.92	0.00	21.00	0.00
2.83	0.00	8.92	0.00		15.00	0.00	21.08	0.00
2.92	0.00	9.00	0.00		15.08	0.00	21.17	0.00
3.00	0.00	9.08	0.00		15.17	0.00	21.25	0.00
3.08	0.00	9.17	0.00		15.25	0.00	21.33	0.00
3.17	0.00	9.25	0.00		15.33	0.00	21.42	0.00
3.25	0.00	9.33	0.00		15.42	0.00	21.50	0.00
3.33	0.00	9.42	0.00		15.50	0.00	21.58	0.00
3.42	0.00	9.50	0.00		15.58	0.00	21.67	0.00
3.50	0.00	9.58	0.00		15.67	0.00	21.75	0.00
3.58	0.00	9.67	0.00		15.75	0.00	21.83	0.00
3.67	0.00	9.75	0.00		15.83	0.00	21.92	0.00

3.75	0.00	9.83	0.00	15.92	0.00	22.00	0.00
3.83	0.00	9.92	0.00	16.00	0.00	22.08	0.00
3.92	0.00	10.00	0.00	16.08	0.00	22.17	0.00
4.00	0.00	10.08	0.00	16.17	0.00	22.25	0.00
4.08	0.00	10.17	0.00	16.25	0.00	22.33	0.00
4.17	0.00	10.25	0.00	16.33	0.00	22.42	0.00
4.25	0.00	10.33	0.00	16.42	0.00	22.50	0.00
4.33	0.00	10.42	0.00	16.50	0.00	22.58	0.00
4.42	0.00	10.50	0.00	16.58	0.00	22.67	0.00
4.50	0.00	10.58	0.00	16.67	0.00	22.75	0.00
4.58	0.00	10.67	0.00	16.75	0.00	22.83	0.00
4.67	0.00	10.75	0.00	16.83	0.00	22.92	0.00
4.75	0.00	10.83	0.00	16.92	0.00	23.00	0.00
4.83	0.00	10.92	0.00	17.00	0.00	23.08	0.00
4.92	0.00	11.00	0.00	17.08	0.00	23.17	0.00
5.00	0.00	11.08	0.00	17.17	0.00	23.25	0.00
5.08	0.00	11.17	0.00	17.25	0.00	23.33	0.00
5.17	0.00	11.25	0.00	17.33	0.00	23.42	0.00
5.25	0.00	11.33	0.00	17.42	0.00	23.50	0.00
5.33	0.00	11.42	0.00	17.50	0.00	23.58	0.00
5.42	0.00	11.50	0.00	17.58	0.00	23.67	0.00
5.50	0.00	11.58	0.00	17.67	0.00	23.75	0.00
5.58	0.00	11.67	0.00	17.75	0.00	23.83	0.00
5.67	0.00	11.75	0.00	17.83	0.00	23.92	0.00
5.75	0.00	11.83	0.00	17.92	0.00	24.00	5.00
5.83	0.00	11.92	0.00	18.00	0.00		
5.92	0.00	12.00	8.10	18.08	0.00		
6.00	13.10	12.08	0.00	18.17	0.00		

```

-----
| CALIB                                     |
| NASHYD ( 0201) | Area (ha)= 20.78 Curve Number (CN)= 75.0
| ID= 1 DT= 5.0 min | Ia (mm)= 8.50 # of Linear Res.(N)= 3.00
-----
| U.H. Tp(hrs)= 0.12

```

Unit Hyd Qpeak (cms)= 6.614

PEAK FLOW (cms)= 2.350 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 18.866

TOTAL RAINFALL (mm)= 59.417

RUNOFF COEFFICIENT = 0.318

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| CALIB                                     |

```


STANDHYD (0202)	Area (ha)= 2.74	
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 52.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.42	1.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	135.15	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	234.80	95.95	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.18 (ii)	10.96 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.09	
			TOTALS
PEAK FLOW (cms)=	0.84	0.20	0.857 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.17
RUNOFF VOLUME (mm)=	57.42	33.25	45.82
TOTAL RAINFALL (mm)=	59.42	59.42	59.42
RUNOFF COEFFICIENT =	0.97	0.56	0.77

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 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.

CALIB	
STANDHYD (0203)	Area (ha)= 1.11
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 74.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.82	0.29	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	86.02	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	234.80	119.95	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.66 (ii)	5.70 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.15	
			TOTALS
PEAK FLOW (cms)=	0.51	0.08	0.528 (iii)

TIME TO PEAK	(hrs)=	0.17	0.33	0.17
RUNOFF VOLUME	(mm)=	57.42	41.93	53.39
TOTAL RAINFALL	(mm)=	59.42	59.42	59.42
RUNOFF COEFFICIENT	=	0.97	0.71	0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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.

```

-----
| ADD HYD ( 0200) |
| 1 + 2 = 3 |
-----

```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0201):	20.78	2.350	0.33	18.87
+ ID2= 2 (0202):	2.74	0.857	0.17	45.82
=====				
ID = 3 (0200):	23.52	3.003	0.33	22.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0200) |
| 3 + 2 = 1 |
-----

```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0200):	23.52	3.003	0.33	22.01
+ ID2= 2 (0203):	1.11	0.528	0.17	53.39
=====				
ID = 1 (0200):	24.63	3.365	0.33	23.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 0101) |
| ID= 1 DT= 5.0 min |
-----

```

Area	(ha)=	2.43	Curve Number	(CN)= 82.0
Ia	(mm)=	4.90	# of Linear Res.(N)=	3.00
U.H. Tp	(hrs)=	0.07		

Unit Hyd Qpeak (cms)= 1.326

PEAK FLOW	(cms)=	0.454 (i)
TIME TO PEAK	(hrs)=	0.333
RUNOFF VOLUME	(mm)=	24.580
TOTAL RAINFALL	(mm)=	59.417

RUNOFF COEFFICIENT = 0.414

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB |
| STANDHYD ( 0102) |
| ID= 1 DT= 5.0 min |
-----
```

Area (ha)=	0.81	
Total Imp(%)=	99.00	Dir. Conn.(%)= 99.00
	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.80	0.01
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	73.48	40.00
Mannings n =	0.013	0.350
Max.Eff.Inten.(mm/hr)=	234.80	152.70
over (min)	5.00	5.00
Storage Coeff. (min)=	1.51 (ii)	2.49 (ii)
Unit Hyd. Tpeak (min)=	5.00	5.00
Unit Hyd. peak (cms)=	0.33	0.29
		TOTALS
PEAK FLOW (cms)=	0.50	0.00 0.507 (iii)
TIME TO PEAK (hrs)=	0.17	0.25 0.17
RUNOFF VOLUME (mm)=	57.42	49.68 57.34
TOTAL RAINFALL (mm)=	59.42	59.42 59.42
RUNOFF COEFFICIENT =	0.97	0.84 0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 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.

```
-----
| CALIB |
| STANDHYD ( 0103) |
| ID= 1 DT= 5.0 min |
-----
```

Area (ha)=	1.26	
Total Imp(%)=	99.00	Dir. Conn.(%)= 99.00
	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.25	0.01
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	91.65	40.00
Mannings n =	0.013	0.350

Max.Eff.Inten.(mm/hr)=	234.80	152.70	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.72 (ii)	2.70 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.29	
			TOTALS
PEAK FLOW (cms)=	0.77	0.01	0.773 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	57.42	49.68	57.34
TOTAL RAINFALL (mm)=	59.42	59.42	59.42
RUNOFF COEFFICIENT =	0.97	0.84	0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 98.0 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.

CALIB			
STANDHYD (0104)	Area (ha)=	1.76	
ID= 1 DT= 5.0 min	Total Imp(%)=	99.00	Dir. Conn.(%)= 99.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.74	0.02	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	108.32	40.00	
Mannings n	=	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	234.80	152.70		
over (min)	5.00	5.00		
Storage Coeff. (min)=	1.90 (ii)	2.88 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.32	0.28		
				TOTALS
PEAK FLOW (cms)=	1.05	0.01	1.060 (iii)	
TIME TO PEAK (hrs)=	0.17	0.25	0.17	
RUNOFF VOLUME (mm)=	57.42	49.68	57.34	
TOTAL RAINFALL (mm)=	59.42	59.42	59.42	
RUNOFF COEFFICIENT =	0.97	0.84	0.97	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 98.0 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.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0101):    2.43    0.454    0.33    24.58
+ ID2= 2 ( 0102):    0.81    0.507    0.17    57.34
=====
ID = 3 ( 0100):    3.24    0.772    0.25    32.77
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0100):    3.24    0.772    0.25    32.77
+ ID2= 2 ( 0103):    1.26    0.773    0.17    57.34
=====
ID = 1 ( 0100):    4.50    1.474    0.17    39.65
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0100):    4.50    1.474    0.17    39.65
+ ID2= 2 ( 0104):    1.76    1.060    0.17    57.34
=====
ID = 3 ( 0100):    6.26    2.534    0.17    44.62
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| RESERVOIR( 0011)|
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
-----
          OVERFLOW IS OFF
          OUTFLOW      STORAGE      OUTFLOW      STORAGE
          (cms)      (ha.m.)      (cms)      (ha.m.)
          0.0000      0.0000      0.3528      0.0906
          0.0438      0.0064      0.3938      0.1293
          0.1804      0.0192      0.4310      0.1722
          0.2514      0.0371      0.4651      0.2190
          0.3063      0.0602      0.4970      0.2700
  
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0100)	6.260	2.534	0.17	44.62
OUTFLOW: ID= 1 (0011)	6.260	0.420	0.42	44.62

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.59
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.1793

```

-----
| CALIB |
| STANDHYD ( 0105) |
| ID= 1 DT= 5.0 min |
-----

```

Area (ha)= 1.16
 Total Imp(%)= 21.00 Dir. Conn.(%)= 21.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.24	0.92	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	87.94	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	234.80	85.88	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.68 (ii)	10.86 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.32	0.09	
			TOTALS
PEAK FLOW (cms)=	0.15	0.12	0.179 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.33
RUNOFF VOLUME (mm)=	57.42	29.84	35.63
TOTAL RAINFALL (mm)=	59.42	59.42	59.42
RUNOFF COEFFICIENT =	0.97	0.50	0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 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.

```

-----
| ADD HYD ( 0016) |
| 1 + 2 = 3 |
-----

```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	1.16	0.179	0.33	35.63

+ ID2= 2 (0011):	6.26	0.420	0.42	44.62
=====				
ID = 3 (0016):	7.42	0.585	0.33	43.21

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

=====

=====

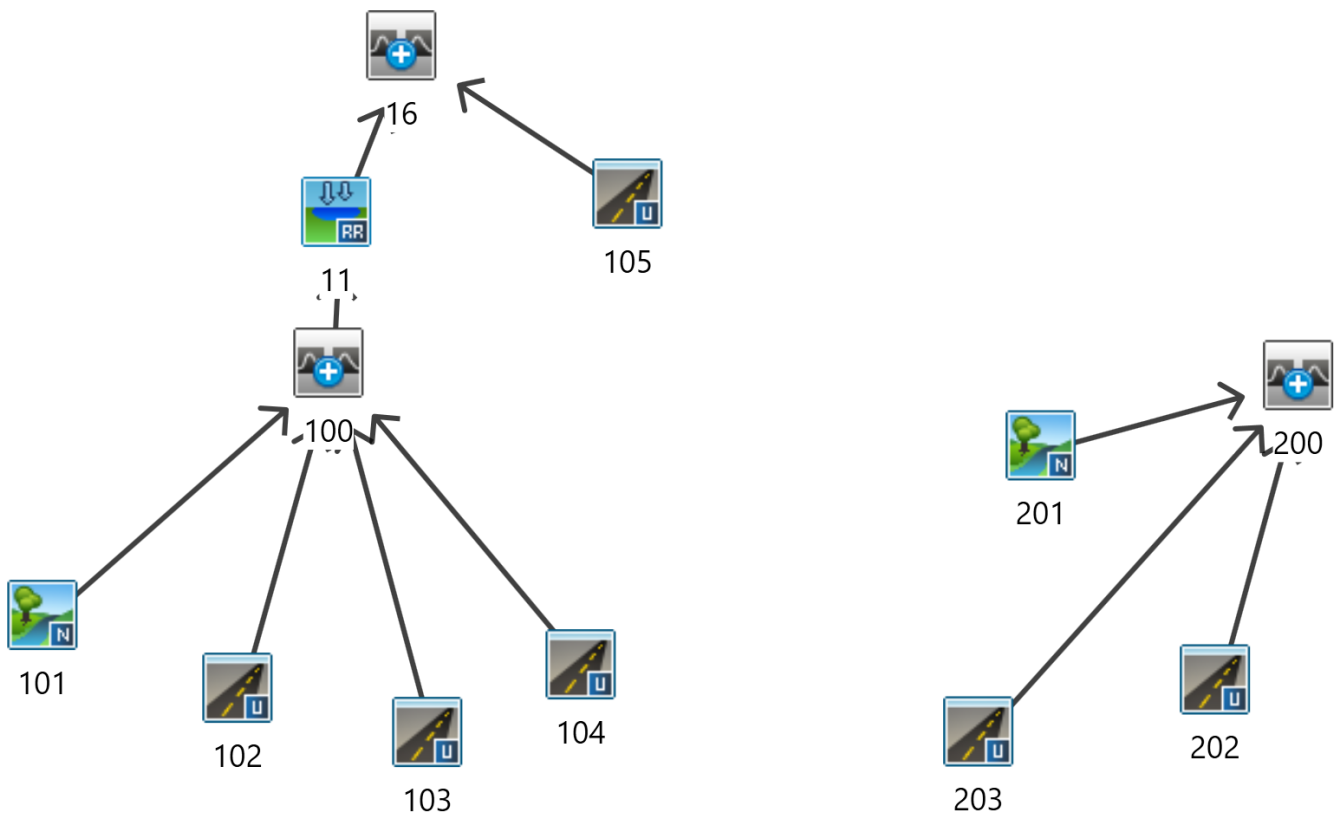
VISUAL OTTHYMO

5-YEAR

POST-DEVELOPMENT

RESULTS

(2090 MTO Storm Event)



=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\2ffe4cb4-9a4b-4e83-91db-78db37b478ff\s

Summary filename:

C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\2ffe4cb4-9a4b-4e83-91db-78db37b478ff\s

DATE: 03-12-2026

TIME: 12:05:54

USER:

COMMENTS: _____

** SIMULATION : 5-yr Projected for 2090 **

| READ STORM |

Filename: C:\Users\CAJD070997\AppData\Local\Temp\

Ptotal= 37.48 mm	662c8c4a-a34e-4ff9-bafe-5680f7530c23\c922c664
Comments: 5-yr Storm (Projected for 2090)	

TIME	RAIN	TIME	RAIN	'	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	'	hrs	mm/hr	hrs	mm/hr
0.00	0.00	6.08	0.00		12.17	0.00	18.25	0.00
0.08	161.50	6.17	0.00		12.25	0.00	18.33	0.00
0.17	100.20	6.25	0.00		12.33	0.00	18.42	0.00
0.25	75.80	6.33	0.00		12.42	0.00	18.50	0.00
0.33	0.00	6.42	0.00		12.50	0.00	18.58	0.00
0.42	0.00	6.50	0.00		12.58	0.00	18.67	0.00
0.50	47.10	6.58	0.00		12.67	0.00	18.75	0.00
0.58	0.00	6.67	0.00		12.75	0.00	18.83	0.00
0.67	0.00	6.75	0.00		12.83	0.00	18.92	0.00
0.75	0.00	6.83	0.00		12.92	0.00	19.00	0.00
0.83	0.00	6.92	0.00		13.00	0.00	19.08	0.00
0.92	0.00	7.00	0.00		13.08	0.00	19.17	0.00
1.00	29.30	7.08	0.00		13.17	0.00	19.25	0.00
1.08	0.00	7.17	0.00		13.25	0.00	19.33	0.00
1.17	0.00	7.25	0.00		13.33	0.00	19.42	0.00
1.25	0.00	7.33	0.00		13.42	0.00	19.50	0.00
1.33	0.00	7.42	0.00		13.50	0.00	19.58	0.00
1.42	0.00	7.50	0.00		13.58	0.00	19.67	0.00
1.50	0.00	7.58	0.00		13.67	0.00	19.75	0.00
1.58	0.00	7.67	0.00		13.75	0.00	19.83	0.00
1.67	0.00	7.75	0.00		13.83	0.00	19.92	0.00
1.75	0.00	7.83	0.00		13.92	0.00	20.00	0.00
1.83	0.00	7.92	0.00		14.00	0.00	20.08	0.00
1.92	0.00	8.00	0.00		14.08	0.00	20.17	0.00
2.00	18.30	8.08	0.00		14.17	0.00	20.25	0.00
2.08	0.00	8.17	0.00		14.25	0.00	20.33	0.00
2.17	0.00	8.25	0.00		14.33	0.00	20.42	0.00
2.25	0.00	8.33	0.00		14.42	0.00	20.50	0.00
2.33	0.00	8.42	0.00		14.50	0.00	20.58	0.00
2.42	0.00	8.50	0.00		14.58	0.00	20.67	0.00
2.50	0.00	8.58	0.00		14.67	0.00	20.75	0.00
2.58	0.00	8.67	0.00		14.75	0.00	20.83	0.00
2.67	0.00	8.75	0.00		14.83	0.00	20.92	0.00
2.75	0.00	8.83	0.00		14.92	0.00	21.00	0.00
2.83	0.00	8.92	0.00		15.00	0.00	21.08	0.00
2.92	0.00	9.00	0.00		15.08	0.00	21.17	0.00
3.00	0.00	9.08	0.00		15.17	0.00	21.25	0.00
3.08	0.00	9.17	0.00		15.25	0.00	21.33	0.00
3.17	0.00	9.25	0.00		15.33	0.00	21.42	0.00
3.25	0.00	9.33	0.00		15.42	0.00	21.50	0.00
3.33	0.00	9.42	0.00		15.50	0.00	21.58	0.00
3.42	0.00	9.50	0.00		15.58	0.00	21.67	0.00
3.50	0.00	9.58	0.00		15.67	0.00	21.75	0.00
3.58	0.00	9.67	0.00		15.75	0.00	21.83	0.00
3.67	0.00	9.75	0.00		15.83	0.00	21.92	0.00

3.75	0.00	9.83	0.00	15.92	0.00	22.00	0.00
3.83	0.00	9.92	0.00	16.00	0.00	22.08	0.00
3.92	0.00	10.00	0.00	16.08	0.00	22.17	0.00
4.00	0.00	10.08	0.00	16.17	0.00	22.25	0.00
4.08	0.00	10.17	0.00	16.25	0.00	22.33	0.00
4.17	0.00	10.25	0.00	16.33	0.00	22.42	0.00
4.25	0.00	10.33	0.00	16.42	0.00	22.50	0.00
4.33	0.00	10.42	0.00	16.50	0.00	22.58	0.00
4.42	0.00	10.50	0.00	16.58	0.00	22.67	0.00
4.50	0.00	10.58	0.00	16.67	0.00	22.75	0.00
4.58	0.00	10.67	0.00	16.75	0.00	22.83	0.00
4.67	0.00	10.75	0.00	16.83	0.00	22.92	0.00
4.75	0.00	10.83	0.00	16.92	0.00	23.00	0.00
4.83	0.00	10.92	0.00	17.00	0.00	23.08	0.00
4.92	0.00	11.00	0.00	17.08	0.00	23.17	0.00
5.00	0.00	11.08	0.00	17.17	0.00	23.25	0.00
5.08	0.00	11.17	0.00	17.25	0.00	23.33	0.00
5.17	0.00	11.25	0.00	17.33	0.00	23.42	0.00
5.25	0.00	11.33	0.00	17.42	0.00	23.50	0.00
5.33	0.00	11.42	0.00	17.50	0.00	23.58	0.00
5.42	0.00	11.50	0.00	17.58	0.00	23.67	0.00
5.50	0.00	11.58	0.00	17.67	0.00	23.75	0.00
5.58	0.00	11.67	0.00	17.75	0.00	23.83	0.00
5.67	0.00	11.75	0.00	17.83	0.00	23.92	0.00
5.75	0.00	11.83	0.00	17.92	0.00	24.00	3.40
5.83	0.00	11.92	0.00	18.00	0.00		
5.92	0.00	12.00	5.40	18.08	0.00		
6.00	8.70	12.08	0.00	18.17	0.00		

CALIB			
NASHYD (0201)	Area (ha)= 20.78	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 8.50	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.12		

Unit Hyd Qpeak (cms)= 6.614

PEAK FLOW (cms)= 0.826 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 7.289

TOTAL RAINFALL (mm)= 37.475

RUNOFF COEFFICIENT = 0.195

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
-------	--

STANDHYD (0202)	Area (ha)= 2.74	
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 52.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.42	1.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	135.15	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	137.50	37.03	
over (min)	5.00	20.00	
Storage Coeff. (min)=	2.69 (ii)	15.54 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.29	0.07	
			TOTALS
PEAK FLOW (cms)=	0.46	0.07	0.463 (iii)
TIME TO PEAK (hrs)=	0.17	0.58	0.17
RUNOFF VOLUME (mm)=	35.47	15.71	25.99
TOTAL RAINFALL (mm)=	37.48	37.48	37.48
RUNOFF COEFFICIENT =	0.95	0.42	0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 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.

CALIB	
STANDHYD (0203)	Area (ha)= 1.11
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 74.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.82	0.29	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	86.02	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	137.50	54.38	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.05 (ii)	13.07 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.08	
			TOTALS
PEAK FLOW (cms)=	0.29	0.03	0.288 (iii)

TIME TO PEAK	(hrs)=	0.17	0.42	0.17
RUNOFF VOLUME	(mm)=	35.47	21.66	31.88
TOTAL RAINFALL	(mm)=	37.48	37.48	37.48
RUNOFF COEFFICIENT	=	0.95	0.58	0.85

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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.

```

-----
| ADD HYD ( 0200) |
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0201):  20.78  0.826  0.33  7.29
+ ID2= 2 ( 0202):  2.74  0.463  0.17  25.99
=====
ID = 3 ( 0200):  23.52  1.177  0.33  9.47

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0200) |
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0200):  23.52  1.177  0.33  9.47
+ ID2= 2 ( 0203):  1.11  0.288  0.17  31.88
=====
ID = 1 ( 0200):  24.63  1.375  0.33  10.48

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 2.43 Curve Number (CN)= 82.0
| ID= 1 DT= 5.0 min | Ia (mm)= 4.90 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.07

```

Unit Hyd Qpeak (cms)= 1.326

PEAK FLOW (cms)= 0.203 (i)
 TIME TO PEAK (hrs)= 0.333
 RUNOFF VOLUME (mm)= 10.956
 TOTAL RAINFALL (mm)= 37.475

RUNOFF COEFFICIENT = 0.292

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB |
| STANDHYD ( 0102) |
| ID= 1 DT= 5.0 min |
|-----|
Area (ha)= 0.81
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
```

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.80	0.01	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	73.48	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	137.50	81.88	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.87 (ii)	3.08 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.27	
			TOTALS
PEAK FLOW (cms)=	0.29	0.00	0.286 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	35.48	28.00	35.40
TOTAL RAINFALL (mm)=	37.48	37.48	37.48
RUNOFF COEFFICIENT =	0.95	0.75	0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 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.

```
-----
| CALIB |
| STANDHYD ( 0103) |
| ID= 1 DT= 5.0 min |
|-----|
Area (ha)= 1.26
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.25	0.01
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	91.65	40.00
Mannings n =	0.013	0.350

Max.Eff.Inten.(mm/hr)=	137.50	81.88	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.13 (ii)	3.34 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.31	0.26	
			TOTALS
PEAK FLOW (cms)=	0.43	0.00	0.432 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	35.47	28.00	35.40
TOTAL RAINFALL (mm)=	37.48	37.48	37.48
RUNOFF COEFFICIENT =	0.95	0.75	0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 98.0 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.

CALIB			
STANDHYD (0104)	Area (ha)=	1.76	
ID= 1 DT= 5.0 min	Total Imp(%)=	99.00	Dir. Conn.(%)= 99.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.74	0.02	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	108.32	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	137.50	81.88	
over (min)	5.00	5.00	
Storage Coeff. (min)=	2.36 (ii)	3.57 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.30	0.26	
			TOTALS
PEAK FLOW (cms)=	0.59	0.00	0.588 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	35.48	28.00	35.40
TOTAL RAINFALL (mm)=	37.48	37.48	37.48
RUNOFF COEFFICIENT =	0.95	0.75	0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 98.0 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.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0101):    2.43    0.203    0.33    10.96
+ ID2= 2 ( 0102):    0.81    0.286    0.17    35.40
=====
ID = 3 ( 0100):    3.24    0.392    0.25    17.07
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0100):    3.24    0.392    0.25    17.07
+ ID2= 2 ( 0103):    1.26    0.432    0.17    35.40
=====
ID = 1 ( 0100):    4.50    0.776    0.17    22.20
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0100):    4.50    0.776    0.17    22.20
+ ID2= 2 ( 0104):    1.76    0.588    0.17    35.40
=====
ID = 3 ( 0100):    6.26    1.364    0.17    25.91
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| RESERVOIR( 0011)|
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
-----
          OVERFLOW IS OFF
          OUTFLOW      STORAGE      OUTFLOW      STORAGE
          (cms)      (ha.m.)      (cms)      (ha.m.)
          0.0000      0.0000      0.3528      0.0906
          0.0438      0.0064      0.3938      0.1293
          0.1804      0.0192      0.4310      0.1722
          0.2514      0.0371      0.4651      0.2190
          0.3063      0.0602      0.4970      0.2700
  
```


	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0100)	6.260	1.364	0.17	25.91
OUTFLOW: ID= 1 (0011)	6.260	0.342	0.42	25.91

PEAK FLOW REDUCTION [Qout/Qin](%)= 25.04
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0862

```

-----
| CALIB |
| STANDHYD ( 0105) |
| ID= 1 DT= 5.0 min |
-----

```

Area (ha)= 1.16
 Total Imp(%)= 21.00 Dir. Conn.(%)= 21.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.24	0.92	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	87.94	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	137.50	31.48	
over (min)	5.00	20.00	
Storage Coeff. (min)=	2.08 (ii)	15.79 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.31	0.07	
			TOTALS
PEAK FLOW (cms)=	0.08	0.04	0.087 (iii)
TIME TO PEAK (hrs)=	0.17	0.58	0.17
RUNOFF VOLUME (mm)=	35.47	13.64	18.22
TOTAL RAINFALL (mm)=	37.48	37.48	37.48
RUNOFF COEFFICIENT =	0.95	0.36	0.49

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 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.

```

-----
| ADD HYD ( 0016) |
| 1 + 2 = 3 |
-----

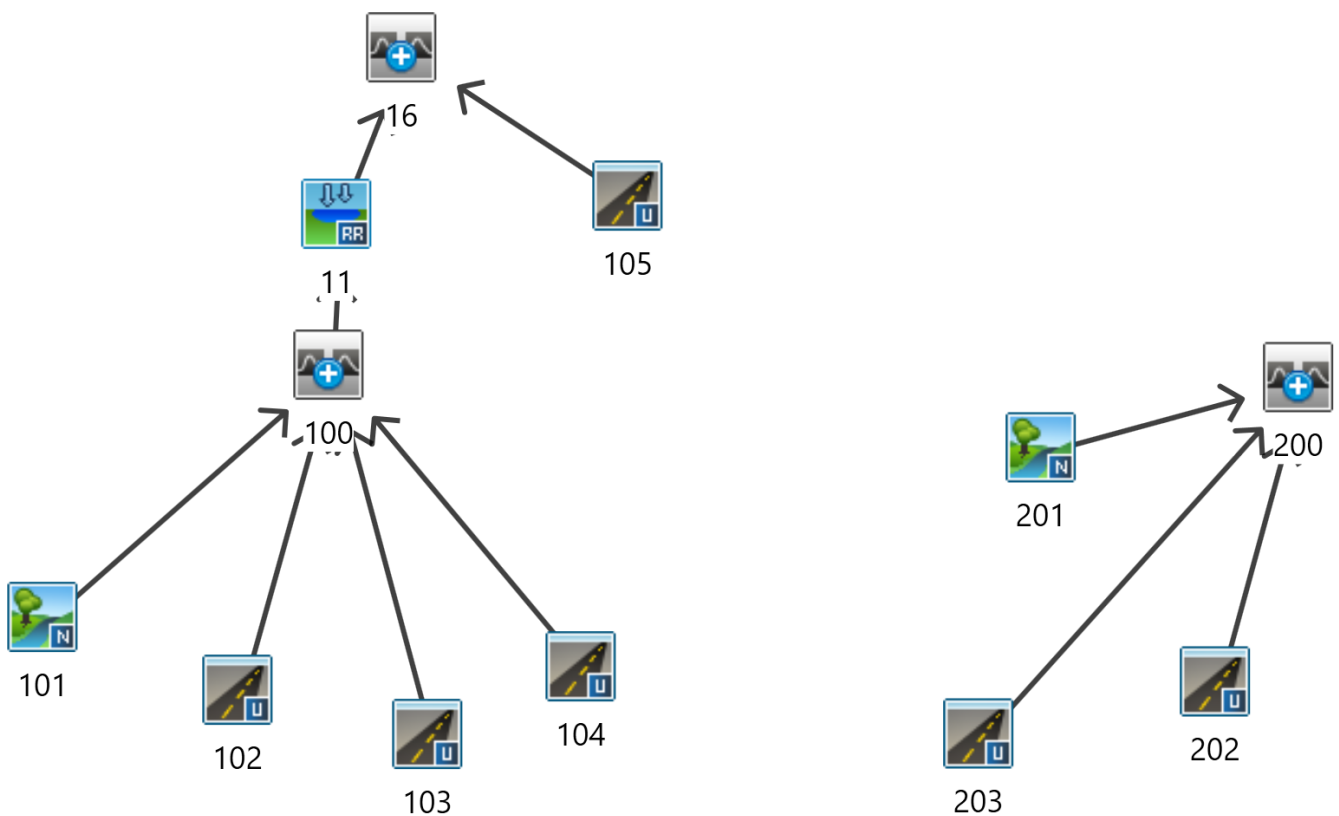
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	1.16	0.087	0.17	18.22

+ ID2= 2 (0011):	6.26	0.342	0.42	25.91
=====				
ID = 3 (0016):	7.42	0.403	0.33	24.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

VISUAL OTTHYMO 100-YEAR POST-DEVELOPMENT RESULTS (2090 MTO Storm Event)



=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:

C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\9634abb-83c8-495c-99b7-f4240591d601\s

Summary filename:

C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\9634abb-83c8-495c-99b7-f4240591d601\s

DATE: 03-12-2026

TIME: 12:05:55

USER:

COMMENTS: _____

** SIMULATION : 100-yr Projected for 2090 **

| READ STORM |

Filename: C:\Users\CAJD070997\AppData\Local\Temp\

Ptotal= 61.18 mm	662c8c4a-a34e-4ff9-bafe-5680f7530c23\2dd5c8a6
Comments: 100-yr Storm (Projected for 2090)	

TIME	RAIN	TIME	RAIN	'	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	'	hrs	mm/hr	hrs	mm/hr
0.00	0.00	6.08	0.00		12.17	0.00	18.25	0.00
0.08	264.90	6.17	0.00		12.25	0.00	18.33	0.00
0.17	163.90	6.25	0.00		12.33	0.00	18.42	0.00
0.25	123.80	6.33	0.00		12.42	0.00	18.50	0.00
0.33	0.00	6.42	0.00		12.50	0.00	18.58	0.00
0.42	0.00	6.50	0.00		12.58	0.00	18.67	0.00
0.50	76.70	6.58	0.00		12.67	0.00	18.75	0.00
0.58	0.00	6.67	0.00		12.75	0.00	18.83	0.00
0.67	0.00	6.75	0.00		12.83	0.00	18.92	0.00
0.75	0.00	6.83	0.00		12.92	0.00	19.00	0.00
0.83	0.00	6.92	0.00		13.00	0.00	19.08	0.00
0.92	0.00	7.00	0.00		13.08	0.00	19.17	0.00
1.00	47.50	7.08	0.00		13.17	0.00	19.25	0.00
1.08	0.00	7.17	0.00		13.25	0.00	19.33	0.00
1.17	0.00	7.25	0.00		13.33	0.00	19.42	0.00
1.25	0.00	7.33	0.00		13.42	0.00	19.50	0.00
1.33	0.00	7.42	0.00		13.50	0.00	19.58	0.00
1.42	0.00	7.50	0.00		13.58	0.00	19.67	0.00
1.50	0.00	7.58	0.00		13.67	0.00	19.75	0.00
1.58	0.00	7.67	0.00		13.75	0.00	19.83	0.00
1.67	0.00	7.75	0.00		13.83	0.00	19.92	0.00
1.75	0.00	7.83	0.00		13.92	0.00	20.00	0.00
1.83	0.00	7.92	0.00		14.00	0.00	20.08	0.00
1.92	0.00	8.00	0.00		14.08	0.00	20.17	0.00
2.00	29.50	8.08	0.00		14.17	0.00	20.25	0.00
2.08	0.00	8.17	0.00		14.25	0.00	20.33	0.00
2.17	0.00	8.25	0.00		14.33	0.00	20.42	0.00
2.25	0.00	8.33	0.00		14.42	0.00	20.50	0.00
2.33	0.00	8.42	0.00		14.50	0.00	20.58	0.00
2.42	0.00	8.50	0.00		14.58	0.00	20.67	0.00
2.50	0.00	8.58	0.00		14.67	0.00	20.75	0.00
2.58	0.00	8.67	0.00		14.75	0.00	20.83	0.00
2.67	0.00	8.75	0.00		14.83	0.00	20.92	0.00
2.75	0.00	8.83	0.00		14.92	0.00	21.00	0.00
2.83	0.00	8.92	0.00		15.00	0.00	21.08	0.00
2.92	0.00	9.00	0.00		15.08	0.00	21.17	0.00
3.00	0.00	9.08	0.00		15.17	0.00	21.25	0.00
3.08	0.00	9.17	0.00		15.25	0.00	21.33	0.00
3.17	0.00	9.25	0.00		15.33	0.00	21.42	0.00
3.25	0.00	9.33	0.00		15.42	0.00	21.50	0.00
3.33	0.00	9.42	0.00		15.50	0.00	21.58	0.00
3.42	0.00	9.50	0.00		15.58	0.00	21.67	0.00
3.50	0.00	9.58	0.00		15.67	0.00	21.75	0.00
3.58	0.00	9.67	0.00		15.75	0.00	21.83	0.00
3.67	0.00	9.75	0.00		15.83	0.00	21.92	0.00

3.75	0.00	9.83	0.00	15.92	0.00	22.00	0.00
3.83	0.00	9.92	0.00	16.00	0.00	22.08	0.00
3.92	0.00	10.00	0.00	16.08	0.00	22.17	0.00
4.00	0.00	10.08	0.00	16.17	0.00	22.25	0.00
4.08	0.00	10.17	0.00	16.25	0.00	22.33	0.00
4.17	0.00	10.25	0.00	16.33	0.00	22.42	0.00
4.25	0.00	10.33	0.00	16.42	0.00	22.50	0.00
4.33	0.00	10.42	0.00	16.50	0.00	22.58	0.00
4.42	0.00	10.50	0.00	16.58	0.00	22.67	0.00
4.50	0.00	10.58	0.00	16.67	0.00	22.75	0.00
4.58	0.00	10.67	0.00	16.75	0.00	22.83	0.00
4.67	0.00	10.75	0.00	16.83	0.00	22.92	0.00
4.75	0.00	10.83	0.00	16.92	0.00	23.00	0.00
4.83	0.00	10.92	0.00	17.00	0.00	23.08	0.00
4.92	0.00	11.00	0.00	17.08	0.00	23.17	0.00
5.00	0.00	11.08	0.00	17.17	0.00	23.25	0.00
5.08	0.00	11.17	0.00	17.25	0.00	23.33	0.00
5.17	0.00	11.25	0.00	17.33	0.00	23.42	0.00
5.25	0.00	11.33	0.00	17.42	0.00	23.50	0.00
5.33	0.00	11.42	0.00	17.50	0.00	23.58	0.00
5.42	0.00	11.50	0.00	17.58	0.00	23.67	0.00
5.50	0.00	11.58	0.00	17.67	0.00	23.75	0.00
5.58	0.00	11.67	0.00	17.75	0.00	23.83	0.00
5.67	0.00	11.75	0.00	17.83	0.00	23.92	0.00
5.75	0.00	11.83	0.00	17.92	0.00	24.00	5.40
5.83	0.00	11.92	0.00	18.00	0.00		
5.92	0.00	12.00	8.60	18.08	0.00		
6.00	13.90	12.08	0.00	18.17	0.00		

CALIB			
NASHYD (0201)	Area (ha)= 20.78	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 8.50	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.12		

Unit Hyd Qpeak (cms)= 6.614

PEAK FLOW (cms)= 2.475 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 19.938

TOTAL RAINFALL (mm)= 61.183

RUNOFF COEFFICIENT = 0.326

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB

STANDHYD (0202)	Area (ha)= 2.74	
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 52.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.42	1.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	135.15	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	240.90	99.76	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.15 (ii)	10.80 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.09	
			TOTALS
PEAK FLOW (cms)=	0.86	0.21	0.882 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.17
RUNOFF VOLUME (mm)=	59.18	34.76	47.46
TOTAL RAINFALL (mm)=	61.18	61.18	61.18
RUNOFF COEFFICIENT =	0.97	0.57	0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 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.

CALIB	
STANDHYD (0203)	Area (ha)= 1.11
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 74.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.82	0.29	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	86.02	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	240.90	124.01	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.64 (ii)	5.64 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.15	
			TOTALS
PEAK FLOW (cms)=	0.52	0.09	0.543 (iii)

TIME TO PEAK	(hrs)=	0.17	0.33	0.17
RUNOFF VOLUME	(mm)=	59.18	43.60	55.13
TOTAL RAINFALL	(mm)=	61.18	61.18	61.18
RUNOFF COEFFICIENT	=	0.97	0.71	0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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.

```

-----
| ADD HYD ( 0200) |
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0201):    20.78    2.475    0.33    19.94
+ ID2= 2 ( 0202):    2.74    0.882    0.17    47.46
=====
ID = 3 ( 0200):    23.52    3.150    0.33    23.14

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0200) |
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0200):    23.52    3.150    0.33    23.14
+ ID2= 2 ( 0203):    1.11    0.543    0.17    55.13
=====
ID = 1 ( 0200):    24.63    3.523    0.33    24.59

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 0101) | Area (ha)= 2.43 Curve Number (CN)= 82.0
| ID= 1 DT= 5.0 min | Ia (mm)= 4.90 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.07

```

Unit Hyd Qpeak (cms)= 1.326

PEAK FLOW (cms)= 0.474 (i)
TIME TO PEAK (hrs)= 0.333
RUNOFF VOLUME (mm)= 25.786
TOTAL RAINFALL (mm)= 61.183

RUNOFF COEFFICIENT = 0.421

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB |
| STANDHYD ( 0102) |
| ID= 1 DT= 5.0 min |
|-----|
Area (ha)= 0.81
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
```

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.80	0.01	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	73.48	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	240.90	157.79	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.49 (ii)	2.46 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.33	0.30	
			TOTALS
PEAK FLOW (cms)=	0.52	0.00	0.521 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	59.18	51.44	59.11
TOTAL RAINFALL (mm)=	61.18	61.18	61.18
RUNOFF COEFFICIENT =	0.97	0.84	0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 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.

```
-----
| CALIB |
| STANDHYD ( 0103) |
| ID= 1 DT= 5.0 min |
|-----|
Area (ha)= 1.26
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.25	0.01
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	91.65	40.00
Mannings n =	0.013	0.350

Max.Eff.Inten.(mm/hr)=	240.90	157.79	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.71 (ii)	2.67 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.29	
			TOTALS
PEAK FLOW (cms)=	0.79	0.01	0.795 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	59.18	51.44	59.10
TOTAL RAINFALL (mm)=	61.18	61.18	61.18
RUNOFF COEFFICIENT =	0.97	0.84	0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 98.0 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.

CALIB			
STANDHYD (0104)	Area (ha)=	1.76	
ID= 1 DT= 5.0 min	Total Imp(%)=	99.00	Dir. Conn.(%)= 99.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.74	0.02	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	108.32	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	240.90	157.79	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.89 (ii)	2.85 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.28	
			TOTALS
PEAK FLOW (cms)=	1.08	0.01	1.090 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	59.18	51.44	59.11
TOTAL RAINFALL (mm)=	61.18	61.18	61.18
RUNOFF COEFFICIENT =	0.97	0.84	0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 98.0 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.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
                AREA      QPEAK      TPEAK      R.V.
                (ha)      (cms)      (hrs)      (mm)
    ID1= 1 ( 0101):    2.43    0.474    0.33    25.79
    + ID2= 2 ( 0102):    0.81    0.521    0.17    59.11
    =====
    ID = 3 ( 0100):    3.24    0.800    0.25    34.12
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 3 + 2 = 1 |
-----
                AREA      QPEAK      TPEAK      R.V.
                (ha)      (cms)      (hrs)      (mm)
    ID1= 3 ( 0100):    3.24    0.800    0.25    34.12
    + ID2= 2 ( 0103):    1.26    0.795    0.17    59.10
    =====
    ID = 1 ( 0100):    4.50    1.520    0.17    41.11
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
                AREA      QPEAK      TPEAK      R.V.
                (ha)      (cms)      (hrs)      (mm)
    ID1= 1 ( 0100):    4.50    1.520    0.17    41.11
    + ID2= 2 ( 0104):    1.76    1.090    0.17    59.11
    =====
    ID = 3 ( 0100):    6.26    2.610    0.17    46.17
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| RESERVOIR( 0011)|
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
-----
                OVERFLOW IS OFF
                OUTFLOW      STORAGE      |      OUTFLOW      STORAGE
                (cms)      (ha.m.)      |      (cms)      (ha.m.)
                0.0000      0.0000      |      0.3528      0.0906
                0.0438      0.0064      |      0.3938      0.1293
                0.1804      0.0192      |      0.4310      0.1722
                0.2514      0.0371      |      0.4651      0.2190
                0.3063      0.0602      |      0.4970      0.2700
  
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0100)	6.260	2.610	0.17	46.17
OUTFLOW: ID= 1 (0011)	6.260	0.425	0.42	46.17

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.29
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.1858

```

-----
| CALIB |
| STANDHYD ( 0105) |
| ID= 1 DT= 5.0 min |
-----

```

Area (ha)= 1.16
 Total Imp(%)= 21.00 Dir. Conn.(%)= 21.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.24	0.92	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	87.94	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	240.90	89.48	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.66 (ii)	10.69 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.32	0.09	
			TOTALS
PEAK FLOW (cms)=	0.15	0.13	0.187 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.33
RUNOFF VOLUME (mm)=	59.18	31.25	37.11
TOTAL RAINFALL (mm)=	61.18	61.18	61.18
RUNOFF COEFFICIENT =	0.97	0.51	0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 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.

```

-----
| ADD HYD ( 0016) |
| 1 + 2 = 3 |
-----

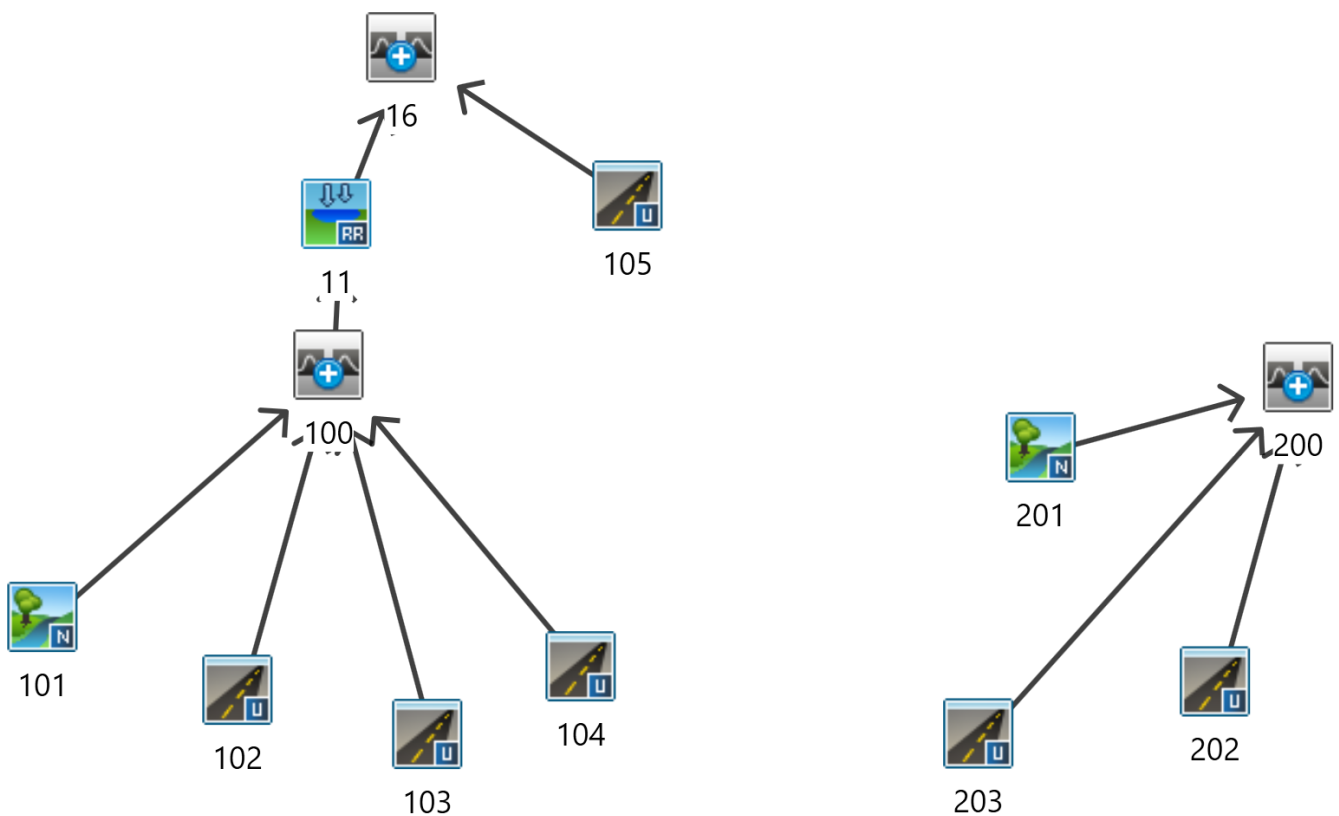
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	1.16	0.187	0.33	37.11

+ ID2= 2 (0011):	6.26	0.425	0.42	46.17
=====				
ID = 3 (0016):	7.42	0.597	0.33	44.75

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

VISUAL OTTHYMO 50-YEAR POST-DEVELOPMENT RESULTS (2090 Climate Adjusted Storm Event)



=====

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

000 TTTTT TTTTT H H Y Y M M 000 TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
000 T T H H Y M M 000

Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2022 Smart City Water Inc
All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat

Output filename:
C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\7130d59-b0de-4593-a88d-7979c5471fc8\s
Summary filename:
C:\Users\CAJD070997\AppData\Local\Civica\VH5\a6ab6c1b-52c7-43db-abbf-e705320d2511\7130d59-b0de-4593-a88d-7979c5471fc8\s

DATE: 03-12-2026 TIME: 12:05:55

USER:

COMMENTS: _____

** SIMULATION : 50-yr Projected for 2090 **

| READ STORM | Filename: C:\Users\CAJD070997\AppData\Local\Temp\
|

Ptotal= 64.40 mm	662c8c4a-a34e-4ff9-bafe-5680f7530c23\0c1e8dfe
Comments: 50-yr Storm (BCC Climate Adjusted 2090)	

TIME	RAIN	TIME	RAIN	'	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	'	hrs	mm/hr	hrs	mm/hr
0.00	0.00	6.08	0.00		12.17	0.00	18.25	0.00
0.08	278.20	6.17	0.00		12.25	0.00	18.33	0.00
0.17	172.30	6.25	0.00		12.33	0.00	18.42	0.00
0.25	130.30	6.33	0.00		12.42	0.00	18.50	0.00
0.33	0.00	6.42	0.00		12.50	0.00	18.58	0.00
0.42	0.00	6.50	0.00		12.58	0.00	18.67	0.00
0.50	80.80	6.58	0.00		12.67	0.00	18.75	0.00
0.58	0.00	6.67	0.00		12.75	0.00	18.83	0.00
0.67	0.00	6.75	0.00		12.83	0.00	18.92	0.00
0.75	0.00	6.83	0.00		12.92	0.00	19.00	0.00
0.83	0.00	6.92	0.00		13.00	0.00	19.08	0.00
0.92	0.00	7.00	0.00		13.08	0.00	19.17	0.00
1.00	50.20	7.08	0.00		13.17	0.00	19.25	0.00
1.08	0.00	7.17	0.00		13.25	0.00	19.33	0.00
1.17	0.00	7.25	0.00		13.33	0.00	19.42	0.00
1.25	0.00	7.33	0.00		13.42	0.00	19.50	0.00
1.33	0.00	7.42	0.00		13.50	0.00	19.58	0.00
1.42	0.00	7.50	0.00		13.58	0.00	19.67	0.00
1.50	0.00	7.58	0.00		13.67	0.00	19.75	0.00
1.58	0.00	7.67	0.00		13.75	0.00	19.83	0.00
1.67	0.00	7.75	0.00		13.83	0.00	19.92	0.00
1.75	0.00	7.83	0.00		13.92	0.00	20.00	0.00
1.83	0.00	7.92	0.00		14.00	0.00	20.08	0.00
1.92	0.00	8.00	0.00		14.08	0.00	20.17	0.00
2.00	31.20	8.08	0.00		14.17	0.00	20.25	0.00
2.08	0.00	8.17	0.00		14.25	0.00	20.33	0.00
2.17	0.00	8.25	0.00		14.33	0.00	20.42	0.00
2.25	0.00	8.33	0.00		14.42	0.00	20.50	0.00
2.33	0.00	8.42	0.00		14.50	0.00	20.58	0.00
2.42	0.00	8.50	0.00		14.58	0.00	20.67	0.00
2.50	0.00	8.58	0.00		14.67	0.00	20.75	0.00
2.58	0.00	8.67	0.00		14.75	0.00	20.83	0.00
2.67	0.00	8.75	0.00		14.83	0.00	20.92	0.00
2.75	0.00	8.83	0.00		14.92	0.00	21.00	0.00
2.83	0.00	8.92	0.00		15.00	0.00	21.08	0.00
2.92	0.00	9.00	0.00		15.08	0.00	21.17	0.00
3.00	0.00	9.08	0.00		15.17	0.00	21.25	0.00
3.08	0.00	9.17	0.00		15.25	0.00	21.33	0.00
3.17	0.00	9.25	0.00		15.33	0.00	21.42	0.00
3.25	0.00	9.33	0.00		15.42	0.00	21.50	0.00
3.33	0.00	9.42	0.00		15.50	0.00	21.58	0.00
3.42	0.00	9.50	0.00		15.58	0.00	21.67	0.00
3.50	0.00	9.58	0.00		15.67	0.00	21.75	0.00
3.58	0.00	9.67	0.00		15.75	0.00	21.83	0.00
3.67	0.00	9.75	0.00		15.83	0.00	21.92	0.00

3.75	0.00	9.83	0.00	15.92	0.00	22.00	0.00
3.83	0.00	9.92	0.00	16.00	0.00	22.08	0.00
3.92	0.00	10.00	0.00	16.08	0.00	22.17	0.00
4.00	0.00	10.08	0.00	16.17	0.00	22.25	0.00
4.08	0.00	10.17	0.00	16.25	0.00	22.33	0.00
4.17	0.00	10.25	0.00	16.33	0.00	22.42	0.00
4.25	0.00	10.33	0.00	16.42	0.00	22.50	0.00
4.33	0.00	10.42	0.00	16.50	0.00	22.58	0.00
4.42	0.00	10.50	0.00	16.58	0.00	22.67	0.00
4.50	0.00	10.58	0.00	16.67	0.00	22.75	0.00
4.58	0.00	10.67	0.00	16.75	0.00	22.83	0.00
4.67	0.00	10.75	0.00	16.83	0.00	22.92	0.00
4.75	0.00	10.83	0.00	16.92	0.00	23.00	0.00
4.83	0.00	10.92	0.00	17.00	0.00	23.08	0.00
4.92	0.00	11.00	0.00	17.08	0.00	23.17	0.00
5.00	0.00	11.08	0.00	17.17	0.00	23.25	0.00
5.08	0.00	11.17	0.00	17.25	0.00	23.33	0.00
5.17	0.00	11.25	0.00	17.33	0.00	23.42	0.00
5.25	0.00	11.33	0.00	17.42	0.00	23.50	0.00
5.33	0.00	11.42	0.00	17.50	0.00	23.58	0.00
5.42	0.00	11.50	0.00	17.58	0.00	23.67	0.00
5.50	0.00	11.58	0.00	17.67	0.00	23.75	0.00
5.58	0.00	11.67	0.00	17.75	0.00	23.83	0.00
5.67	0.00	11.75	0.00	17.83	0.00	23.92	0.00
5.75	0.00	11.83	0.00	17.92	0.00	24.00	5.80
5.83	0.00	11.92	0.00	18.00	0.00		
5.92	0.00	12.00	9.20	18.08	0.00		
6.00	14.80	12.08	0.00	18.17	0.00		

CALIB			
NASHYD (0201)	Area (ha)= 20.78	Curve Number (CN)= 75.0	
ID= 1 DT= 5.0 min	Ia (mm)= 8.50	# of Linear Res.(N)= 3.00	
-----	U.H. Tp(hrs)= 0.12		

Unit Hyd Qpeak (cms)= 6.614

PEAK FLOW (cms)= 2.733 (i)

TIME TO PEAK (hrs)= 0.333

RUNOFF VOLUME (mm)= 21.933

TOTAL RAINFALL (mm)= 64.400

RUNOFF COEFFICIENT = 0.341

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	

STANDHYD (0202)	Area (ha)= 2.74	
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 52.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.42	1.32	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	135.15	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	254.20	107.26	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.11 (ii)	10.51 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.31	0.09	
			TOTALS
PEAK FLOW (cms)=	0.91	0.23	0.937 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.17
RUNOFF VOLUME (mm)=	62.40	37.52	50.46
TOTAL RAINFALL (mm)=	64.40	64.40	64.40
RUNOFF COEFFICIENT =	0.97	0.58	0.78

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 88.0 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.

CALIB	
STANDHYD (0203)	Area (ha)= 1.11
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 74.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.82	0.29	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	86.02	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	254.20	131.90	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.61 (ii)	5.52 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.16	
			TOTALS
PEAK FLOW (cms)=	0.55	0.09	0.575 (iii)

TIME TO PEAK	(hrs)=	0.17	0.33	0.17
RUNOFF VOLUME	(mm)=	62.40	46.66	58.31
TOTAL RAINFALL	(mm)=	64.40	64.40	64.40
RUNOFF COEFFICIENT	=	0.97	0.72	0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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.

```

-----
| ADD HYD ( 0200) |
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0201):    20.78    2.733    0.33    21.93
+ ID2= 2 ( 0202):    2.74    0.937    0.17    50.46
=====
ID = 3 ( 0200):    23.52    3.451    0.33    25.26

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0200) |
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0200):    23.52    3.451    0.33    25.26
+ ID2= 2 ( 0203):    1.11    0.575    0.17    58.31
=====
ID = 1 ( 0200):    24.63    3.846    0.33    26.75

```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 0101) |
| ID= 1 DT= 5.0 min |
-----
          Area      (ha)=    2.43    Curve Number (CN)= 82.0
          Ia      (mm)=    4.90    # of Linear Res.(N)= 3.00
          U.H. Tp(hrs)=    0.07

```

Unit Hyd Qpeak (cms)= 1.326

PEAK FLOW (cms)= 0.513 (i)
 TIME TO PEAK (hrs)= 0.333
 RUNOFF VOLUME (mm)= 28.014
 TOTAL RAINFALL (mm)= 64.400

RUNOFF COEFFICIENT = 0.435

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-----
| CALIB |
| STANDHYD ( 0102) |
| ID= 1 DT= 5.0 min |
|-----|
Area (ha)= 0.81
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
```

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.80	0.01	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	73.48	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	254.20	168.42	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.46 (ii)	2.41 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.33	0.30	
			TOTALS
PEAK FLOW (cms)=	0.55	0.00	0.551 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	62.40	54.63	62.32
TOTAL RAINFALL (mm)=	64.40	64.40	64.40
RUNOFF COEFFICIENT =	0.97	0.85	0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 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.

```
-----
| CALIB |
| STANDHYD ( 0103) |
| ID= 1 DT= 5.0 min |
|-----|
Area (ha)= 1.26
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.25	0.01
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	91.65	40.00
Mannings n =	0.013	0.350

Max.Eff.Inten.(mm/hr)=	254.20	168.42	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.67 (ii)	2.62 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.29	
			TOTALS
PEAK FLOW (cms)=	0.84	0.01	0.842 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	62.40	54.63	62.32
TOTAL RAINFALL (mm)=	64.40	64.40	64.40
RUNOFF COEFFICIENT =	0.97	0.85	0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 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.

```

-----
| CALIB |
| STANDHYD ( 0104) |
| ID= 1 DT= 5.0 min |
-----
Area (ha)= 1.76
Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00

```

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.74	0.02	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	108.32	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	254.20	168.42	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.85 (ii)	2.79 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.32	0.28	
			TOTALS
PEAK FLOW (cms)=	1.15	0.01	1.155 (iii)
TIME TO PEAK (hrs)=	0.17	0.25	0.17
RUNOFF VOLUME (mm)=	62.40	54.63	62.32
TOTAL RAINFALL (mm)=	64.40	64.40	64.40
RUNOFF COEFFICIENT =	0.97	0.85	0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 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.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0101):    2.43    0.513    0.33    28.01
+ ID2= 2 ( 0102):    0.81    0.551    0.17    62.32
=====
ID = 3 ( 0100):    3.24    0.858    0.25    36.59
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 3 + 2 = 1 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 3 ( 0100):    3.24    0.858    0.25    36.59
+ ID2= 2 ( 0103):    1.26    0.842    0.17    62.32
=====
ID = 1 ( 0100):    4.50    1.621    0.17    43.80
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0100)|
| 1 + 2 = 3 |
-----
          AREA      QPEAK      TPEAK      R.V.
          (ha)      (cms)      (hrs)      (mm)
ID1= 1 ( 0100):    4.50    1.621    0.17    43.80
+ ID2= 2 ( 0104):    1.76    1.155    0.17    62.32
=====
ID = 3 ( 0100):    6.26    2.776    0.17    49.00
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| RESERVOIR( 0011)|
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
-----
          OVERFLOW IS OFF
          OUTFLOW      STORAGE      OUTFLOW      STORAGE
          (cms)      (ha.m.)      (cms)      (ha.m.)
          0.0000      0.0000      0.3528      0.0906
          0.0438      0.0064      0.3938      0.1293
          0.1804      0.0192      0.4310      0.1722
          0.2514      0.0371      0.4651      0.2190
          0.3063      0.0602      0.4970      0.2700
  
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0100)	6.260	2.776	0.17	49.00
OUTFLOW: ID= 1 (0011)	6.260	0.435	0.42	49.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 15.65
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.1988

```

-----
| CALIB |
| STANDHYD ( 0105) |
| ID= 1 DT= 5.0 min |
-----

```

Area (ha)= 1.16
 Total Imp(%)= 21.00 Dir. Conn.(%)= 21.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.24	0.92	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	87.94	40.00	
Mannings n =	0.013	0.350	
Max.Eff.Inten.(mm/hr)=	254.20	96.61	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.63 (ii)	10.38 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.32	0.09	
			TOTALS
PEAK FLOW (cms)=	0.16	0.14	0.203 (iii)
TIME TO PEAK (hrs)=	0.17	0.42	0.33
RUNOFF VOLUME (mm)=	62.40	33.85	39.84
TOTAL RAINFALL (mm)=	64.40	64.40	64.40
RUNOFF COEFFICIENT =	0.97	0.53	0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 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.

```

-----
| ADD HYD ( 0016) |
| 1 + 2 = 3 |
-----

```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0105):	1.16	0.203	0.33	39.84

+ ID2= 2 (0011):	6.26	0.435	0.42	49.00
=====				
ID = 3 (0016):	7.42	0.621	0.33	47.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

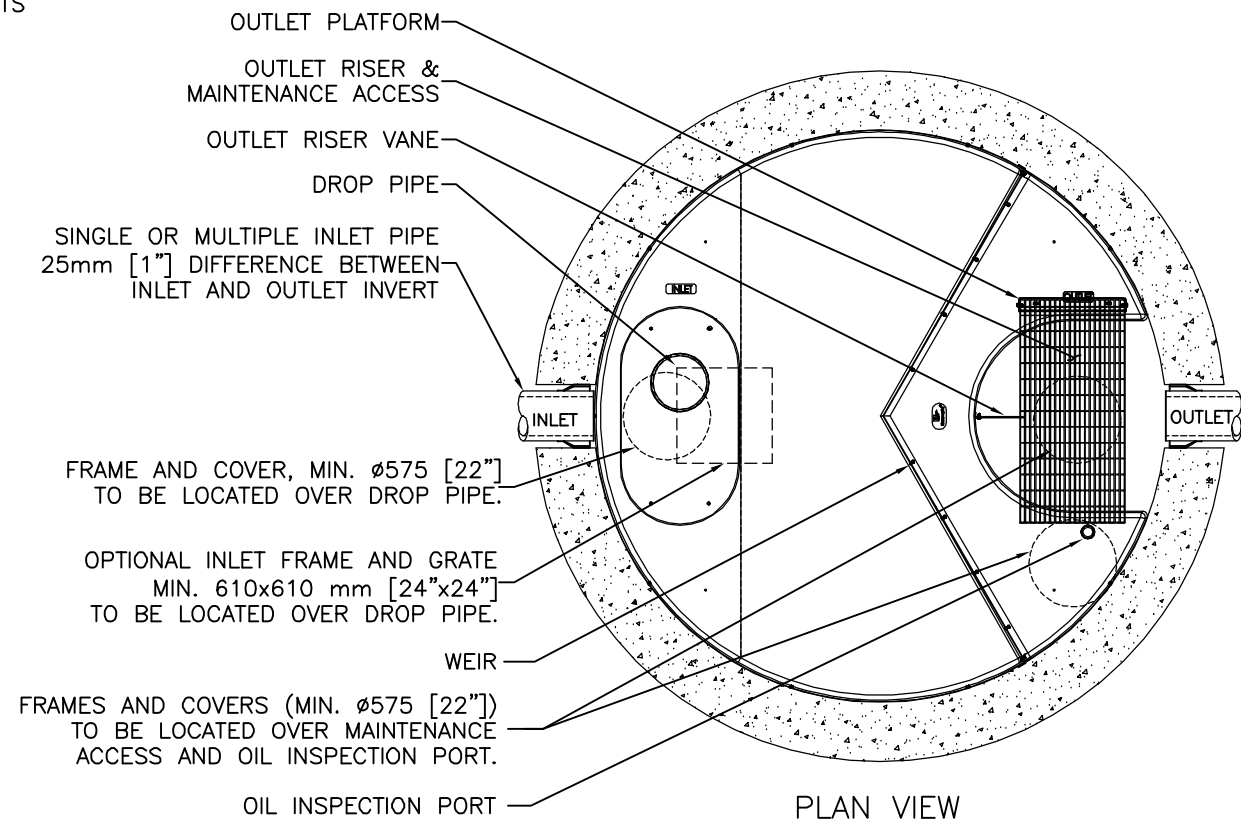
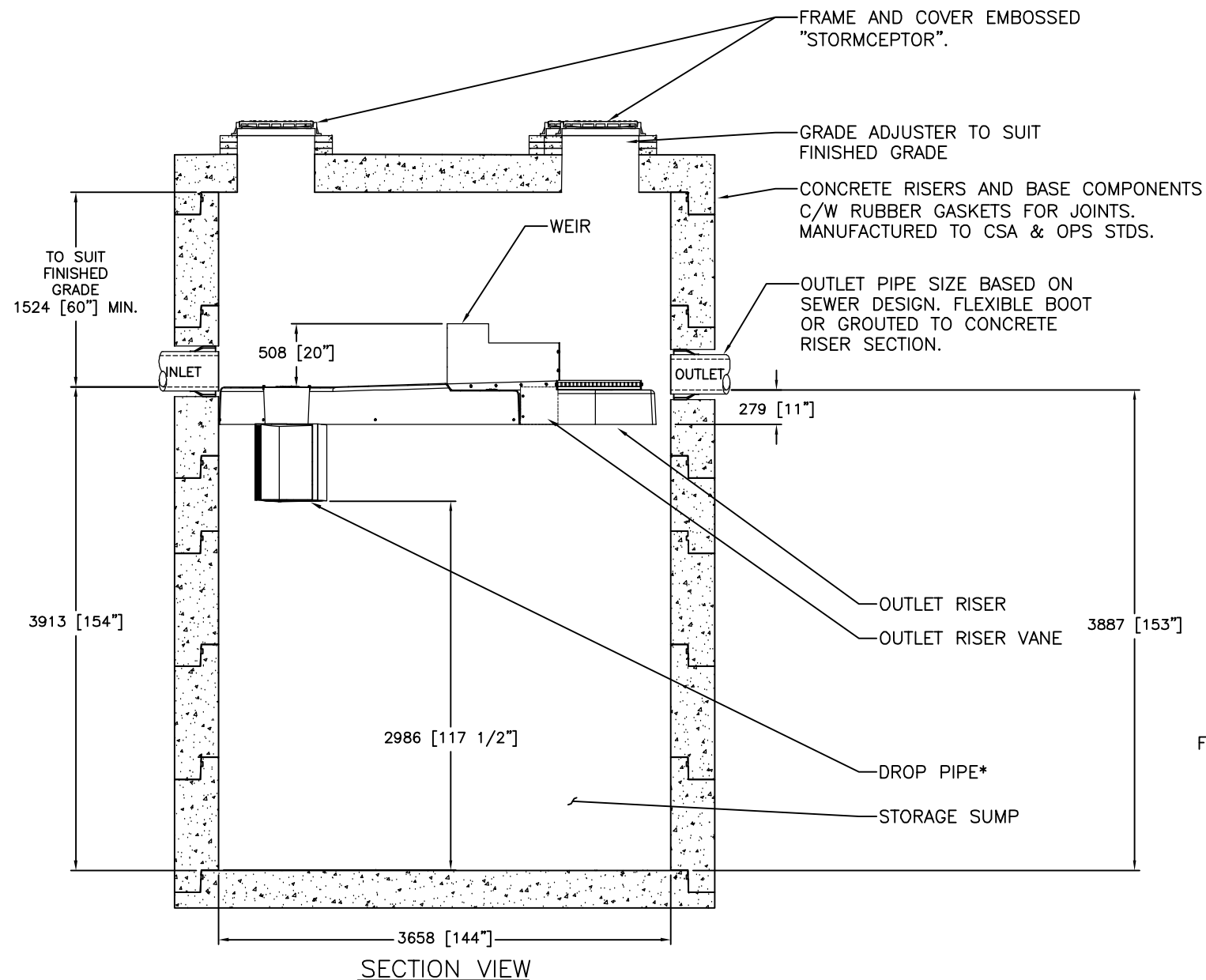
APPENDIX

D

OIL AND GRIT SEPARATOR



DRAWING NOT TO BE USED FOR CONSTRUCTION



GENERAL NOTES:

- * MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m² (27.9 gpm/ft²) FOR STORMCEPTOR EF12 AND 535 L/min/m² (13.1 gpm/ft²) FOR STORMCEPTOR EFO12 (OIL CAPTURE CONFIGURATION).
1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
 2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
 3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
 4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
 5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

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

INSTALLATION NOTES

- REMOVAL OF DEBRIS:**
- A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
 - B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
 - C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
 - D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
 - E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

<u>SITE SPECIFIC DATA REQUIREMENTS</u>					
STORMCEPTOR MODEL			EFO12		
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*
* PER ENGINEER OF RECORD					

The design and information shown on this drawing is the property of Inhibium Systems ("Inhibium") and is provided to you under license. Inhibium Systems and/or its affiliates may be used in connection with this drawing, but the drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Inhibium Systems. Inhibium Systems shall not be held responsible for any errors or omissions on this drawing and shall not be held responsible for any liability or responsibility for such use.

(Discrepancies between the supplied information upon request and the information shown on this drawing are encountered as site work progresses, these discrepancies may be reported to Inhibium immediately for re-evaluation of the design. Inhibium accepts no liability for design based on missing, inaccurate or incomplete information supplied by others.

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

Stormceptor® EF

SCALE = NTS

[illegible]

DATE: 10/24/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: SP
PROJECT No.: EFO12	SEQUENCE No.: *
SHEET: 1 OF 1	

Imbrium® Systems

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

01/23/2026

Province:	Ontario	Project Name:	Brockville Correctional Complex
City:	Brockville	Project Number:	CA0044807.7361
Nearest Rainfall Station:	KINGSTON	Designer Name:	Jared Delpellaro
Climate Station Id:	6104142	Designer Company:	WSP Canada Inc.
Years of Rainfall Data:	20	Designer Email:	jared.delpellaro@wsp.com
		Designer Phone:	613-403-3167
Site Name:	BCC	EOR Name:	
		EOR Company:	
Drainage Area (ha):	6.26	EOR Email:	
% Imperviousness:	68.50	EOR Phone:	
Runoff Coefficient 'c': 0.71			

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

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	129.58
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	526.90
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	5196
Estimated Average Annual Sediment Volume (L/yr):	4225

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	41
EFO5	50
EFO6	58
EFO8	70
EFO10	77
EFO12	85

Recommended Stormceptor EFO Model: EFO12
Estimated Net Annual Sediment (TSS) Load Reduction (%): 85
Water Quality Runoff Volume Capture (%): > 90

THIRD-PARTY TESTING AND VERIFICATION

► **Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

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

PARTICLE SIZE DISTRIBUTION (PSD)

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

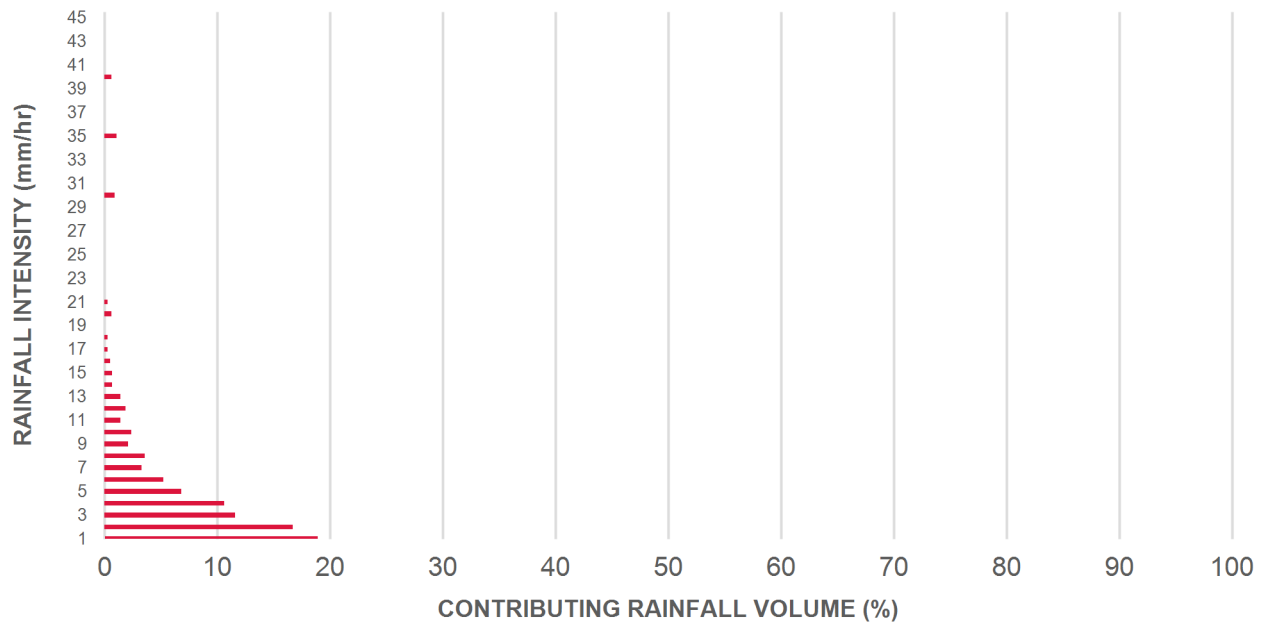
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

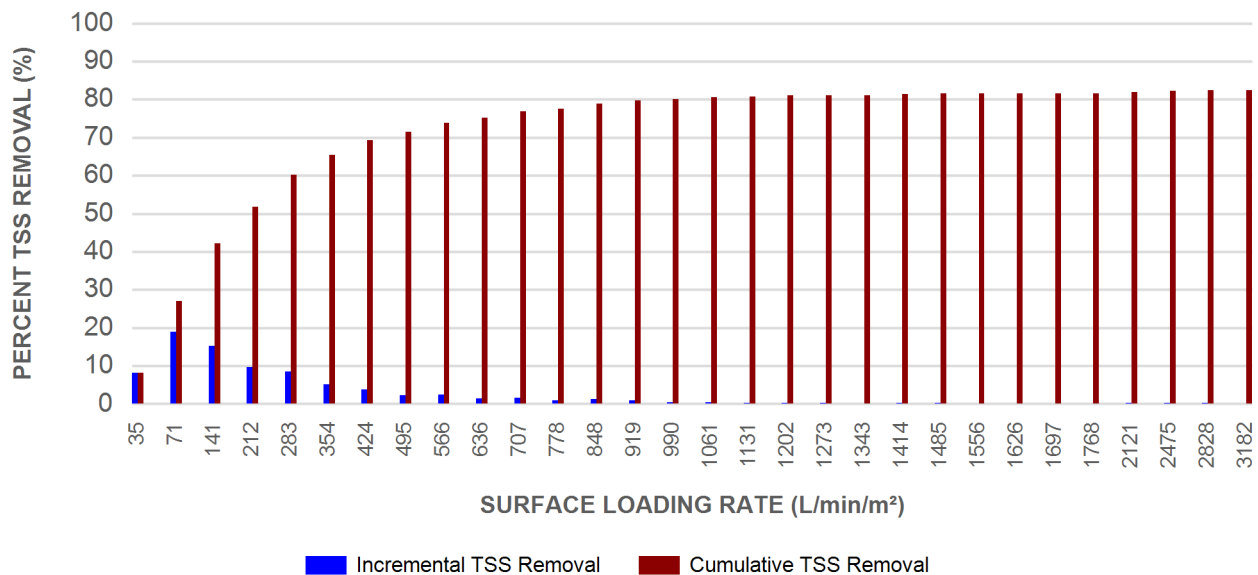
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.1	8.1	6.19	371.0	30.0	100	8.1	8.1
1.00	18.9	27.0	12.37	742.0	59.0	100	18.9	27.0
2.00	16.7	43.7	24.75	1485.0	119.0	95	15.8	42.8
3.00	11.6	55.3	37.12	2227.0	178.0	87	10.1	52.9
4.00	10.6	65.9	49.49	2970.0	238.0	82	8.7	61.6
5.00	6.8	72.8	61.87	3712.0	297.0	79	5.4	67.0
6.00	5.2	78.0	74.24	4454.0	356.0	76	4.0	70.9
7.00	3.3	81.3	86.61	5197.0	416.0	73	2.4	73.3
8.00	3.6	84.9	98.99	5939.0	475.0	71	2.5	75.9
9.00	2.1	87.0	111.36	6682.0	535.0	68	1.4	77.3
10.00	2.4	89.4	123.73	7424.0	594.0	65	1.5	78.9
11.00	1.4	90.7	136.11	8166.0	653.0	64	0.9	79.7
12.00	1.9	92.6	148.48	8909.0	713.0	64	1.2	81.0
13.00	1.4	94.0	160.85	9651.0	772.0	63	0.9	81.8
14.00	0.7	94.7	173.23	10394.0	831.0	63	0.4	82.3
15.00	0.7	95.4	185.60	11136.0	891.0	62	0.4	82.7
16.00	0.5	95.9	197.97	11878.0	950.0	62	0.3	83.0
17.00	0.3	96.2	210.35	12621.0	1010.0	61	0.2	83.2
18.00	0.3	96.4	222.72	13363.0	1069.0	60	0.2	83.3
19.00	0.0	96.4	235.09	14106.0	1128.0	59	0.0	83.3
20.00	0.6	97.1	247.47	14848.0	1188.0	57	0.4	83.7
21.00	0.3	97.4	259.84	15590.0	1247.0	56	0.2	83.9
22.00	0.0	97.4	272.21	16333.0	1307.0	55	0.0	83.9
23.00	0.0	97.4	284.59	17075.0	1366.0	53	0.0	83.9
24.00	0.0	97.4	296.96	17818.0	1425.0	52	0.0	83.9
25.00	0.0	97.4	309.33	18560.0	1485.0	49	0.0	83.9
30.00	0.9	98.3	371.20	22272.0	1782.0	41	0.4	84.3
35.00	1.1	99.4	433.07	25984.0	2079.0	35	0.4	84.6
40.00	0.6	100.0	494.94	29696.0	2376.0	31	0.2	84.8
45.00	0.0	100.0	527.00	31620.0	2530.0	29	0.0	84.8
Estimated Net Annual Sediment (TSS) Load Reduction =								85 %

Climate Station ID: 6104142 Years of Rainfall Data: 20

RAINFALL DATA FROM KINGSTON RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

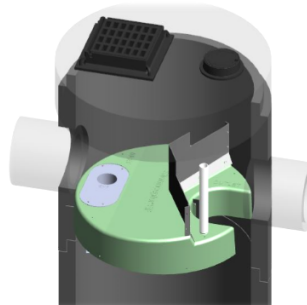
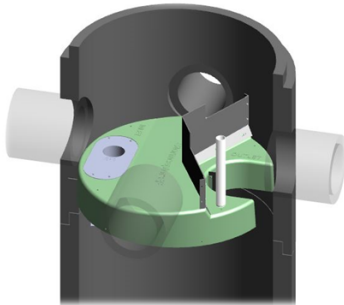
► **Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test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

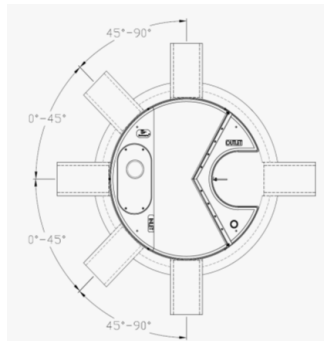
DESIGN FLEXIBILITY

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

OIL CAPTURE AND RETENTION

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



**INLET-TO-OUTLET DROP**

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

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

For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

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

STANDARD STORMCEPTOR EF/EFO DRAWINGS

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

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

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

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

PART 1 – GENERAL

1.1 WORK INCLUDED

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

1.2 REFERENCE STANDARDS & PROCEDURES

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

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

1.3 SUBMITTALS

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

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

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

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

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

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m ³ sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m ³ sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m ³ sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m ³ sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m ³ sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m ³ sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

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

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m² to 1400 L/min/m², and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m² and 1400 L/min/m² shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m².

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

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

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

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid

Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m² to 2600 L/min/m²) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

STANDARD SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE WITH THIRD-PARTY VERIFIED LIGHT LIQUID RE-ENTRAINMENT SIMULATION PERFORMANCE TESTING RESULTS

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, designing, maintaining, and constructing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, **specifically an OGS device that has been third-party tested for oil and fuel retention capability using a protocol for light liquid re-entrainment simulation testing, with testing results and a Statement of Verification in accordance with all the provisions of ISO 14034 Environmental Management – Environmental Technology Verification (ETV).** Work includes supply and installation of concrete bases, precast sections, and the appropriate precast section with OGS internal components correctly installed within the system, watertight sealed to the precast concrete prior to arrival to the project site.

1.2 REFERENCE STANDARDS

1.2.1 For Canadian projects only, the following reference standards apply:

CAN/CSA-A257.4-14: Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-14: Precast Reinforced Circular Concrete Manhole Sections, Catch Basins, and Fittings

CAN/CSA-S6-00: Canadian Highway Bridge Design Code

1.2.2 For ALL projects, the following reference standards apply:

ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks

ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections

ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

ASTM C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures

ASTM D2563: Standard Practice for Classification of Visual Defects in Reinforced Plastics

1.3 SHOP DRAWINGS

1.3.1 Shop drawings shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail the precast concrete components and OGS internal components prior to shipment, including the sequence for installation.

1.3.2 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record. Any and all changes to project cost estimates, bonding amounts, plan check fees for revision of approved documents, or design impacts due to regulatory requirements as a result of a product substitution shall be coordinated by the Contractor with the Engineer of Record.

1.4 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

1.4.1 OGS internal components supplied by the Manufacturer for attachment to the precast concrete vessel shall be pre-fabricated, bolted to the precast and watertight sealed to the precast vessel surface prior to site delivery to ensure Manufacturer's internal assembly process and quality control processes are fully adhered to, and to prevent materials damage on site.

1.4.2 Follow all instructions including the sequence for installation in the shop drawings during installation.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The OGS vessel shall be cylindrical and constructed from precast concrete riser and slab components.

2.1.2 The precast concrete OGS internal components shall include a fiberglass insert bolted and watertight sealed inside the precast concrete vessel, prior to site delivery. Primary internal components that are to be anchored and watertight sealed to the precast concrete vessel shall be done so only by the Manufacturer prior to arrival at the job site to ensure product quality.

2.1.3 The OGS shall be allowed to be specified and have the ability to function as a 240-degree bend structure in the stormwater drainage system, or as a junction structure.

2.1.4 The OGS to be specified shall have the capability to accept influent flow from an inlet grate and an inlet pipe.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be designed and manufactured to meet highway loading conditions per State/Provincial or local requirements.

2.3 GASKETS

Only profile neoprene or nitrile rubber gaskets that are oil resistant shall be accepted. For Canadian projects only, gaskets shall be in accordance to CSA A257.4-14. Mastic sealants, butyl tape/rope or Conseal CS-101 alone are not acceptable gasket materials.

2.4 JOINTS

The concrete joints shall be watertight and meet the design criteria according to ASTM C-990. For projects where joints require gaskets, the concrete joints shall be watertight and oil resistant and meet the design criteria according to ASTM C-443. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

2.5 FRAMES AND COVERS

Frames and covers shall be manufactured in accordance with State/Provincial or local requirements for inspection and maintenance access purposes. A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS manufacturer's product name to properly identify this asset's purpose is for stormwater quality treatment.

2.6 PRECAST CONCRETE

All precast concrete components shall conform to the appropriate CSA or ASTM specifications.

2.7 FIBERGLASS

The fiberglass portion of the OGS device shall be constructed in accordance with ASTM D2563, and in accordance with the PS15-69 manufacturing standard, and shall only be installed, bolted and watertight sealed to the precast concrete by the Manufacturer prior to arrival at the project site to ensure product quality.

2.8 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a fiberglass insert for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The total sediment storage capacity shall be a minimum 40 ft³ (1.1 m³). The total petroleum hydrocarbon storage capacity shall be a minimum 50 gallons (189 liters). The access opening to the sump of the OGS device for periodic inspection and maintenance purposes shall be a minimum 16 inches (406 mm) in diameter.

2.9 LADDERS

Ladder rungs shall be provided upon request or to comply with State/Provincial or local requirements.

2.10 INSPECTION

All precast concrete sections shall be level and inspected to ensure dimensions, appearance, integrity of internal components, and quality of the product meets State/Provincial or local specifications and associated standards.

2.11 WEIR

Weir shall be constructed of 5052 aluminum alloy and shall be installed, bolted and watertight sealed by the Manufacturer prior to shipment to the project site to ensure product quality.

2.12 DROP PIPE

Drop pipe shall be constructed of 5052 aluminum alloy and shall be watertight sealed to the insert with silicone adhesive. Based on assessment of the dimensions of the precast riser section containing the fiberglass insert and the dimensions of the drop pipe, the drop pipe may be installed by the Manufacturer prior to shipment to the project site, or may be installed at the project site by the Contractor, at the Manufacturer's discretion.

2.13 OUTLET RISER VANE

Outlet riser vane shall be constructed of 1/4-inch 60 durometer EPDM rubber and shall be installed by the Manufacturer prior to shipment to the site.

2.14 SAFETY GRATE

Safety grate shall be constructed of 6061-T6 aluminum alloy and shall be installed by the Manufacturer prior to shipment to the site.

2.15 FASTENERS

All fasteners for component attachment shall be constructed of stainless steel. These include bolts, washers, and nuts used for attachment of the fiberglass insert, weir, drop pipe, outlet riser vane, and safety grate.

2.16 OIL INSPECTION PIPE

Oil inspection pipe shall be constructed of 3-inch diameter Schedule 40 PVC and shall be watertight sealed to the oil inspection port with Sikaflex 1a adhesive. Oil inspection pipe shall be installed by the Manufacturer prior to shipment to the site.

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 HYDROLOGY AND RUNOFF VOLUME

The OGS device shall be engineered, designed and sized to treat a minimum of 90 percent of the average annual runoff volume, unless otherwise stated by the Engineer of Record, using historical rainfall data. Rainfall data sets should be comprised of a minimum 15-years of rainfall data or a longer continuous period if available for a given location, but in all cases a minimum 5-year period of rainfall data.

3.3 ANNUAL (TSS) SEDIMENT LOAD AND STORAGE CAPACITY

The OGS device shall be capable of removing and have sufficient storage capacity for the calculated annual total suspended solids (TSS) mass load and volume without scouring previously captured pollutants prior to maintenance being required. The annual (TSS) sediment load and volume transported from the drainage area should be calculated and compared to the OGS device's available storage capacity by the specifying Engineer to ensure adequate capacity between maintenance cycles. Sediment loadings shall be determined by land use and defined as a minimum of 450 kg (992 lb) of sediment (TSS) per impervious hectare of drainage area per year, or greater based on land use, as noted in Table 1 below.

Annual sediment volume calculations shall be performed using the projected average annual treated runoff volume, a typical sediment bulk density of 1602 kg/m³ (100 lbs/ft³) and an assumed Event Mean Concentration (EMC) of 125 mg/L TSS in the runoff, or as otherwise determined by the Engineer of Record.

Example calculation for a 1.3-hectares parking lot site:

- 1.28 meters of rainfall depth, per year
- 1.3 hectares of 100% impervious drainage area
- EMC of 125 mg/L TSS in runoff
- Treatment of 90% of the average annual runoff volume
- Target average annual TSS removal rate of 60% by OGS

Annual Runoff Volume:

- 1.28 m rain depth x 1.3 ha x 10,000 m²/ha = 16,640 m³ of runoff volume
- 16,640 m³ x 1000 L/m³ = 16,640,000 L of runoff volume
- 16,640,000 L x 0.90 = 14,976,000 L to be treated by OGS unit

Annual Sediment Mass and Sediment Volume Load Calculation:

- 14,976,000 L x 125 mg/L x kg/1,000,000 mg = 1,872 kg annual sediment mass
- 1,872 kg x m³/1602 kg = 1.17 m³ annual sediment volume
- 1.17 m³ x 60% TSS removal rate by OGS = 0.70 m³ minimum expected annual storage requirement in OGS

As a guideline, the U.S. EPA has determined typical annual sediment loads per drainage area for various sites by land use (see Table 1). Certain States, Provinces and local jurisdictions have also established such guidelines.

Table 1 – Annual Mass Sediment Loading by Land Use								
	Commercial	Parking Lot	Residential			Highways	Industrial	Shopping Center
			High	Med.	Low			
(lbs/acre/yr)	1,000	400	420	250	10	880	500	440
(kg/hectare/yr)	1,124	450	472	281	11	989	562	494

Source: U.S. EPA Stormwater Best Management Practice Design Guide Volume 1, Appendix D, Table D-1, Burton and Pitt 2002

3.4 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in Table 2, Section 3.5, and based on third-party performance testing conducted in accordance with the Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol *Procedure for Laboratory Testing of Oil-Grit Separators*, as follows:

3.4.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m² to 1400 L/min/m², and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.4.2 Sediment removal efficiency for surface loading rates between 40 L/min/m² and 1400 L/min/m² shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.4.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.4.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m².

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 3.3.

3.4.5 The Peclet Number is not an approved method or model for calculating TSS removal, sizing, or scaling OGS devices.

3.4.6 If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates:

- Canadian ETV or ISO 14034 ETV Verification Statement which verifies third-party performance testing conducted in accordance with the **Procedure for Laboratory Testing of Oil-Grit Separators**, including the Light Liquid Re-entrainment Simulation Testing.
- Equal or better sediment (TSS) removal of the PSD specified in Table 2 at equivalent surface loading rates, as compared to the OGS device specified herein.

- Equal or better Light Liquid Re-entrainment Simulation Test results (using low-density polyethylene beads as a surrogate for light liquids such as oil and fuel) at equivalent surface loading rates, as compared to the OGS device specified herein. However, an alternative OGS device shall not be allowed as a substitute if the Light Liquid Re-entrainment Simulation Test was performed with screening components within the OGS device that are effective at retaining the low-density polyethylene beads, but would not be expected to retain light liquids such as oil and fuel.
- Equal or greater sediment storage capacity, as compared to the OGS device specified herein.
- Supporting documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.5 PARTICLE SIZE DISTRIBUTION (PSD) FOR SIZING

The OGS device shall be sized to achieve the Engineer-specified average annual percent sediment (TSS) removal based solely on the test sediment used in the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. This test sediment is comprised of inorganic ground silica with a specific gravity of 2.65, uniformly mixed, and containing a broad range of particle sizes as specified in Table 2. No alternative PSDs or deviations from Table 2 shall be accepted.

Table 2 Canadian ETV Program Procedure for Laboratory Testing of Oil-Grit Separators Particle Size Distribution (PSD) of Test Sediment		
Particle Diameter (Microns)	% by Mass of All Particles	Specific Gravity
1000	5%	2.65
500	5%	2.65
250	15%	2.65
150	15%	2.65
100	10%	2.65
75	5%	2.65
50	10%	2.65
20	15%	2.65
8	10%	2.65
5	5%	2.65
2	5%	2.65

3.6 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party scour testing conducted and have in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. This scour testing is conducted with the device pre-loaded with test sediment comprised of the particle size distribution (PSD) illustrated in Table 2.

3.6.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².

Data generated from laboratory scour testing performed with an OGS device pre-loaded with a coarser PSD than in Table 2 (i.e. the coarser PSD has no particles in the 1-micron to 50-micron size range, or the D₅₀ of the test sediment exceeds 75 microns) shall not be acceptable for the determination of the device's suitability for on-line installation.

3.7 DESIGN ACCOUNTING FOR BYPASS

3.7.1 The OGS device shall be specified to achieve the TSS removal performance and water quality objectives without washout of previously captured pollutants. The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. To ensure this is achieved, there are two design options with associated requirements:

3.7.1.1 The OGS device shall be placed **off-line** with an upstream diversion structure (typically in an upstream manhole) that only allows the water quality volume to be diverted to the OGS device, and excessive flows diverted downstream around the OGS device to prevent high flow washout of pollutants previously captured. This design typically incorporates a triangular layout including an upstream bypass manhole with an appropriately engineered weir wall, the OGS device, and a downstream junction manhole, which is connected to both the OGS device and bypass structure. In this case with an external bypass required, the OGS device manufacturer must provide calculations and designs for all structures, piping and any other required material applicable to the proper functioning of the system, stamped by a Professional Engineer.

3.7.1.2 Alternatively, OGS devices in compliance with Section 3.6 shall be acceptable for an **on-line** design configuration, thereby eliminating the requirement for an upstream bypass manhole and downstream junction manhole.

3.7.2 The OGS device shall also have sufficient hydraulic conveyance capacity to convey the peak storm event, in accordance with hydraulic conditions per the Engineer of Record. If an alternate OGS device is proposed, supporting documentation shall be submitted that demonstrates equal or better hydraulic conveyance capacity as compared to the OGS device specified herein. This documentation shall be signed and sealed by a local registered Professional Engineer. All costs associated with preparing and certifying this documentation shall be born solely by the Contractor.

3.8 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

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

3.8.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m² to 2600 L/min/m²) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

3.9 PETROLEUM HYDROCARBONS AND FLOATABLES STORAGE CAPACITY

Petroleum hydrocarbons and floatables storage capacity in the OGS device shall be a minimum 50 gallons (189 Liters), or more as specified.

3.9.1 The OGS device shall have gasketed precast concrete joints that are watertight, and oil resistant and meet the design criteria according to ASTM C-443 to provide safe oil and other hydrocarbon materials storage and ground water protection. Mastic sealants or butyl tape/rope alone are not an acceptable alternative.

3.10 SURFACE LOADING RATE SCALING OF DIFFERENT MODEL SIZES

The reference device for scaling shall be an OGS device that has been third-party tested in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. Other model sizes of the tested device shall only be scaled such that the claimed TSS removal efficiency of the scaled device shall be no greater than the TSS removal efficiency of the tested device at identical **surface loading rates** (flow rate divided by settling surface area). The depth of other model sizes of the tested device shall be scaled in accordance with the depth scaling provisions within Section 6.0 of the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.10.1 The Peclet Number and volumetric scaling are not approved methods for scaling OGS devices.

PART 4 – INSPECTION & MAINTENANCE

The OGS manufacturer shall provide an Owner's Manual upon request. Maintenance shall be performed by a professional service provider who has experience in cleaning OGS devices and has been trained and certified in applicable health and safety practices, including confined space entry procedures.

- 4.1 A Quality Assurance Plan that provides inspection for a minimum of 5 years shall be included with the OGS stormwater quality device, and written into the Environmental Compliance Approval (ECA) or the appropriate State/Provincial or local approval document.
- 4.2 OGS device inspection shall include determination of sediment depth and presence of petroleum hydrocarbons below the insert. Inspection shall be easily conducted from finished grade through a frame and cover of at least 22 inch (560 mm) in diameter.
- 4.3 Inspection and pollutant removal shall be conducted periodically. For routine maintenance cleaning activities, pollutant removal shall typically utilize a truck equipped with vacuum apparatus, and shall be easily conducted from finished grade through a frame and cover of at least 22-inches (560 mm) in diameter.
- 4.4 Diameter of the maintenance access opening to the lower chamber and sump shall be scaled consistently across all model sizes, and shall be 1/3 the inside diameter of the OGS structure, or larger.
- 4.5 No confined space entry shall be required for routine inspection and maintenance cleaning activities.
- 4.6 For OGS model sizes of diameter 72 inches (1828 mm) and greater, the access opening to the OGS device's lower chamber and sump shall be large enough to allow a maintenance worker to enter the lower chamber to facilitate non-routine maintenance cleaning activities and repairs, as needed.
- 4.7 The orifice-containing component (i.e. drop pipe, duct, chute, etc.) of the OGS device used to control flow rate into the lower chamber shall be removable from the insert to facilitate cleaning, repair, or replacement of the orifice-containing component, as needed.

PART 5 – EXECUTION

5.1 PRECAST CONCRETE INSTALLATION

The installation of the precast concrete OGS stormwater quality treatment device shall conform to ASTM C 891, ASTM C 478, ASTM C 443, CAN/CSA-A257.4-14, CAN/CSA-A257.4-14, CAN/CSA-S6-00 and all highway, State/Provincial, or local specifications for the construction of manholes. Selected sections of a general specification that are applicable are summarized below. The Contractor shall furnish all labor, equipment and materials necessary to offload, assemble as needed the OGS internal components as specified in the Shop Drawings.

5.2 EXCAVATION

5.2.1 Excavation for the installation of the OGS stormwater quality treatment device shall conform to highway, State/Provincial or local specifications. Topsoil that is removed during the excavation for the OGS stormwater quality treatment device shall be stockpiled in designated areas and not be mixed with subsoil or other materials. Topsoil stockpiles and the general site preparation for the installation of the OGS stormwater quality device shall conform to highway, State/Provincial or local specifications.

5.2.2 The OGS device shall not be installed on frozen ground. Excavation shall extend a minimum of 12 inch (300 mm) from the precast concrete surfaces plus an allowance for shoring and bracing where required. If the bottom of the excavation provides an unsuitable foundation additional excavation may be required.

5.2.3 In areas with a high water table, continuous dewatering shall be provided to ensure that the excavation is stable and free of water.

5.3 BACKFILLING

Backfill material shall conform to highway, State/Provincial or local specifications. Backfill material shall be placed in uniform layers not exceeding 12 inches (300 mm) in depth and compacted to highway, State/Provincial or local specifications.

5.4 OGS WATER QUALITY DEVICE CONSTRUCTION SEQUENCE

5.4.1 The precast concrete OGS stormwater quality treatment device is installed and leveled in sections in the following sequence:

- aggregate base
- base slab, or base
- riser section(s) (if required)
- riser section w/ pre-installed fiberglass insert
- upper riser section(s)
- internal OGS device components
- connect inlet and outlet pipes
- riser section, top slab and/or transition (if required)
- frame and access cover

5.4.2 The precast concrete base shall be placed level at the specified grade. The entire base shall be in contact with the underlying compacted granular material. Subsequent sections, complete with oil resistant, watertight joint seals, shall be installed in accordance with the precast concrete manufacturer's recommendations.

5.4.3 Adjustment of the OGS stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets shall be repaired or replaced as necessary. Once the OGS stormwater quality treatment device has been constructed, any lift holes must be plugged with mortar.

5.5 DROP PIPE AND OIL INSPECTION PIPE

Once the upper precast concrete riser has been attached to the lower precast concrete riser section, the OGS device Drop Pipe and Oil Inspection Pipe must be attached, and watertight sealed to the fiberglass insert using Sikaflex 1a. Installation instructions and required materials shall be provided by the OGS manufacturer.

5.6 INLET AND OUTLET PIPES

Inlet and outlet pipes shall be securely set using grout or approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight. Non-secure inlets and outlets will result in improper performance.

5.7 FRAME AND COVER OR FRAME AND GRATE INSTALLATION

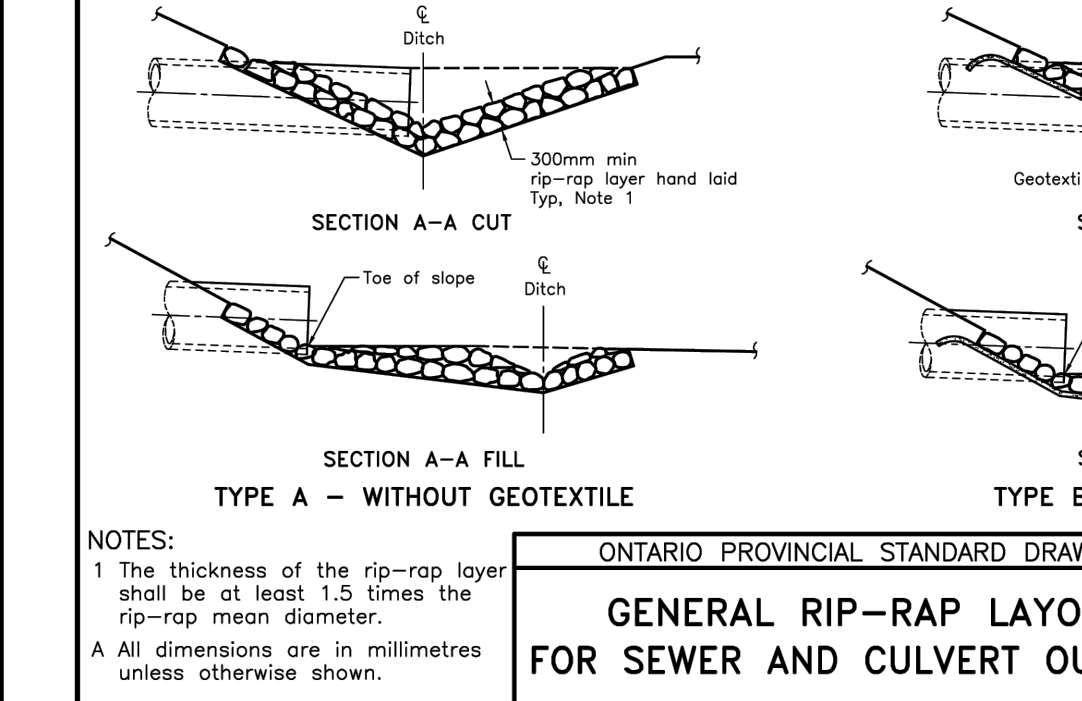
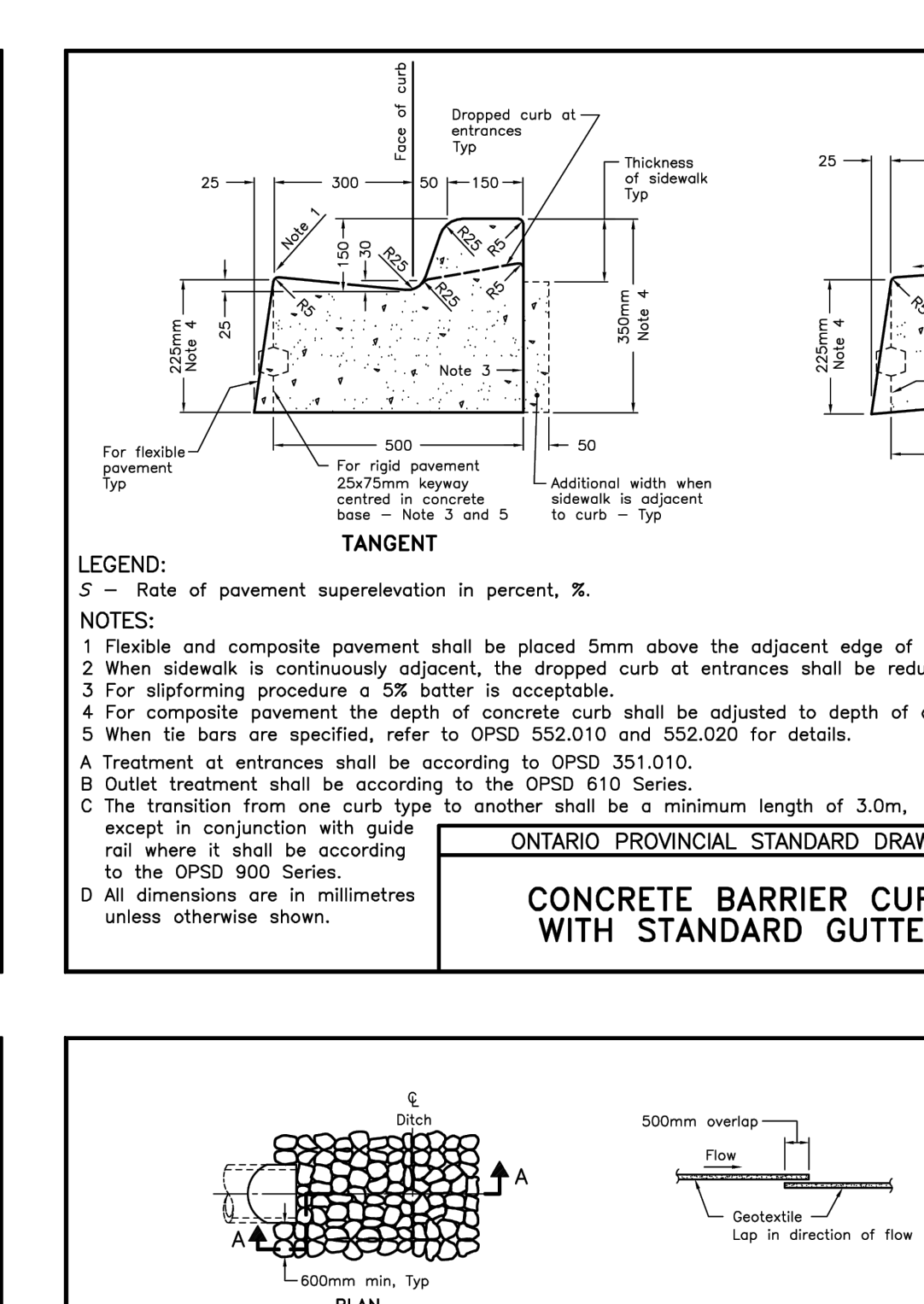
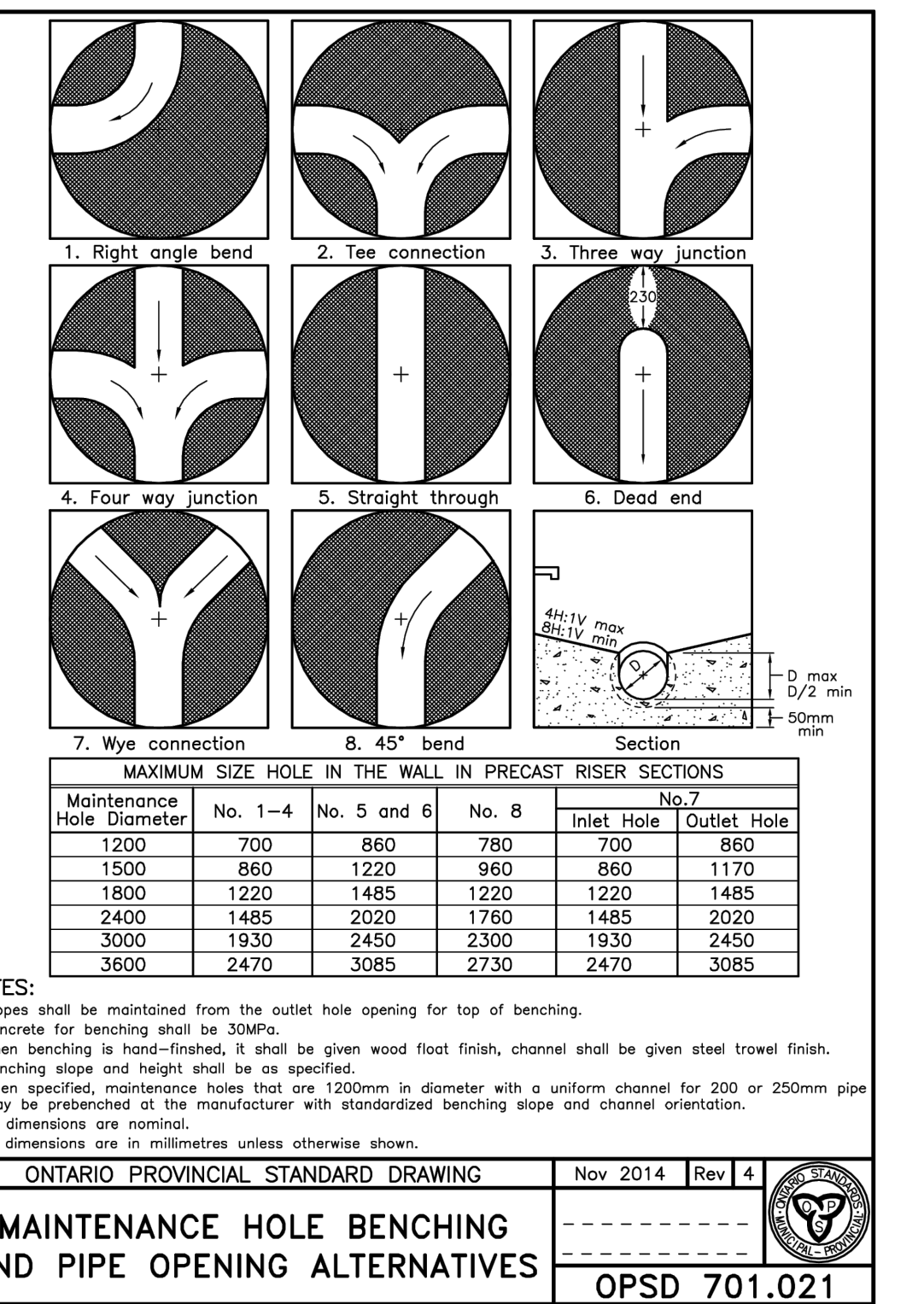
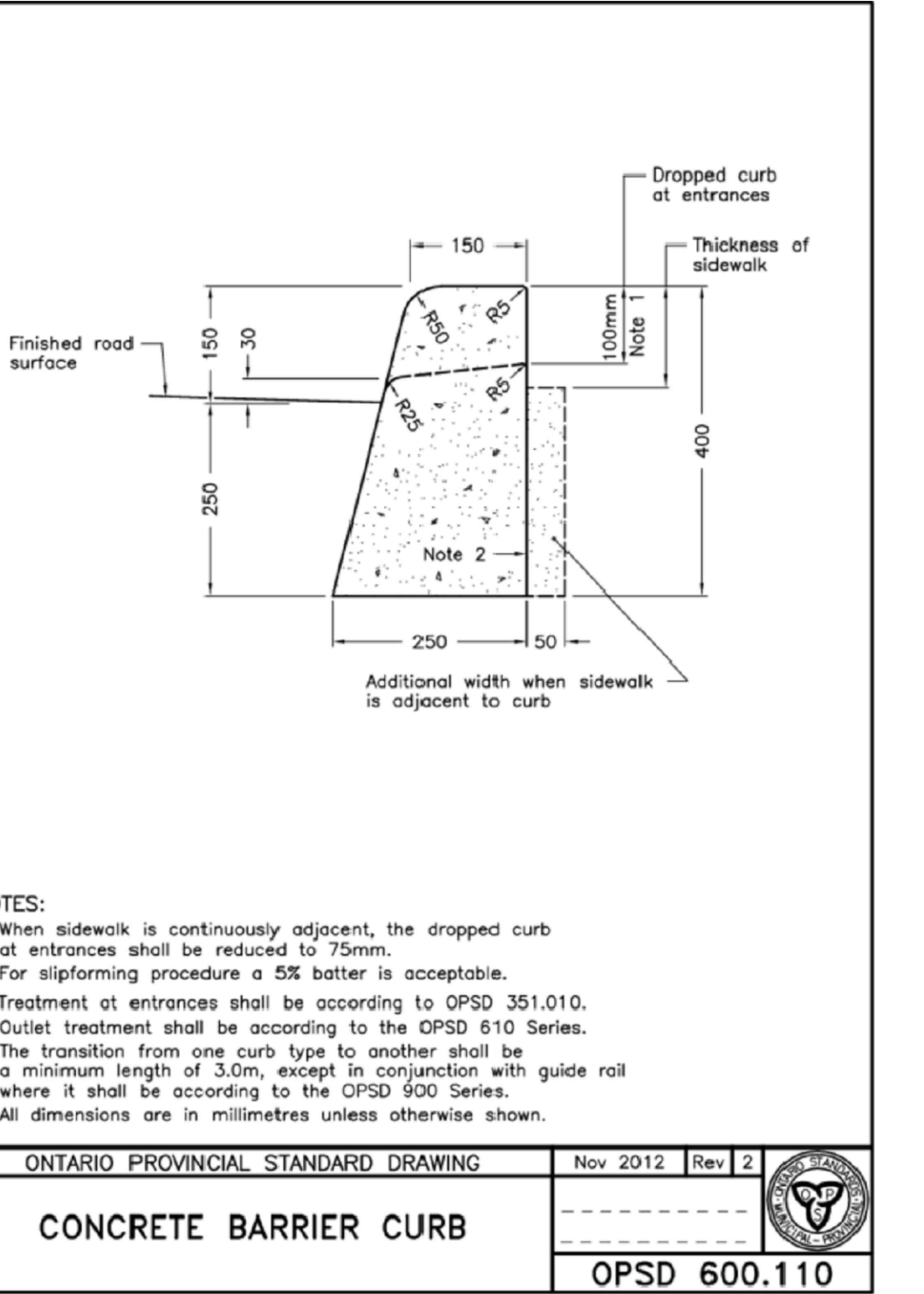
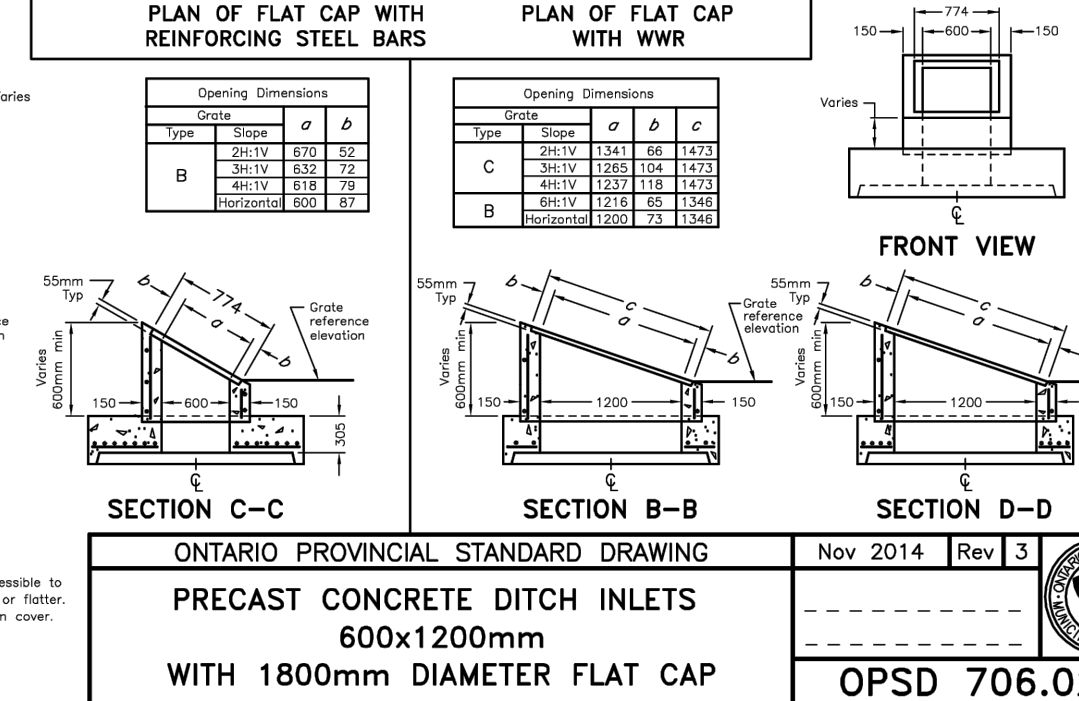
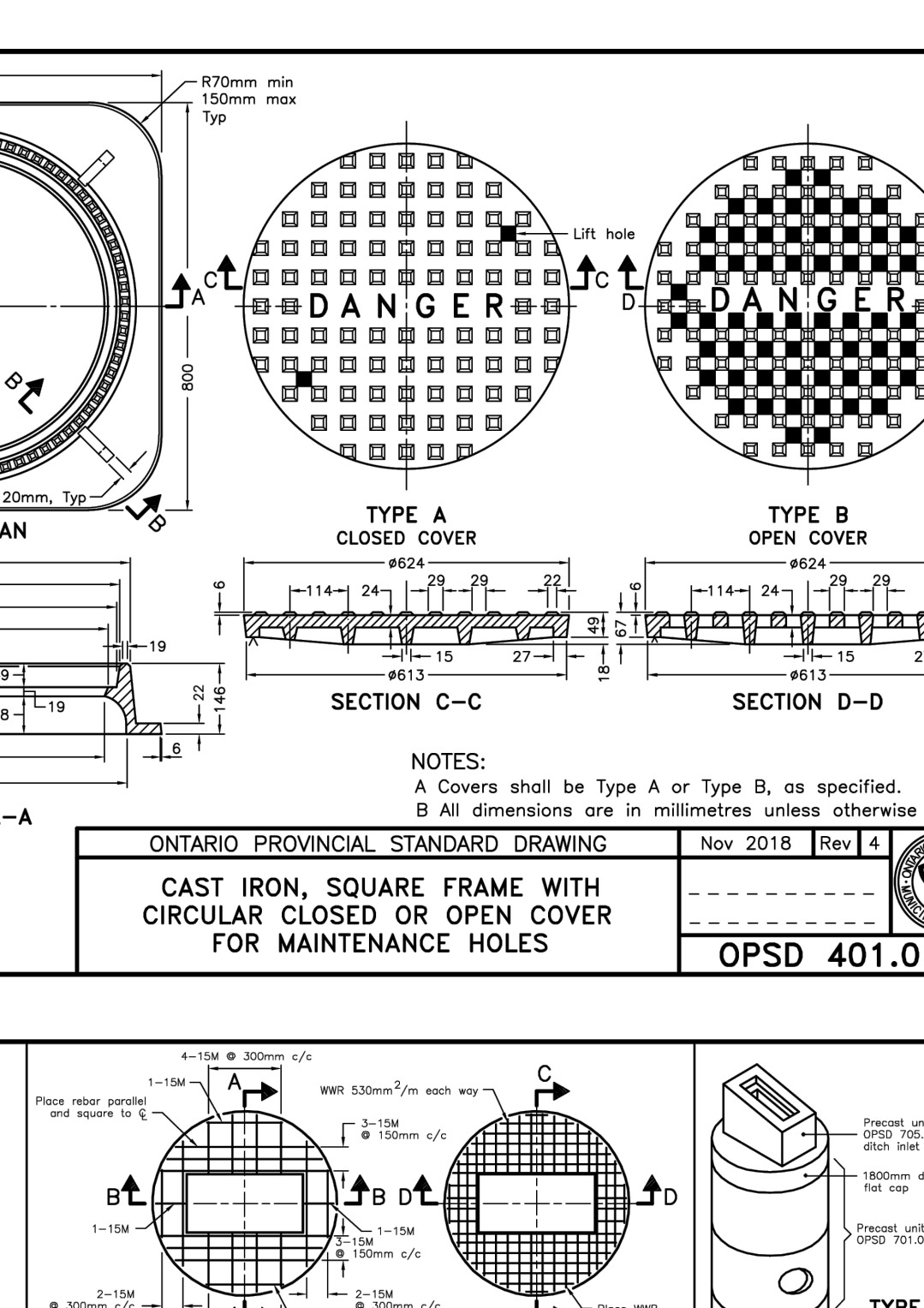
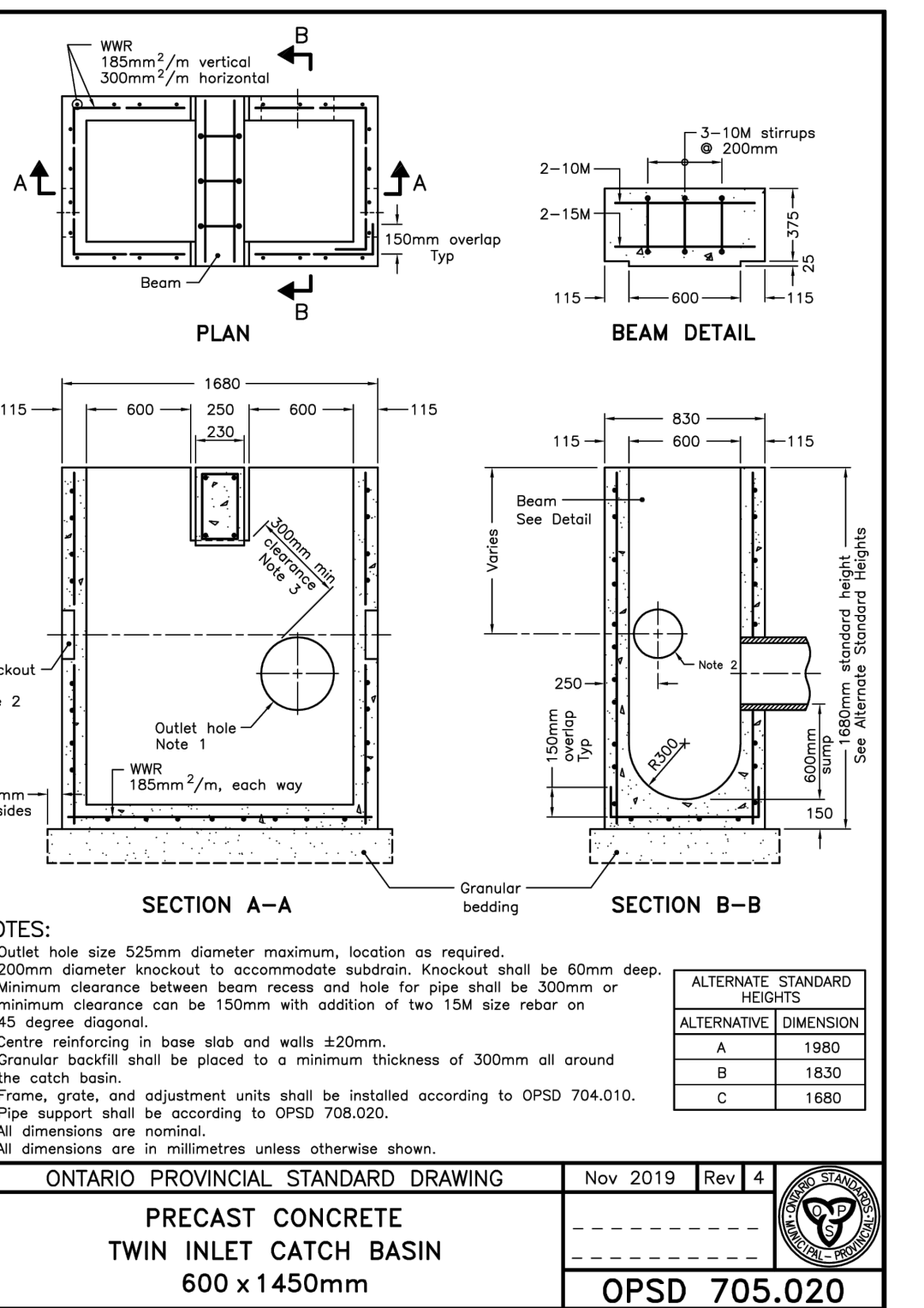
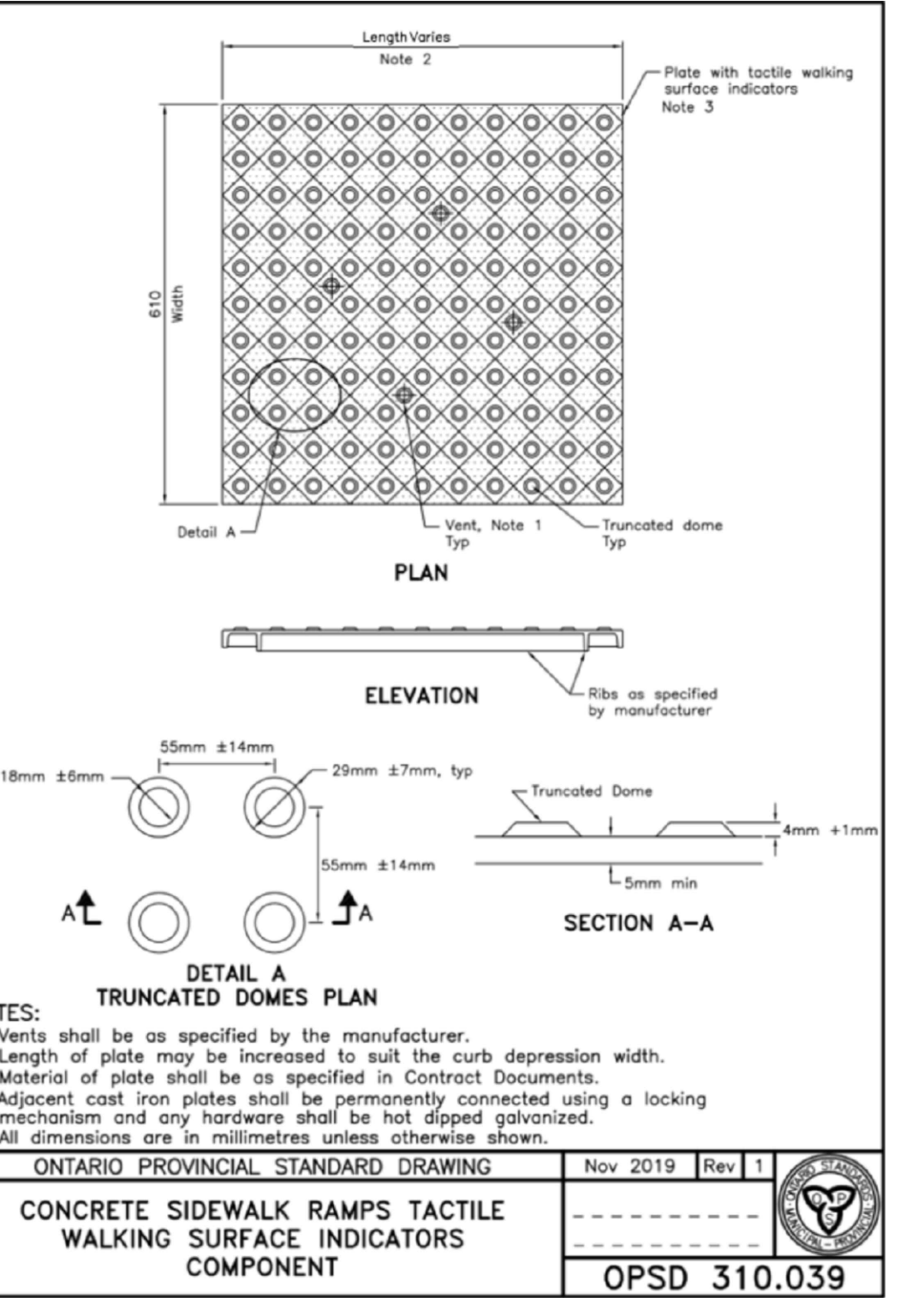
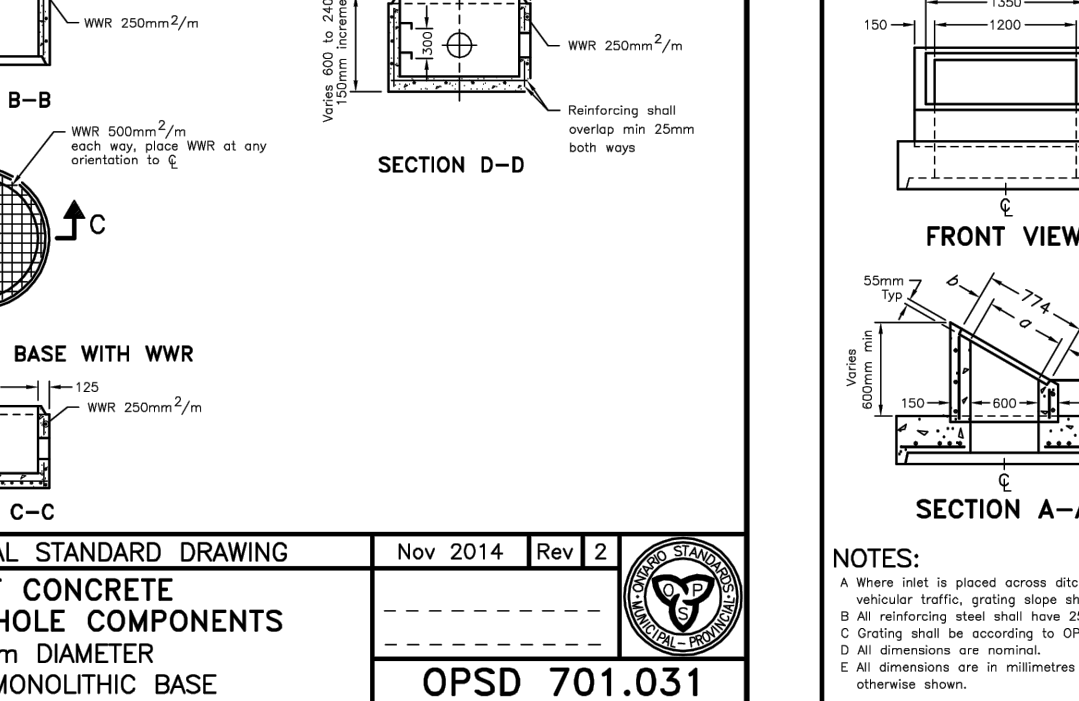
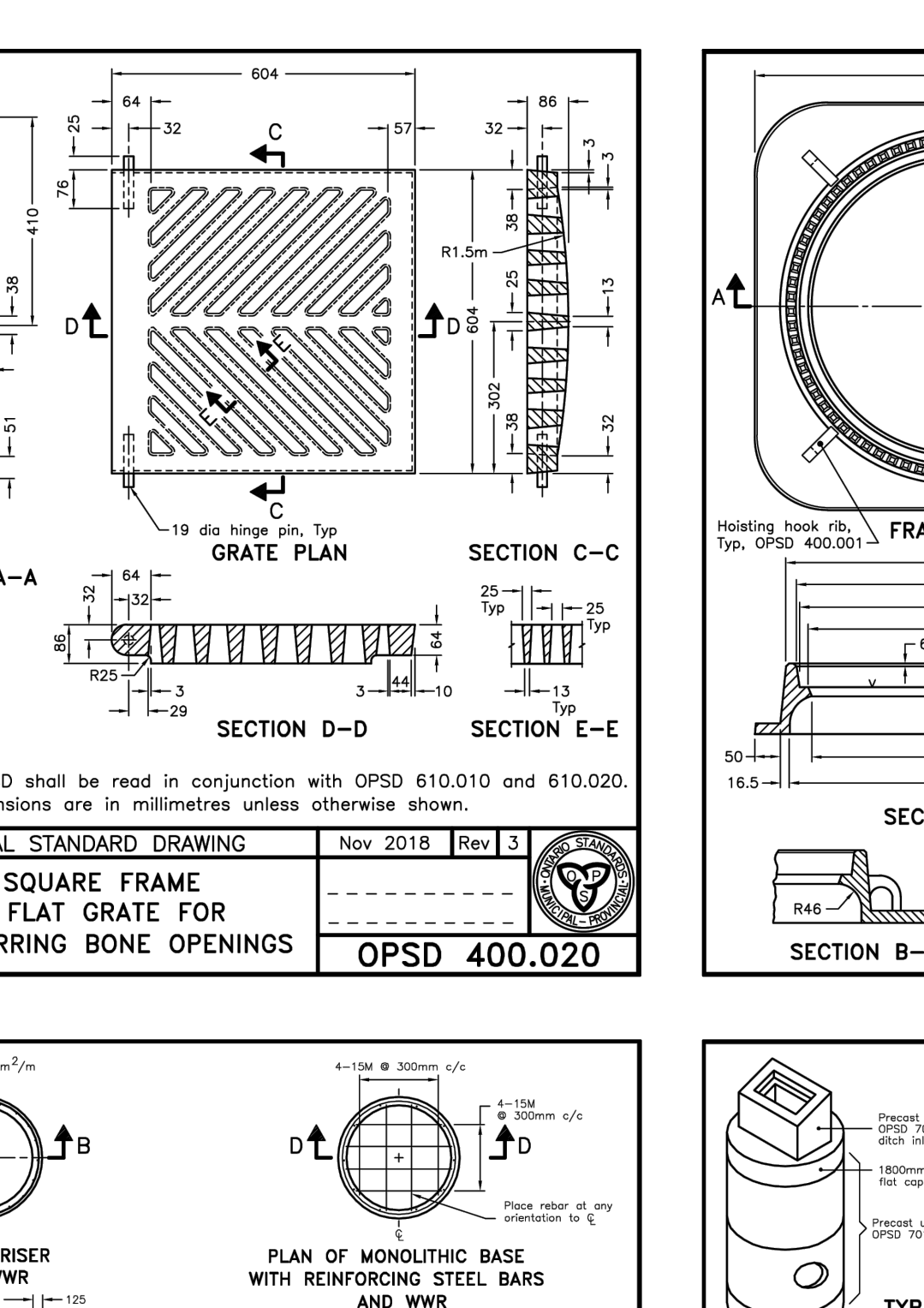
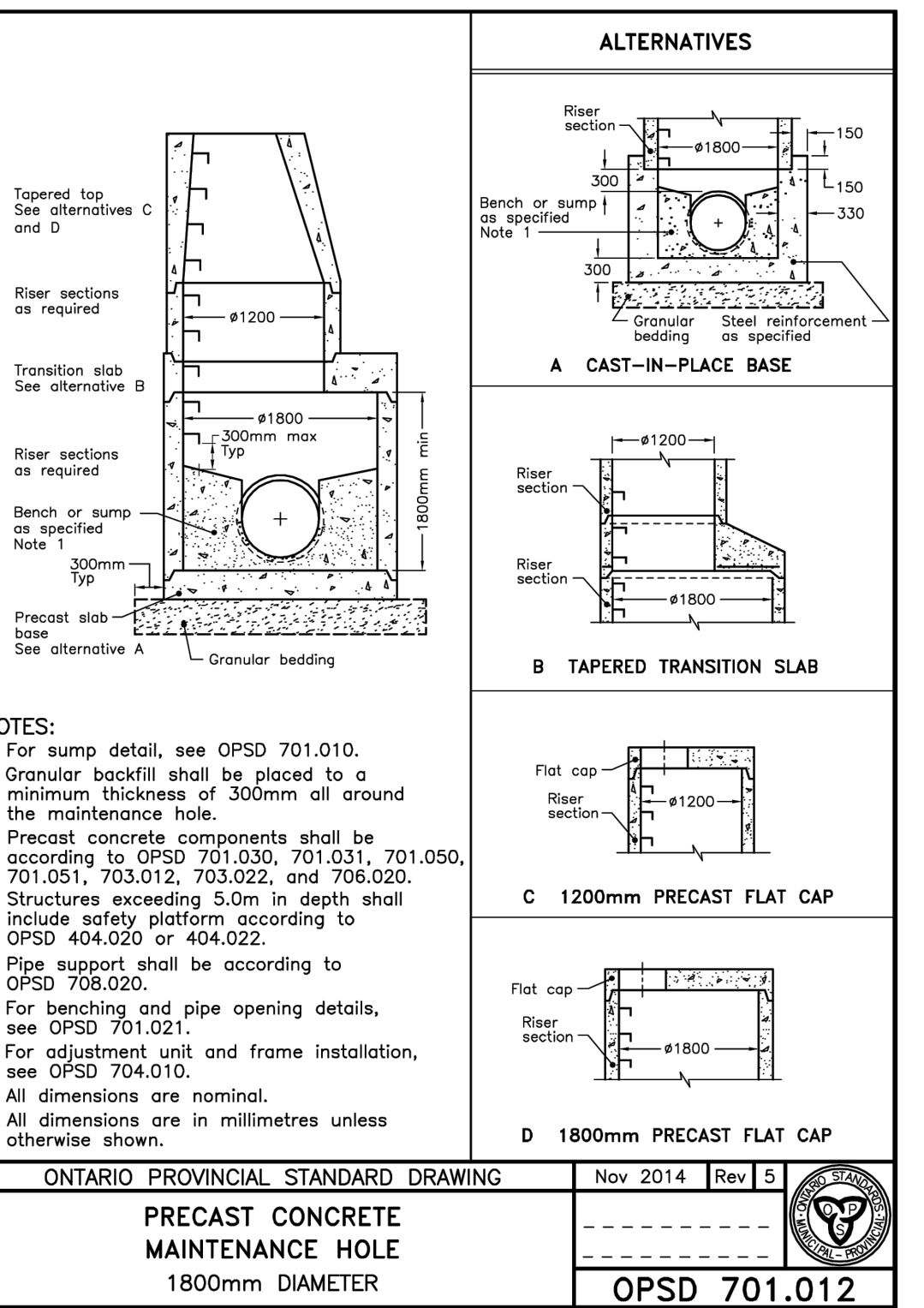
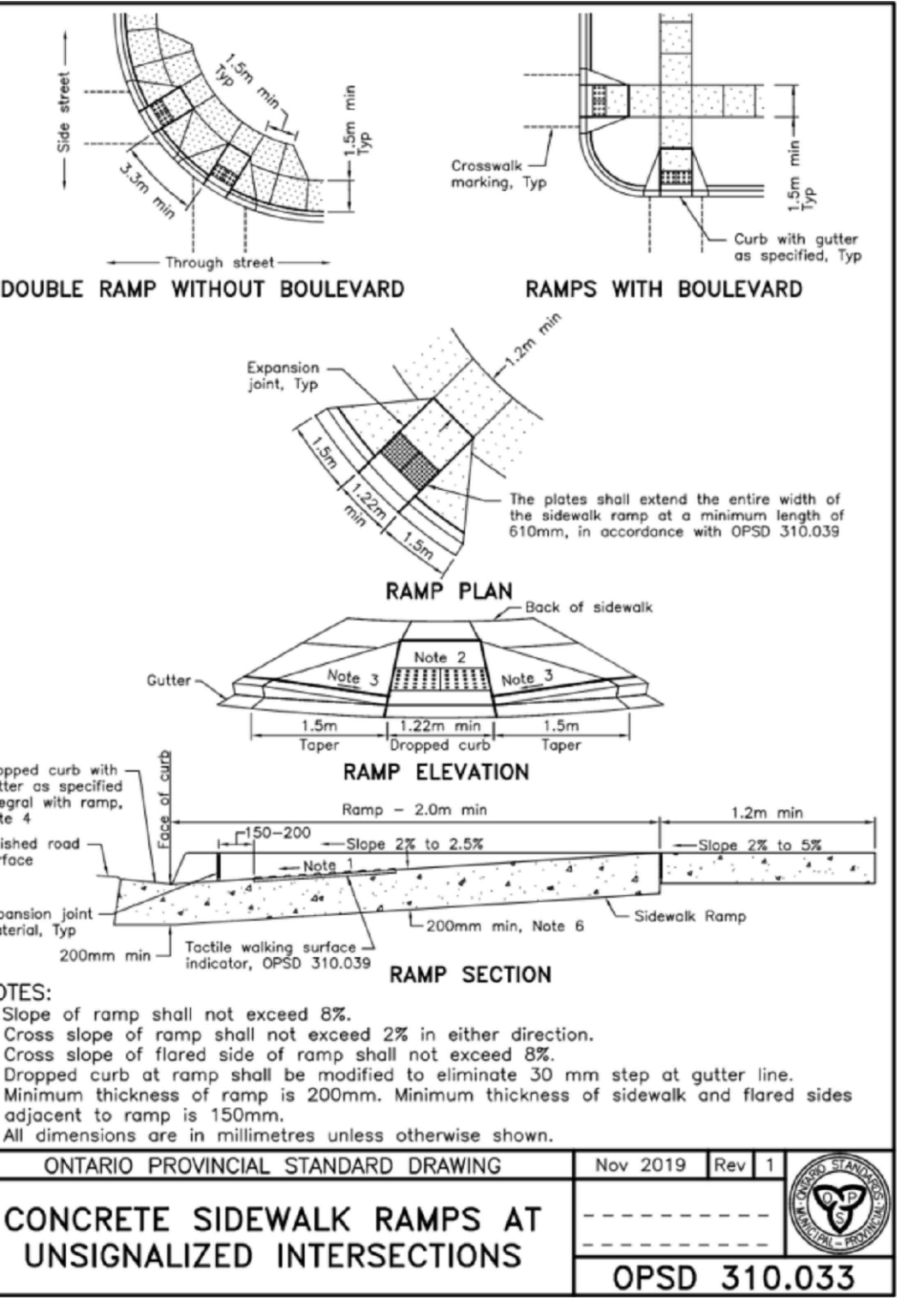
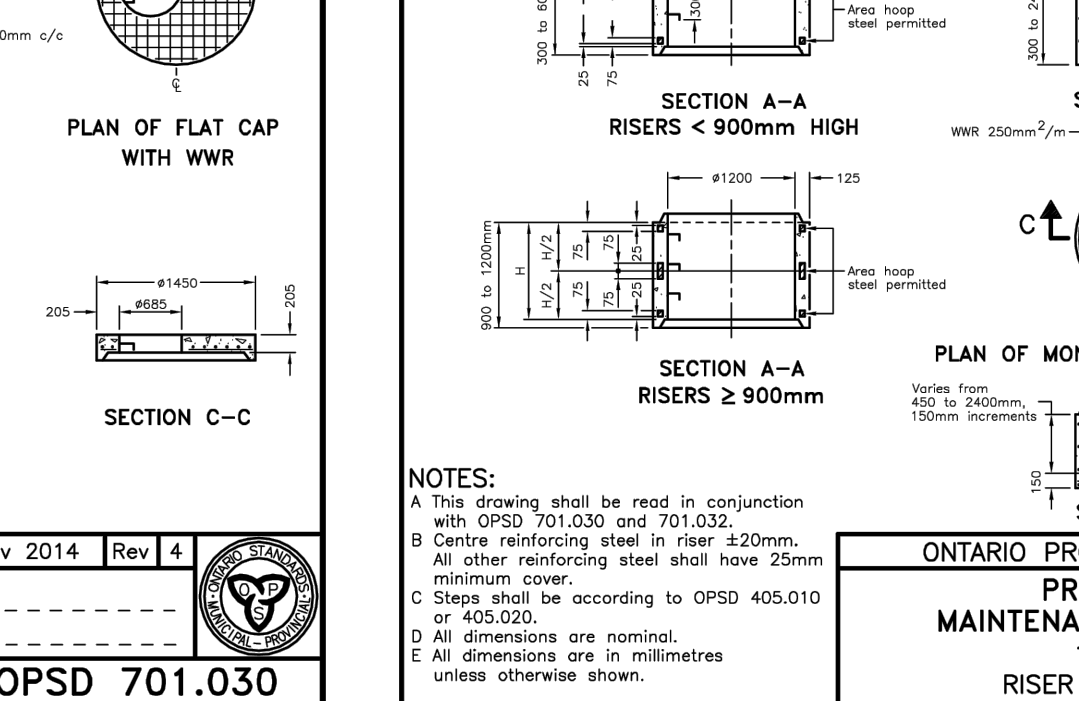
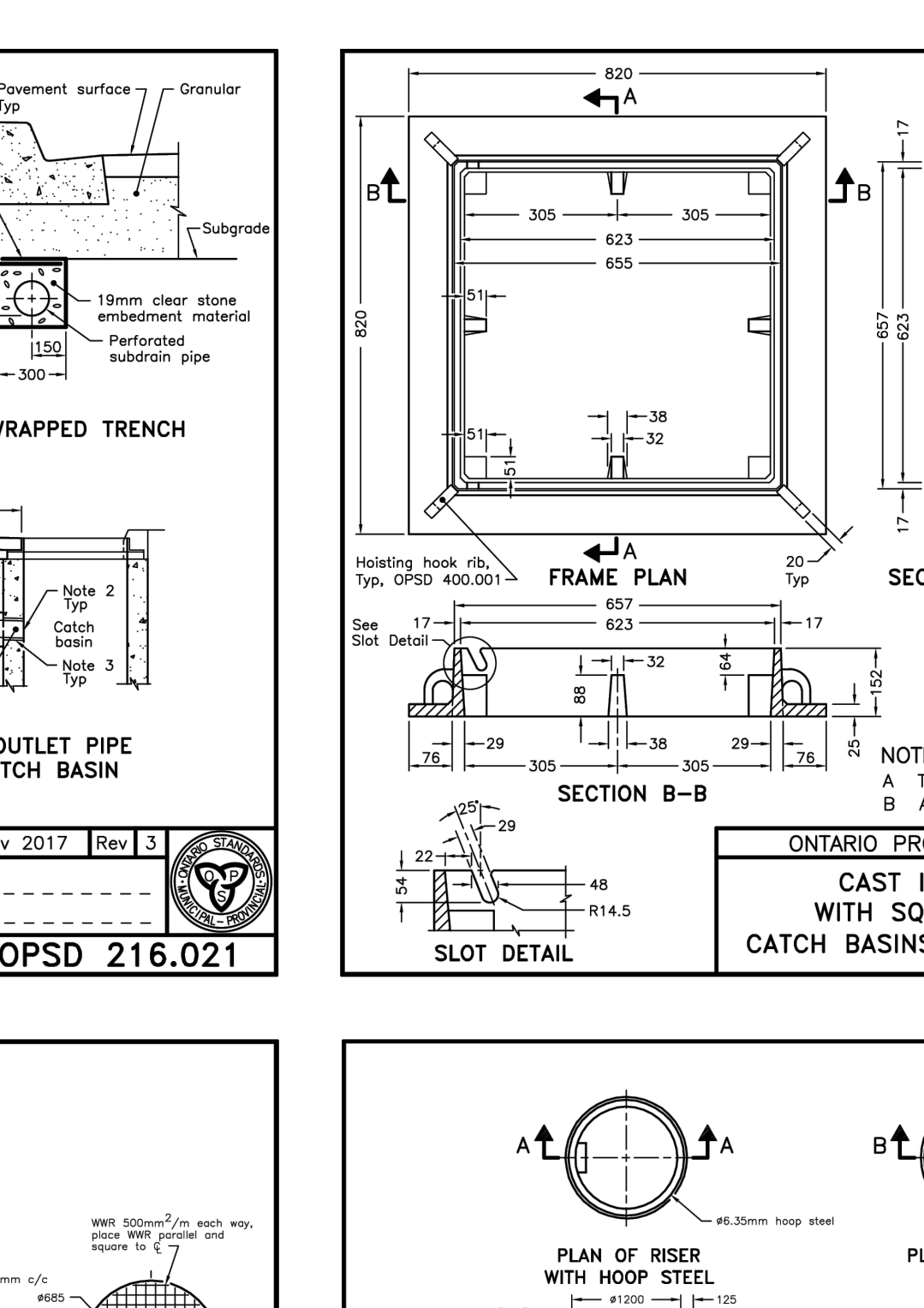
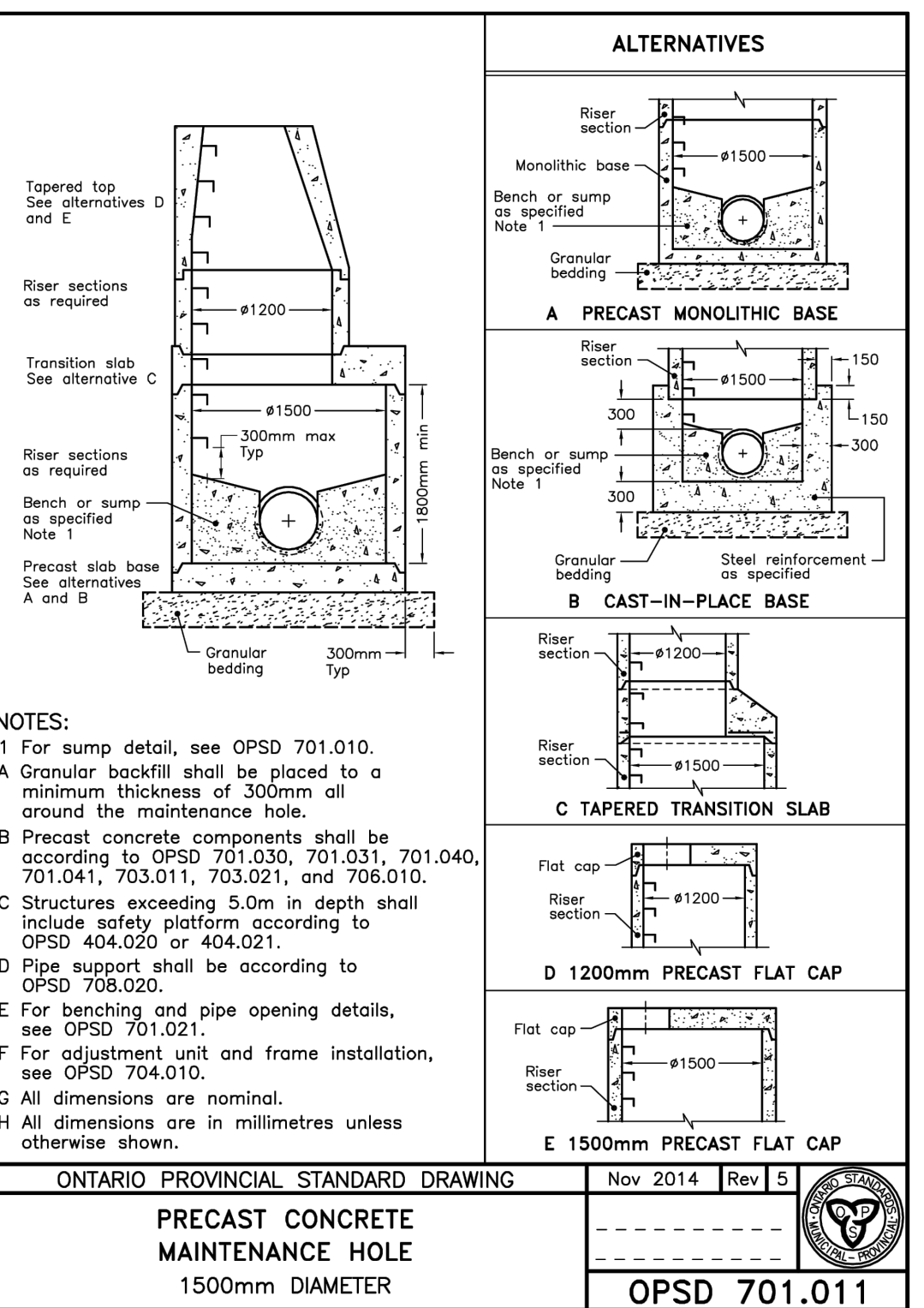
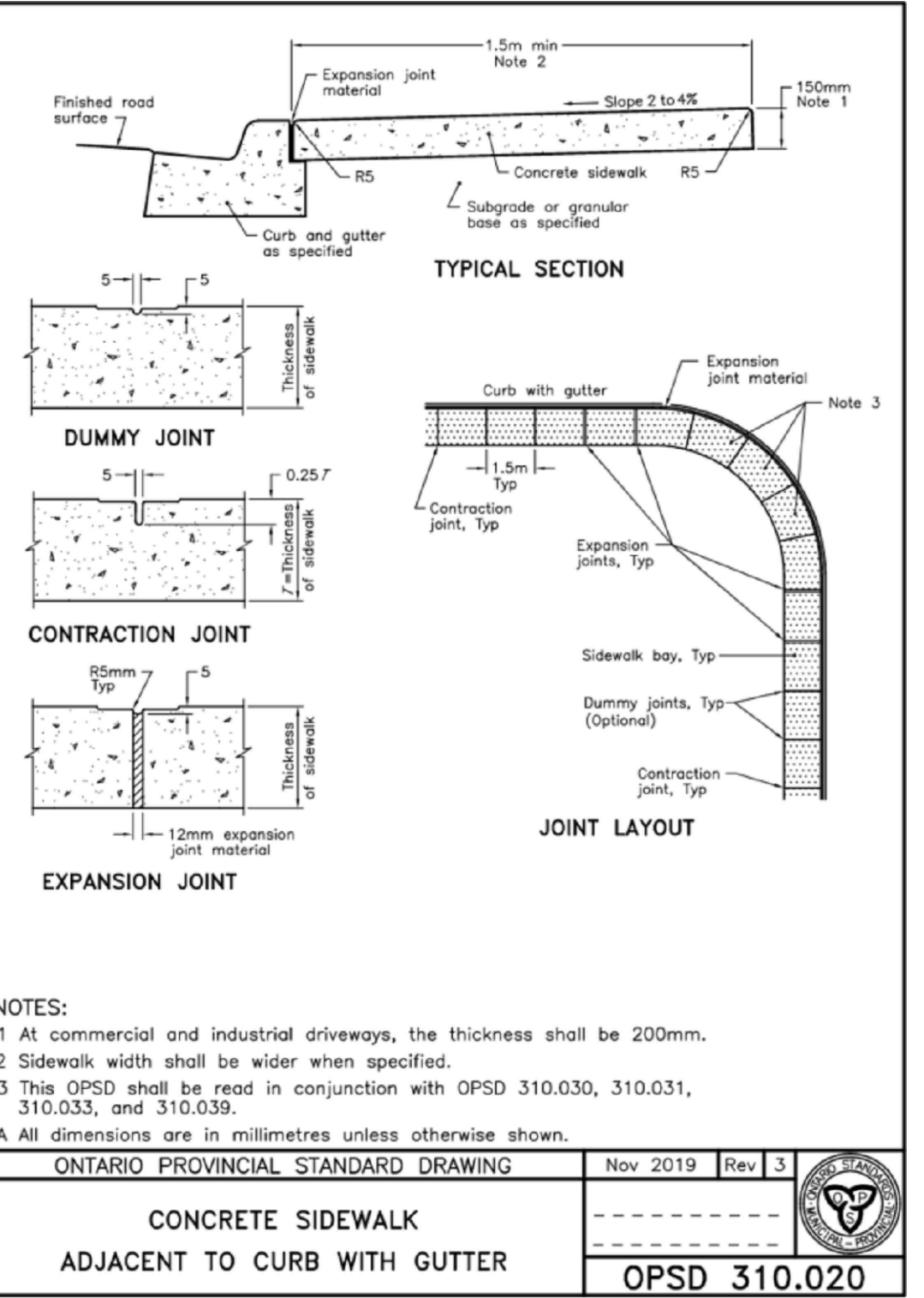
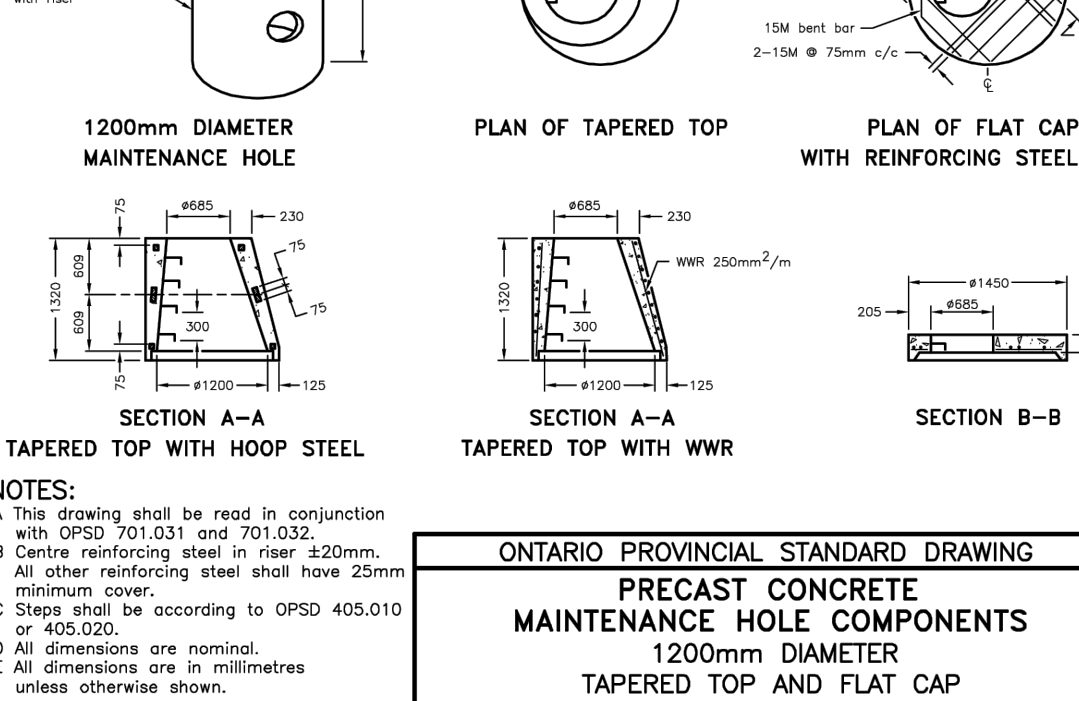
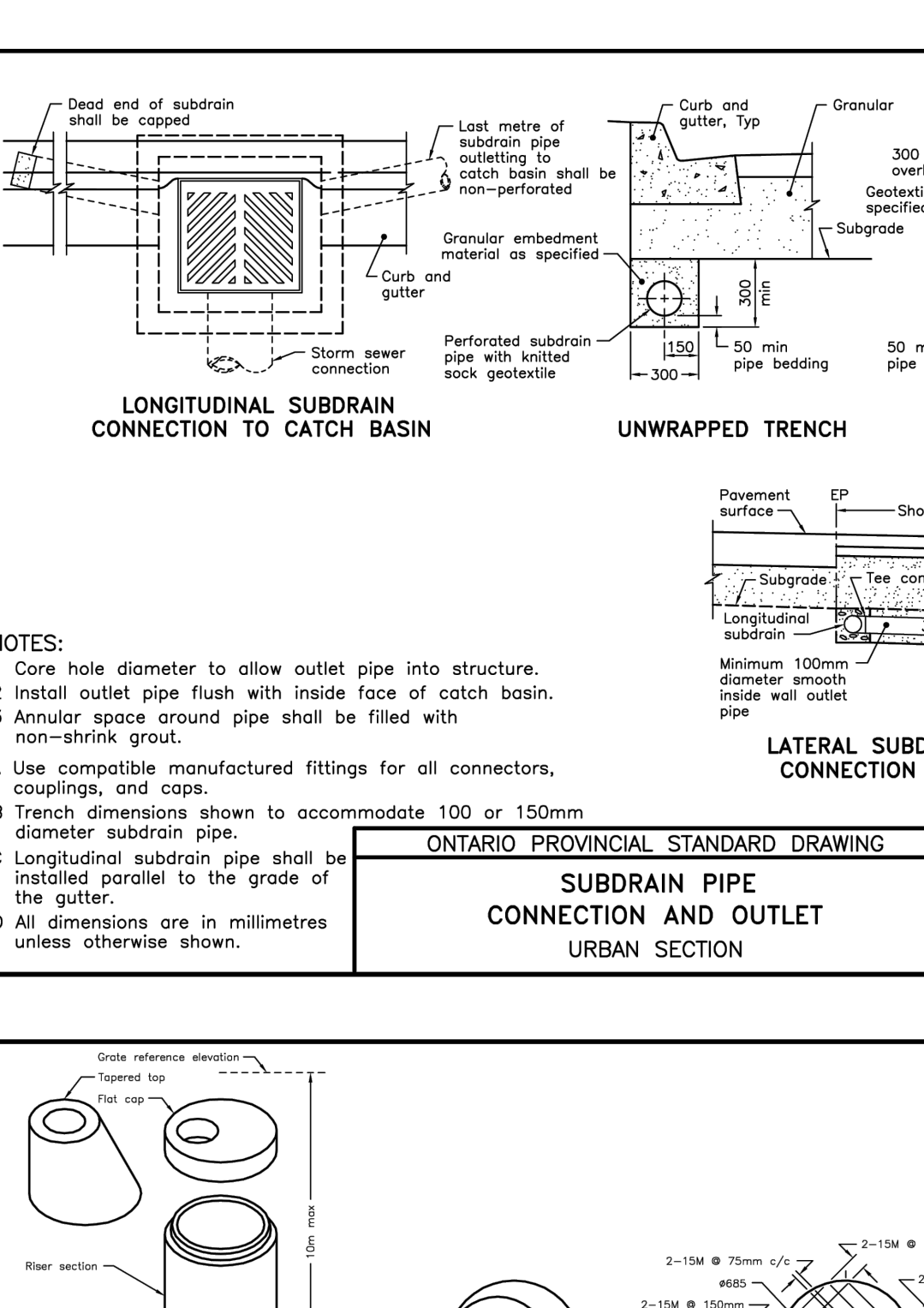
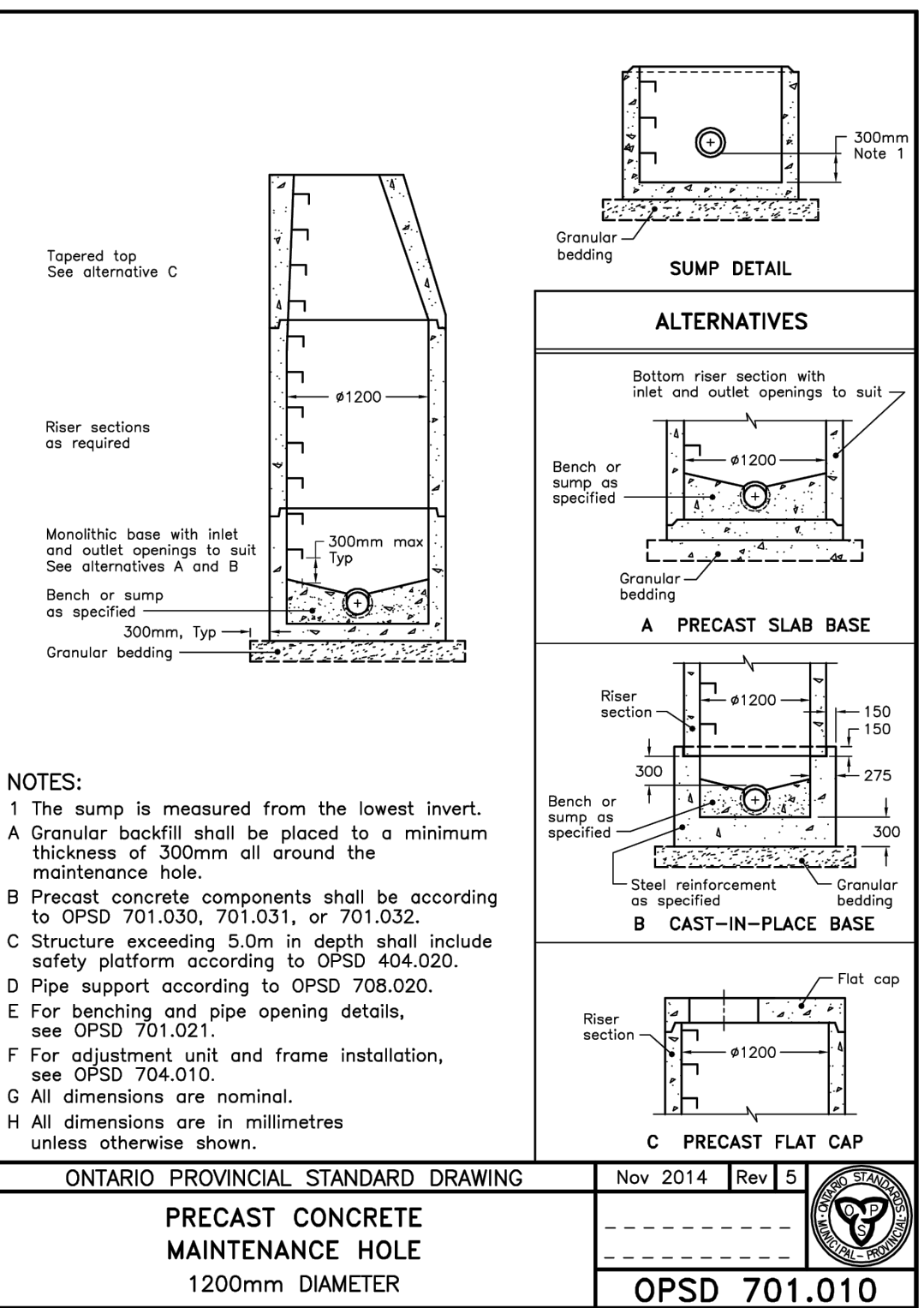
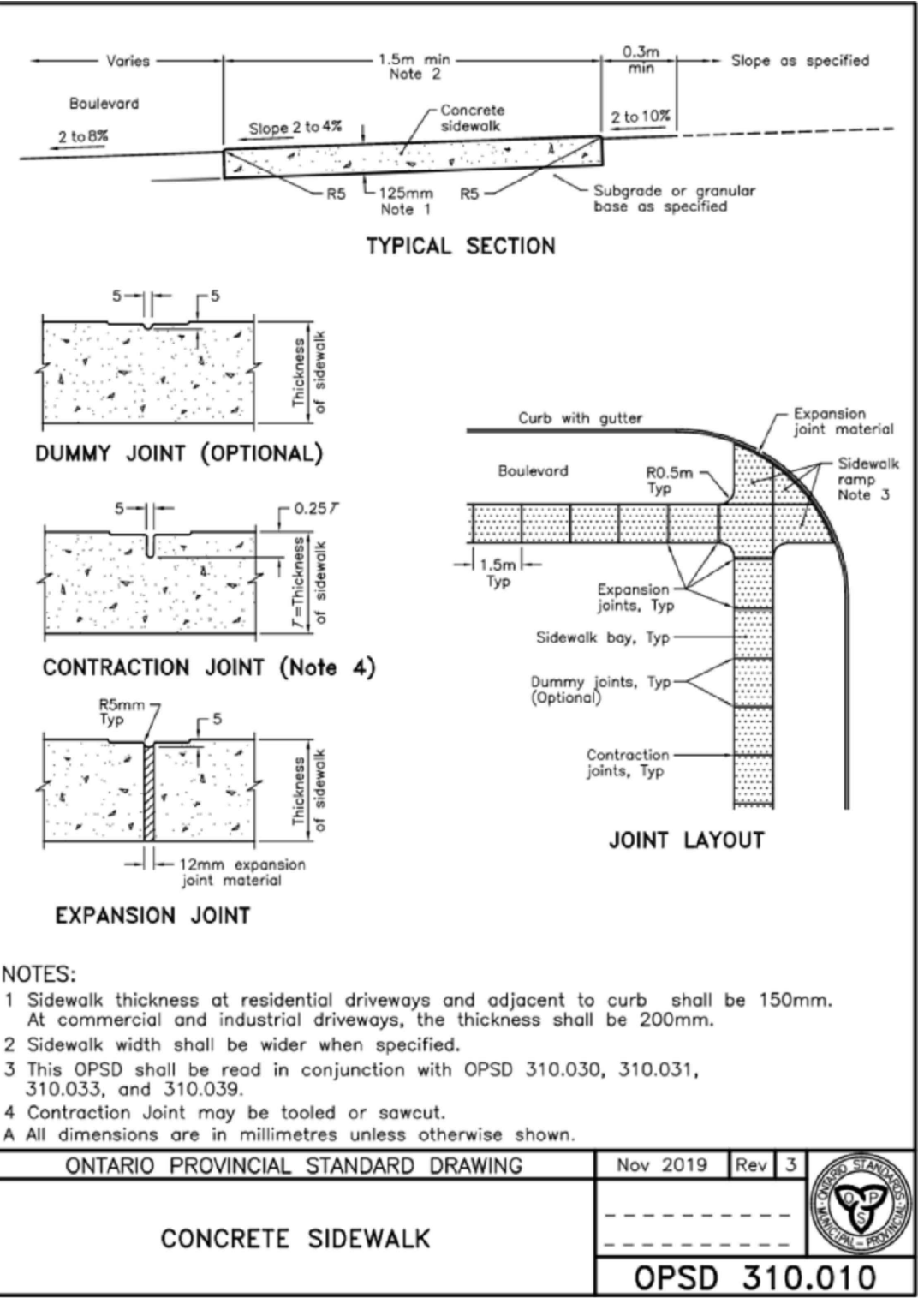
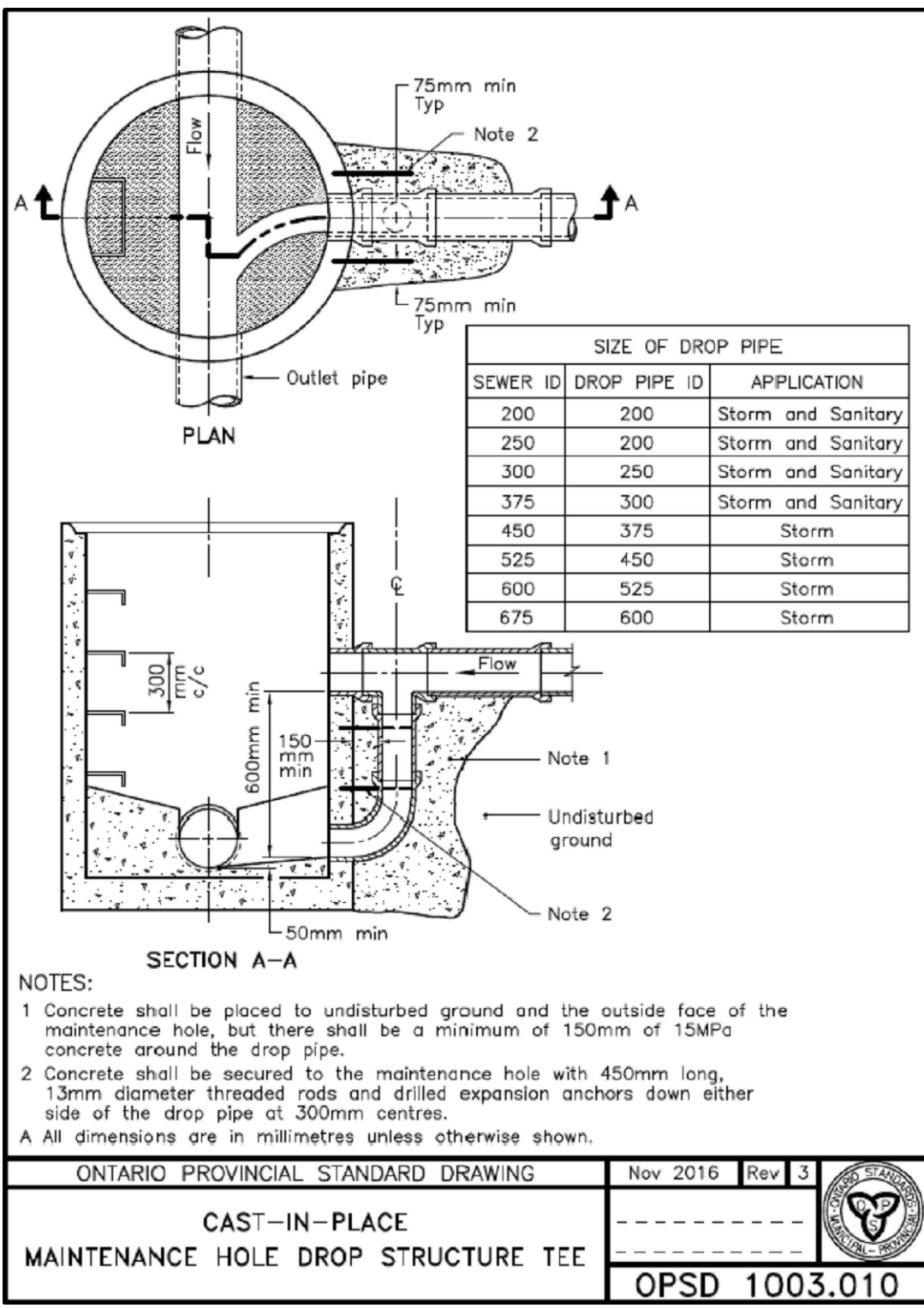
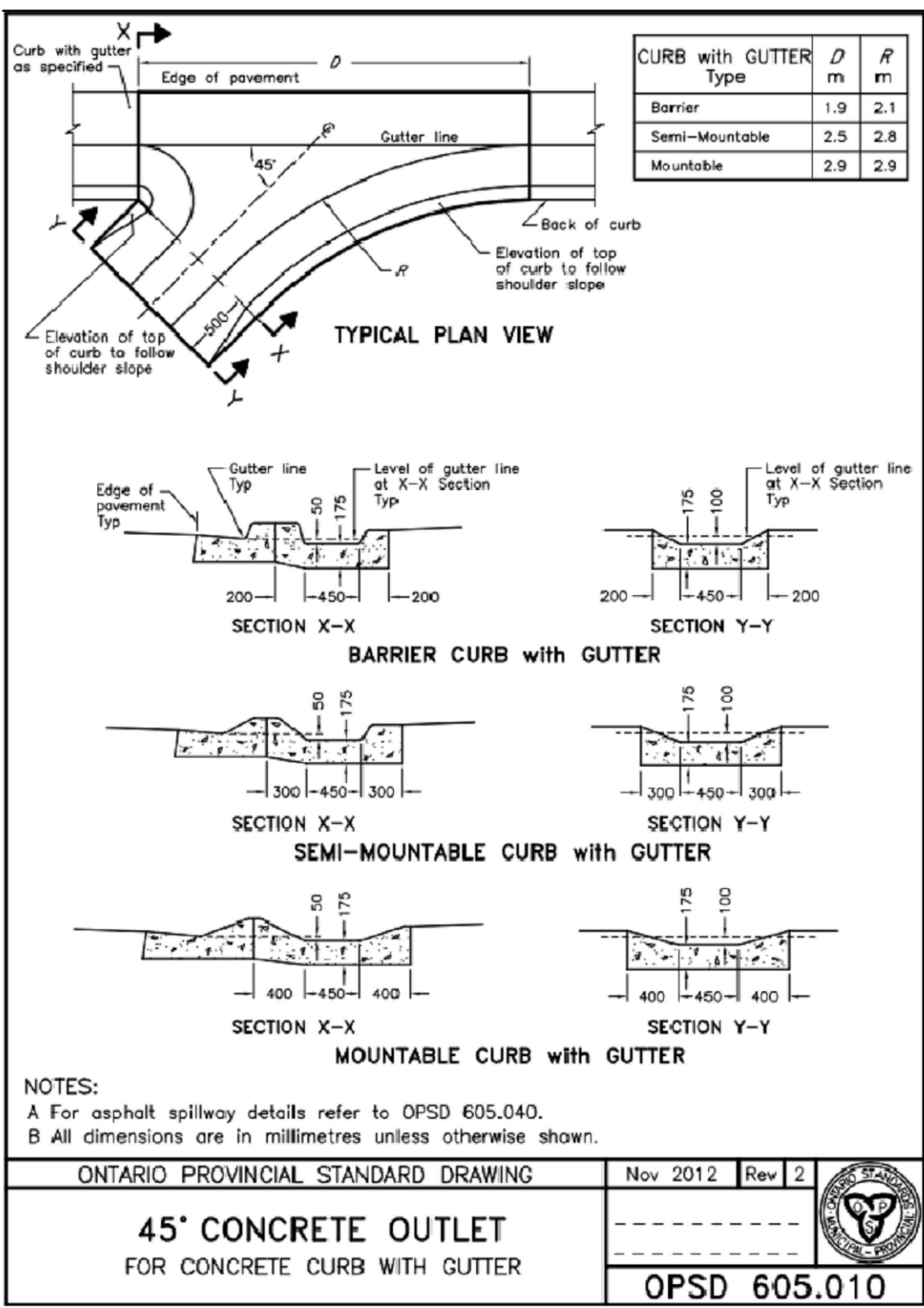
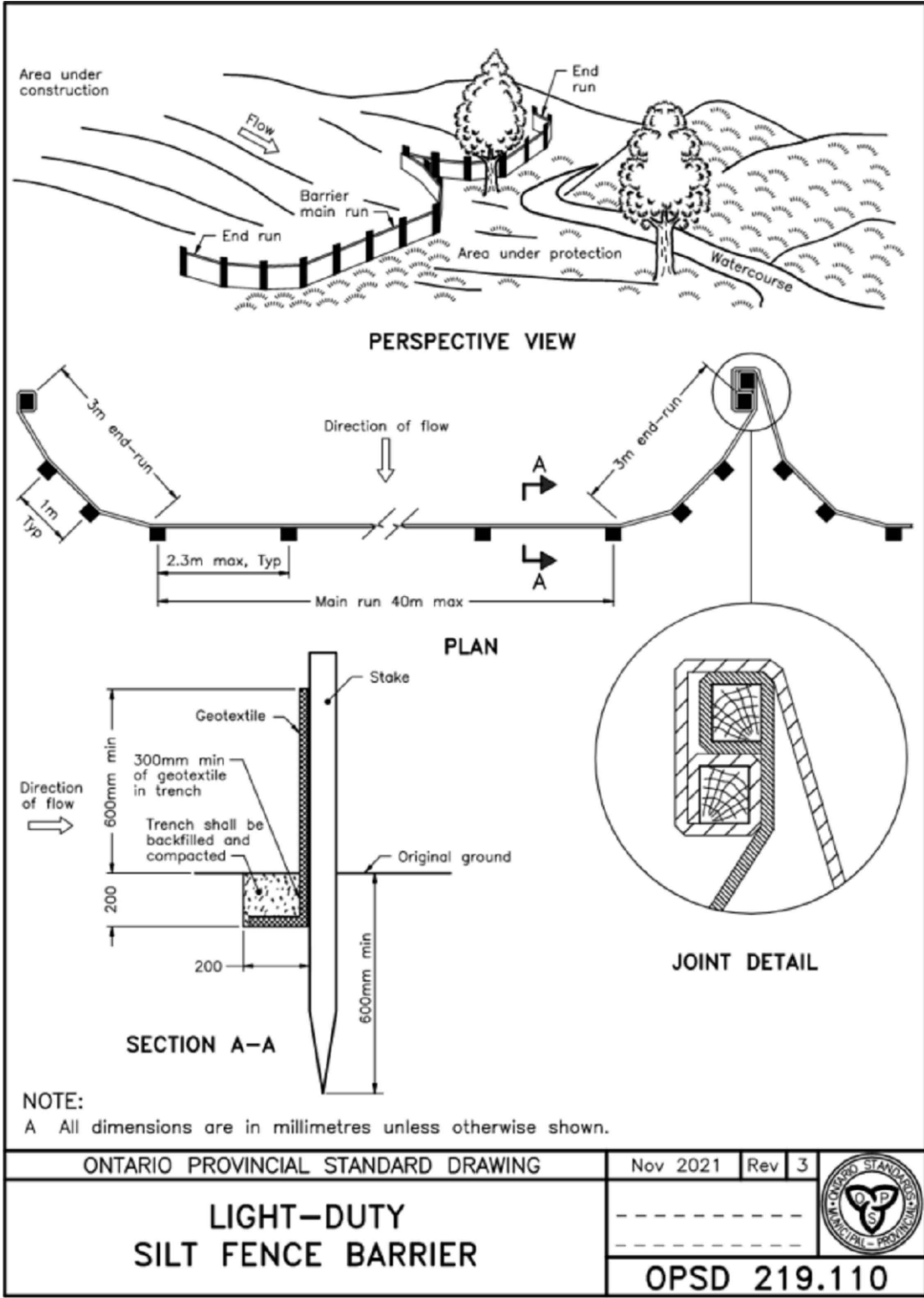
Precast concrete adjustment units shall be installed to set the frame and cover/grate at the required elevation. The adjustment units shall be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover/grate should be set in a full bed of mortar at the elevation specified.

5.7.1 A minimum of one cover, at least 22-inch (560 mm) in diameter, shall be clearly embossed with the OGS device brand or product name to properly identify this asset's purpose is for stormwater quality treatment.

APPENDIX

E

CIVIL DESIGN DRAWINGS



Infrastructure Ontario

Project Title:

BROCKVILLE CORRECTIONAL COMPLEX & ST. LAWRENCE VALLEY CORRECTIONAL AND TREATMENT CENTRE

1809 Oxford Avenue, Brockville

Consultants:

PARKIN ARCHITECTURE 49

Project Number:

C0.3

TRUE NORTH

1 SITE PLAN CONTROL & ZONING BYLAW AMENDMENT 2026-03-16

NO. ISSUED DATE

Notes:

Seal:

Permit to practice

Sheet Title:

OPSDS

Drawn By:

STR

Checked By:

DK

Scale:

AS SHOWN

Date:

2026-03-16

Issued No.

3

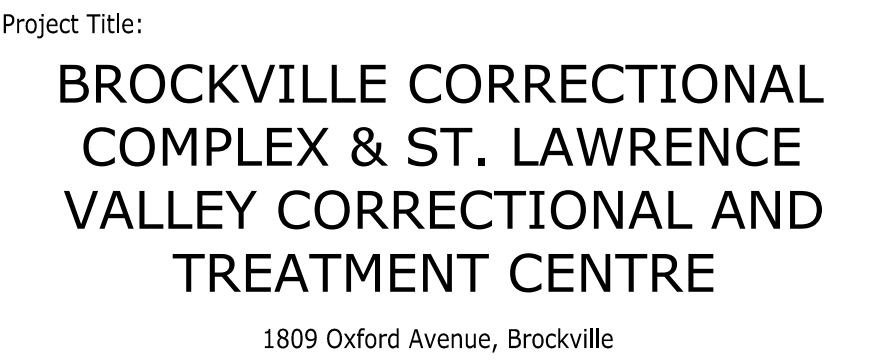
PROFESSIONAL ENGINEER

D.W. KERR

100041183

2026-03-16

PROVINCE OF ONTARIO



Consultants:

PARKIN
ARCHITECTURE 49[illegible]

Notes:

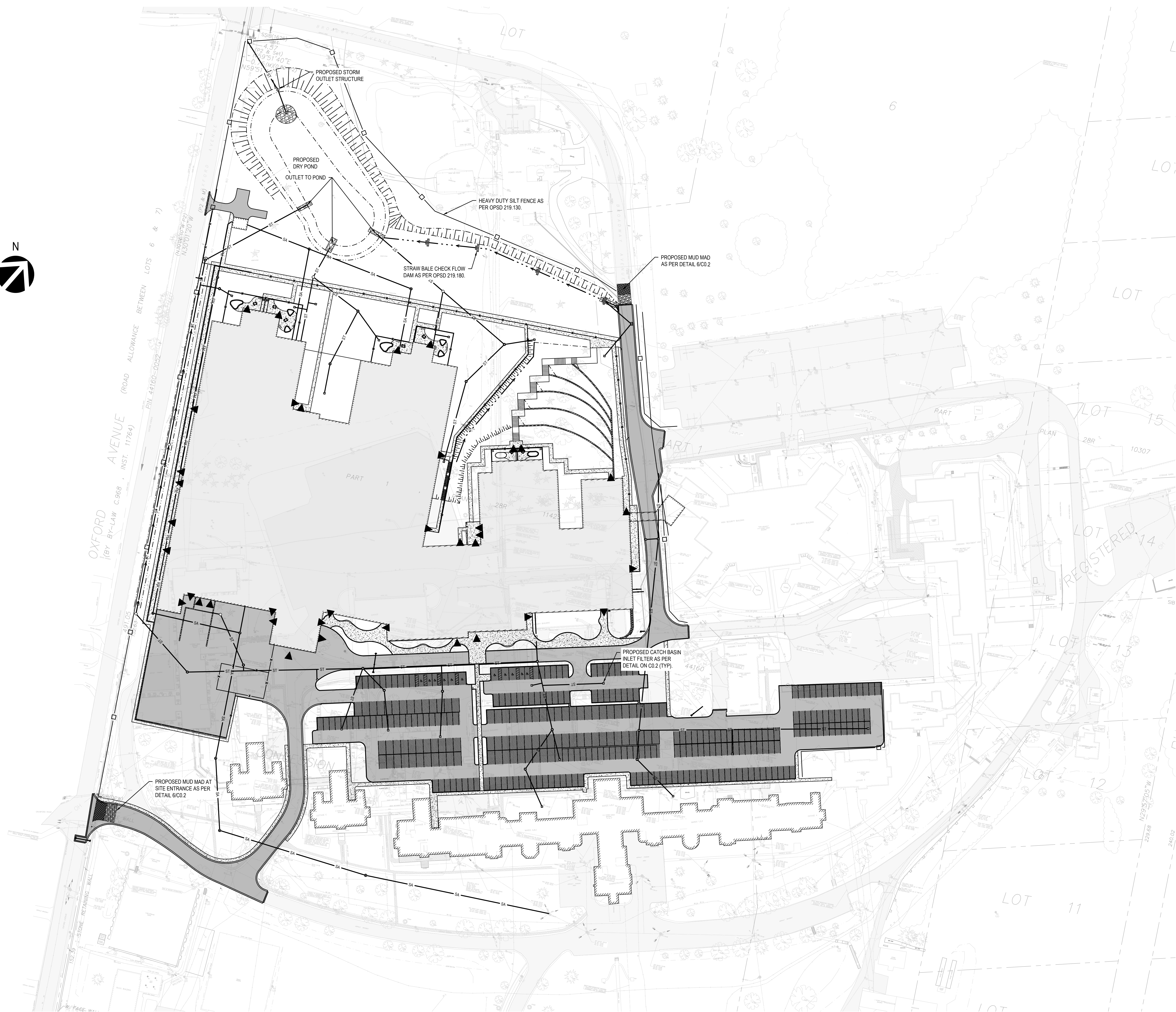
Seal:
Permit to practice



Drawn By: STR	Date: 2026-03-16
------------------	---------------------

Checked By:	Scale:
OK	1 : 750

Sheet Number:	Issued No.
C0.5	3

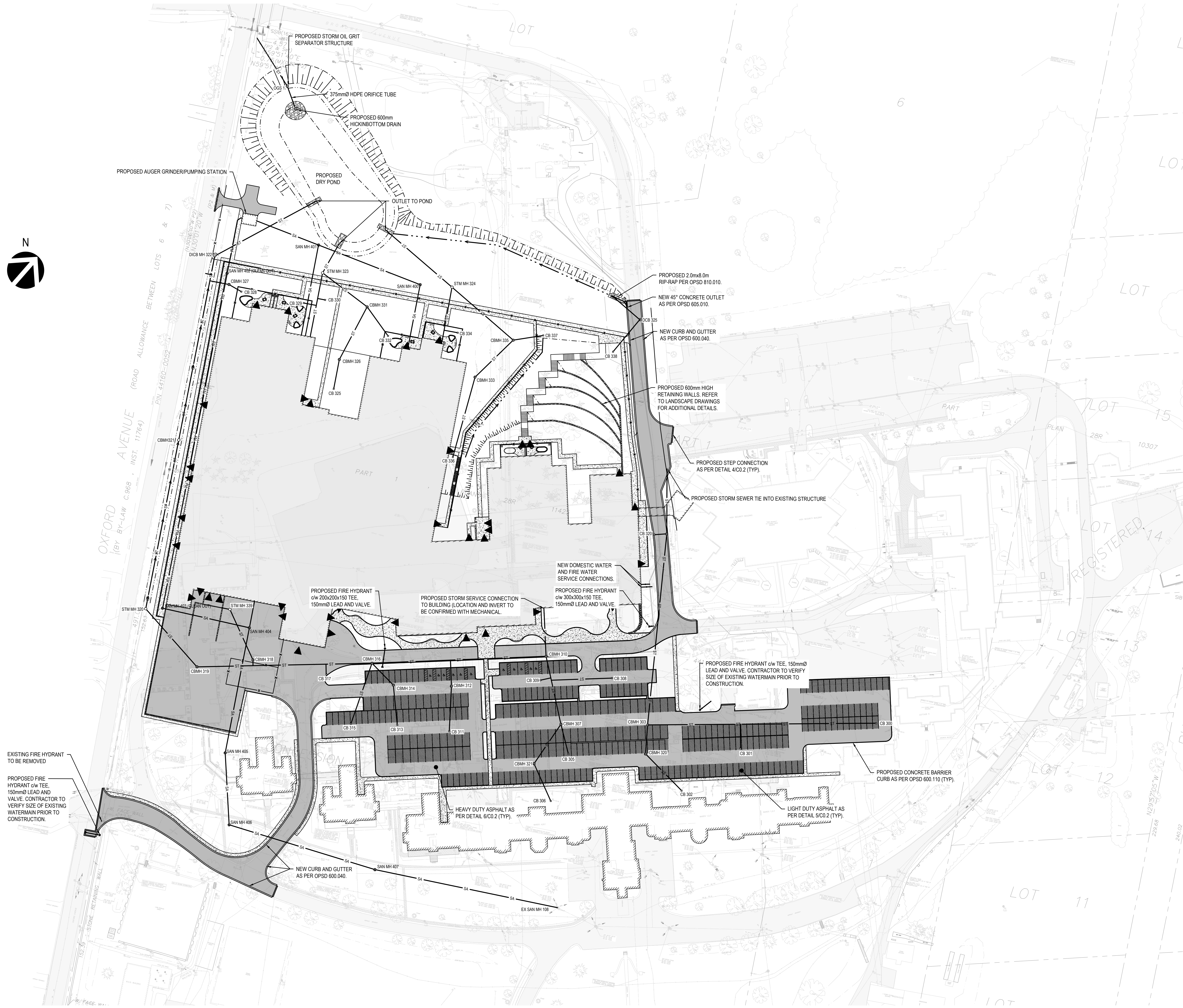


EROSION SEDIMENT CONTROL LEGEND

- | | |
|---|--|
|  | HEAVY DUTY SILT FENCE (OPSD 219.130) |
|  | STRAW BALE CHECK FLOW DAM (OPSD 219.180) |
|  | CATCH BASIN INLET FILTER |
|  | MUD MAT |

LEGEND

- | | |
|-----|--|
| 5A | EXISTING SANITARY SEWER |
| 5B | PROPOSED SANITARY SEWER |
| 6A | PROPOSED SANITARY FORCEMAIN |
| 6B | EXISTING STORM SEWER |
| 7A | PROPOSED STORM SEWER |
| 7B | EXISTING WATERMAIN |
| 7C | PROPOSED WATERMAIN |
| 8A | PROPOSED TOP OF SLOPE TERRACING LINE |
| 8B | PROPOSED BOTTOM OF SLOPE |
| 9A | PROPOSED SWALE IDENTIFIER |
| 9B | EXISTING SANITARY MANHOLE |
| 9C | PROPOSED SANITARY MANHOLE |
| 9D | PROPOSED STORM MANHOLE |
| 9E | PROPOSED STORM CATCH BASIN MANHOLE |
| 9F | PROPOSED STORM DITCH INLET CATCH BASIN |
| 9G | EXISTING STORM CATCH BASIN |
| 9H | PROPOSED STORM CATCH BASIN |
| 9I | EXISTING WATER VALVE |
| 9J | PROPOSED WATER VALVE |
| 9K | PROPOSED FIRE FANNING WALL |
| 10A | PROPOSED BUILDING |
| 10B | PROPOSED HEAVY DUTY ASPHALT |
| 10C | PROPOSED LIGHT DUTY ASPHALT |
| 10D | PROPOSED CONCRETE CURBSTONE |
| 10E | PROPOSED UTILITY WALKING PATH |
| 10F | PROPOSED RIP-RAP PAD |



LEGEND

- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY FORCEMAIN
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- EXISTING WATERMAIN
- PROPOSED WATERMAIN
- PROPOSED CURB
- PROPOSED TOP OF SLOPE WATER/RACING LINE
- PROPOSED BOTTOM OF SLOPE
- PROPOSED SWALE CENTERLINE
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- EXISTING STORM MANHOLE
- PROPOSED STORM MANHOLE
- EXISTING STORM CATCH BASIN
- PROPOSED STORM CATCH BASIN
- EXISTING WATER VALVE
- PROPOSED WATER VALVE
- PROPOSED RETAINING WALL
- PROPOSED BUILDING
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED CONCRETE SURFACE
- PROPOSED OUTER WALKING PATH
- PROPOSED RIP-RAP PAD



Project Title:
**BROCKVILLE CORRECTIONAL
COMPLEX & ST. LAWRENCE
VALLEY CORRECTIONAL AND
TREATMENT CENTRE**
1809 Oxford Avenue, Brockville

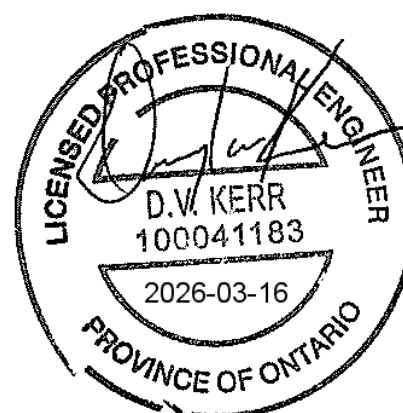


Project Number: TRUE NORTH

1	SITE PLAN CONTROL & ZONING BYLAW AMENDMENT	2026-03-16
NO.	ISSUED	DATE

Notes:

Seal:
Permit to practice



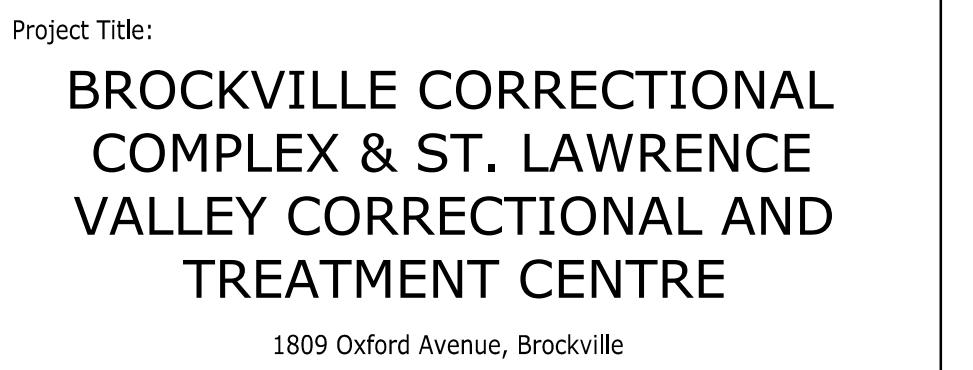
Sheet Title:
GENERAL ARRANGEMENT

Drawn By: STR	Date: 2026-03-16
Checked By: DK	Scale: 1 : 750

Sheet Number: C1.1	Issued No. 3
------------------------------	------------------------

Sheet Title:	
EXISTING CONDITIONS (SERVICING)	
Drawn By: STR	Date: 2026-03-16
Checked By: OK	Scale: 1 : 750
Sheet Number: C1.2	Issued No. 3





Project Number: TRUE NORTH

[illegible]

Notes:

Seal:

Permit to practice



Sheet Title:

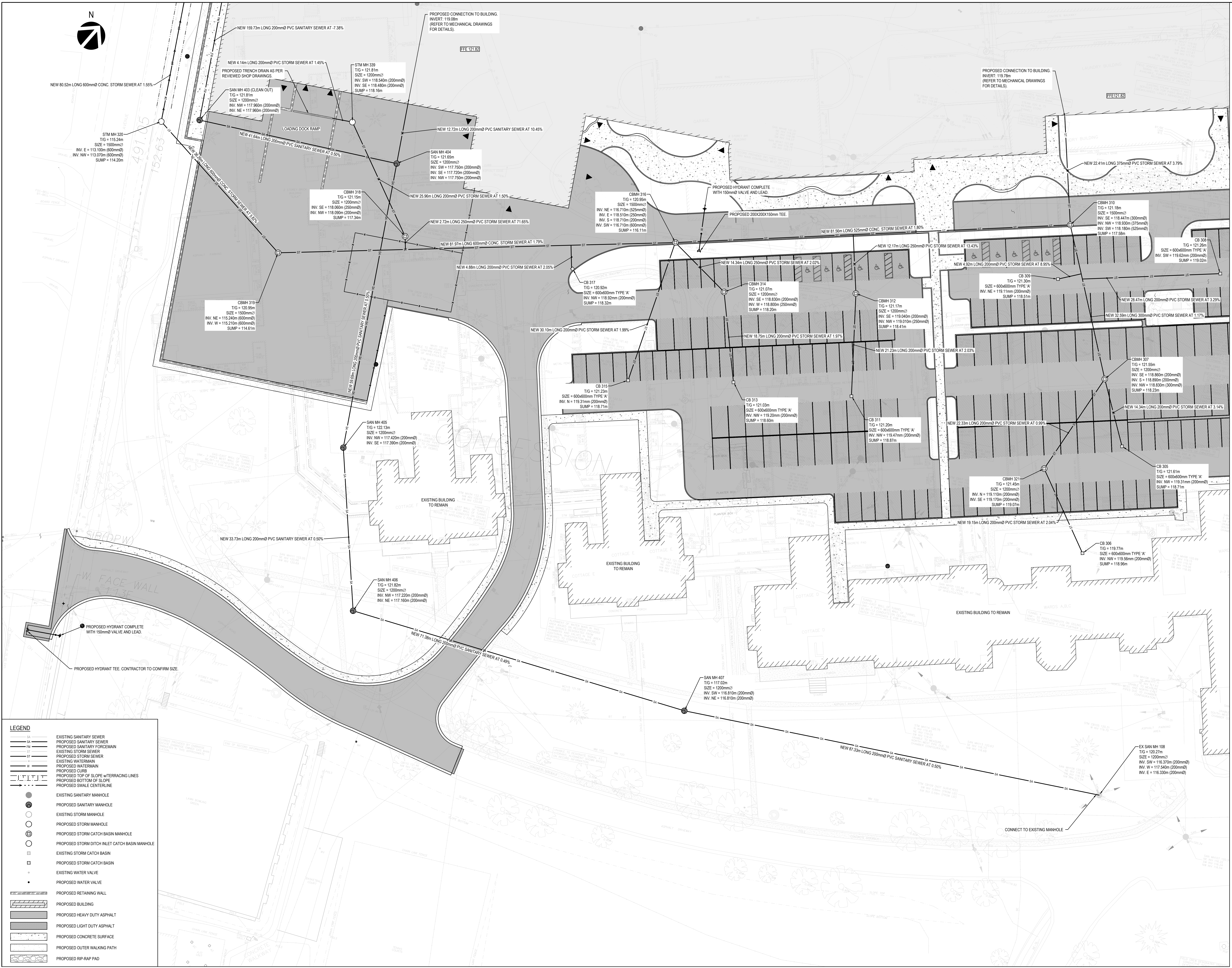
EXISTING CONDITIONS
(TOPOGRAPHY)

Drawn By: STR	Date: 2026-03-16
Checked By: OK	Scale: 1 : 750

Sheet Number:	Issued No.
C1.3	3



3



LEGEND

ST	EXISTING SANITARY SEWER
SA	PROPOSED SANITARY SEWER
FM	PROPOSED SANITARY FORCEMAIN
ST	EXISTING STORM SEWER
SA	PROPOSED STORM SEWER
W	EXISTING WATERMAIN
SA	PROPOSED WATERMAIN
W	PROPOSED TOP OF SLOPE WATERING LINES
W	PROPOSED BOTTOM OF SLOPE
W	PROPOSED SWALE CENTERLINE
●	EXISTING SANITARY MANHOLE
●	PROPOSED SANITARY MANHOLE
○	EXISTING STORM MANHOLE
○	PROPOSED STORM MANHOLE
○	PROPOSED STORM CATCH BASIN MANHOLE
○	PROPOSED STORM DITCH INLET CATCH BASIN MANHOLE
□	EXISTING STORM CATCH BASIN
□	PROPOSED STORM CATCH BASIN
□	EXISTING WATER VALVE
□	PROPOSED WATER VALVE
—	PROPOSED RETAINING WALL
—	PROPOSED BUILDING
—	PROPOSED HEAVY DUTY ASPHALT
—	PROPOSED LIGHT DUTY ASPHALT
—	PROPOSED CONCRETE SURFACE
—	PROPOSED OUTER WALKING PATH
—	PROPOSED RIP-RAP PAD

Project Title:

BROCKVILLE CORRECTIONAL COMPLEX & ST. LAWRENCE VALLEY CORRECTIONAL AND TREATMENT CENTRE

1809 Oxford Avenue, Brockville

Consultants:

PARKIN

ARCHITECTURE | 49

Project Number:

TRUE NORTH

1	SITE PLAN CONTROL & ZONING BYLAW AMENDMENT	2026-03-16
NO.	ISSUED	DATE

Notes:

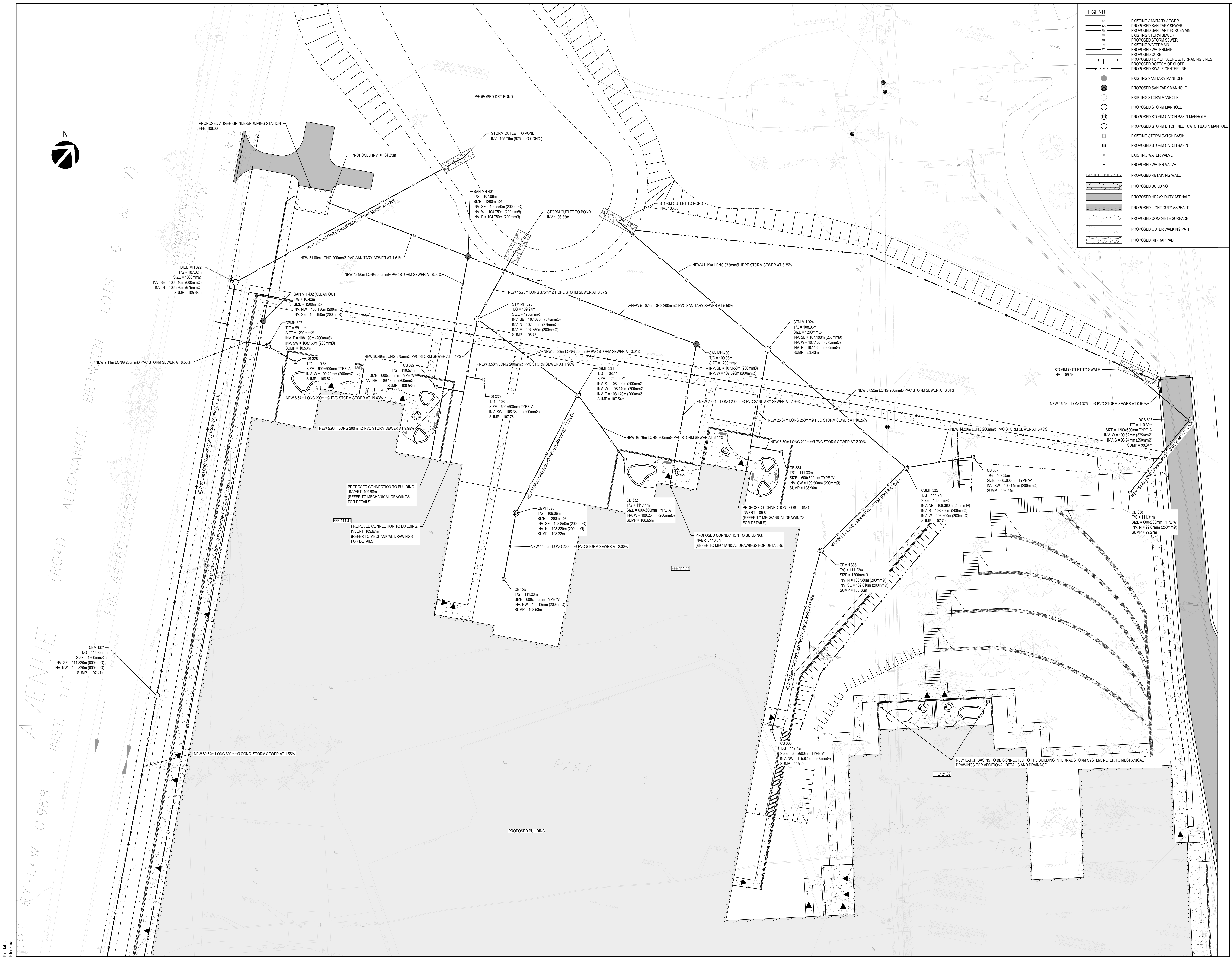
Seal:

Permit to practice

Sheet Title:

SERVICING PLAN I

Drawn By:	Date:
STR	2026-03-16
Checked By:	Scale:
DK	1 : 250
Sheet Number:	Issued No.
C1.10	3



Project Title:

BROCKVILLE CORRECTIONAL COMPLEX & ST. LAWRENCE VALLEY CORRECTIONAL AND TREATMENT CENTRE

1809 Oxford Avenue, Brockville

Consultants:

PARKIN

ARCHITECTURE | 49

wsp

Project Number:

TRUE NORTH

NO.	ISSUED	DATE
1	SITE PLAN CONTROL & ZONING BYLAW AMENDMENT	2026-03-16

Notes:

Seal:

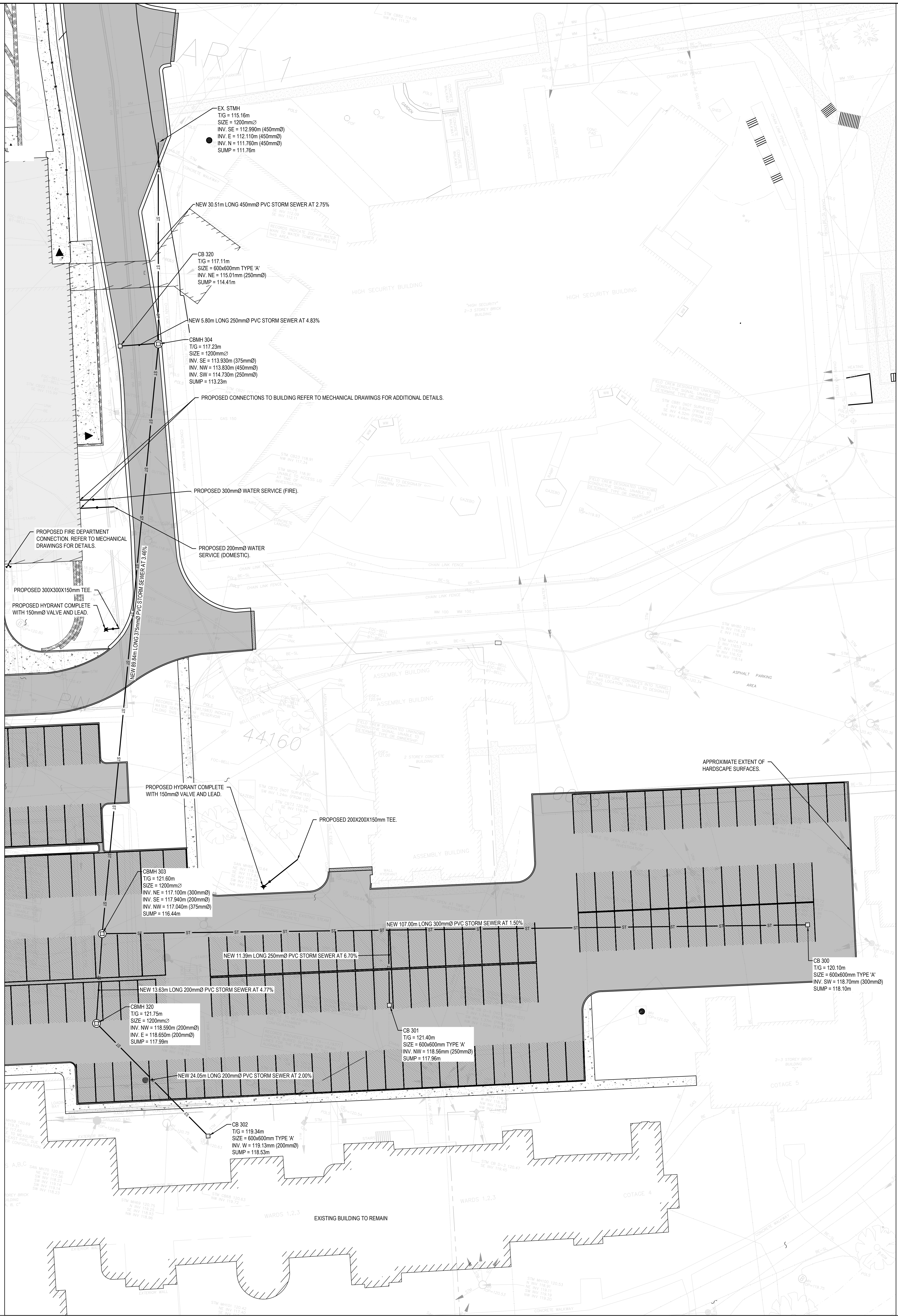
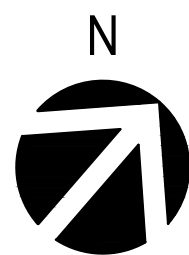
Permit to practice

Sheet Title:

SERVICING PLAN II

Drawn By:	Date:
STR	2026-03-16
Checked By:	Scale:
DK	1 : 250
Sheet Number:	Issued No.
C1.11	3





LEGEND

—	EXISTING SANITARY SEWER
—	PROPOSED SANITARY SEWER
—	PROPOSED SANITARY FORCEMAIN
—	EXISTING STORM SEWER
—	PROPOSED STORM SEWER
—	EXISTING WATERMAIN
—	PROPOSED WATERMAIN
—	PROPOSED CURB
—	PROPOSED TOP OF SLOPE W/TERRACING LINES
—	PROPOSED BOTTOM OF SLOPE
—	PROPOSED SWALE CENTERLINE
●	EXISTING SANITARY MANHOLE
●	PROPOSED SANITARY MANHOLE
○	EXISTING STORM MANHOLE
○	PROPOSED STORM MANHOLE
⊕	PROPOSED STORM CATCH BASIN MANHOLE
○	EXISTING STORM CATCH BASIN
□	PROPOSED STORM CATCH BASIN
+	EXISTING WATER VALVE
+	PROPOSED WATER VALVE
—	PROPOSED RETAINING WALL
▨	PROPOSED BUILDING
▨	PROPOSED HEAVY DUTY ASPHALT
▨	PROPOSED LIGHT DUTY ASPHALT
▨	PROPOSED CONCRETE SURFACE
▨	PROPOSED OUTER WALKING PATH
▨	PROPOSED RIP-RAP PAD



Project Title:
**BROCKVILLE CORRECTIONAL
COMPLEX & ST. LAWRENCE
VALLEY CORRECTIONAL AND
TREATMENT CENTRE**
1809 Oxford Avenue, Brockville



Project Number: TRUE NORTH

1	SITE PLAN CONTROL & ZONING BYLAW AMENDMENT	2026-03-16
NO.	ISSUED	DATE

Notes:

Seal:
Permit to practice

Sheet Title:
SERVICING PLAN III

Drawn By: STR	Date: 2026-03-16
Checked By: DK	Scale: 1 : 250
Sheet Number: C1.12	Issued No. 3