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Stormwater Management Report

Hydro One Operations Centre

3440 Frank Kenny Road, Orléans, ON

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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1.0 Introduction

1.1 General

This Stormwater Management Brief has been prepared by J.L. Richards & Associates Limited (JLR) on behalf of BGIS to support an application for Hydro One Networks Inc. (HONI) Site Plan Control at 3440 Frank Kenny Road, Ottawa.

BGIS is acting as the design builder for HONI for a new Hydro One Operations Centre (OC) to be constructed in Orléans, Ontario. The OC building to meet Hydro One's stakeholder requirements, current industry, regulatory, safety and operational standards and to allow HONI to perform its Business Line operations at this site. JLR has been retained to provide professional planning, architectural, engineering, and related technical/design services to complete this project.

JLR prepared a Due Diligence Study of the site in October 2016. The report evaluated two site designs and concluded both options met the requirements needed to construct the permanent OC facility. Reference Section 1.3 of this report for a summary of the findings from the study. Specifically, to support the Phase 2 development would require a revised Site Plan, Grading, Servicing, and Stormwater Management Plan.

This Stormwater Management Report and plans have been prepared per the following:

- City of Ottawa - Servicing Study Guidelines for Development Applications.
- Ottawa Sewer Design Guidelines (2012) and associated Technical Bulletins.
- JLR. March 2012 (revised July 2012). Stormwater Management Report for the Interim Phase (Phase 1) of the Orleans Operation Centre.
- JLR. October 2016. Due Diligence Study Hydro One Networks Inc. (HONI).
- WSP Golder. September 2022. *Geotechnical Investigation Proposed Hydro One Operations Facility 3440 Frank Kenny Road Ottawa, Ontario* (R/N 21493887).
- GHD. August 2022. *Hydrogeological Assessment, Groundwater Level Monitoring, Orleans Operations Centre (OC), 3440 Frank Kenny Road, Navan, Ontario*. (GHD Reference No: 12575389-LTR-3-Spence).
- Bowfin Environmental Consulting Inc. Rev. March 2022. *Fisheries Impact Assessment*, 3440 Frank Kenny Road, Navan, Ontario.

1.2 Site Description and Proposed Development

The total area of the expanded Phase 2 HONI Orleans OC Facility is 2.65 ha. The parcel of land located at 3440 Frank Kenny Road is Part of Lot 10, Concession 8, within the City of Ottawa. Refer to **Figure 1** for the Location Plan. The land parcel is bounded by Frank Kenny Road to the east, a school bus storage yard to the north and existing farm with a General Agricultural (AG) zoning to the south and west.

As part of Phase 1, the site was partially developed with an interim modular office complex (interim office) with a gravel parking lot, rear lot storage building (2-storey) and associated yard facilities. The topography of the site is relatively flat, the front portion of the site slopes easterly to the existing offsite roadside ditch along Frank Kenny Road. The rear portion of the site slopes southwesterly towards the existing stormwater management facility.

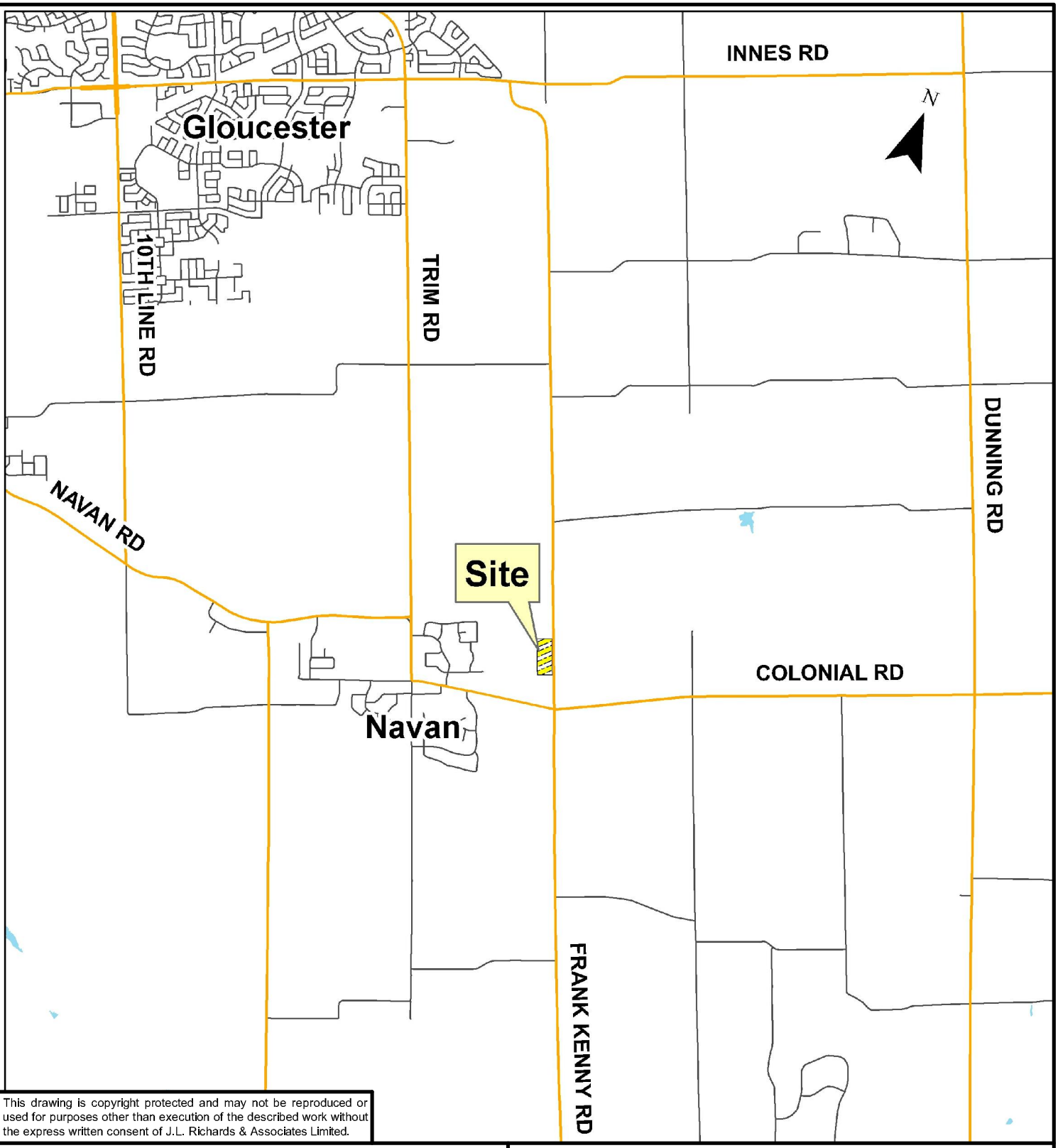
Per the City of Ottawa Comprehensive Zoning By-law 2008-250, the site is within a Rural Heavy Industrial, Rural Exception Zone 35, RH [35r] zone, which permits the development of the proposed operations centre.

As part of Phase 2 development, HONI intends to remove the interim modular office and front gravel parking lot and add a proposed onsite permanent operations centre. The redeveloped site includes a permanent office building (one storey office with workshop and vehicle storage), a front asphalt parking lot and the expansion of the rear yard facility. The site will also feature various outdoor surface storage areas and an updated stormwater management facility.

1.3 Findings from JLR's Due Diligence Study (October 2016)

JLR prepared a Due Diligence Study for Phase 2 in October 2016 which concluded that the proposed site satisfies the requirements to develop HONI's permanent operations centre. The key findings of this report are as follows:

- The proposed development of an office and service centre complies with the site-specific Zoning By-Law.
- Phase 2 of the development will be subject to Site Plan Approval Revision, Public Consultation and HONI will be required to enter into a Site Plan Agreement.
- A grading and SWM design will be required for the development. The SWM design must be to the satisfaction of the City of Ottawa, South Nation Conservation Authority and Ministry of the Environment, Conservation, and Parks (MECP). An amendment to the existing MECP Environmental Compliance Approval (ECA) for the stormwater management works will be required as confirmed by the local district office of the MECP. See Appendix C.
- Post-development runoff will be conveyed overland towards two (2) outlets:
    1. The roadside ditch located along Frank Kenny Road; and
    2. A proposed stormwater management facility located on site.
- The fish habitat assessment supports development 15.0 metres from a watercourse. See the Fish Impact Assessment prepared for the project submitted under separate cover.



PROJECT:

HYDRO ONE - ORLEANS OPERATIONS CENTER

3440 FRANK KENNY ROAD

DRAWING:

KEY LOCATION PLAN

J.L.Richards
ENGINEERS·ARCHITECTS·PLANNERS

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DESIGN:	MD
DRAWN:	GC
CHECKED:	DU
PLOTTED:	Mar 29, 2022

DRAWING NO.: **FIGURE 1**

JLR NO: 31500-000

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C KEY LOCATION PLAN.dwg

1.4 Geotechnical Considerations

In 2012, WSP Golder (Golder) conducted a geotechnical investigation to support the development of both the interim (Phase 1) and future (Phase 2) sites. The report was updated in March and further revised in September 2022 to provide construction recommendations for the proposed building foundation (slab-on-grade, wall backfill, etc.), frost protection, pavement construction, installation of site servicing, and cement type. The report also provides recommendations for the installation of the fire tanks, stormwater management facility (SWMF), loading dock ramp, and septic system installation.

The average groundwater level per the geotechnical boring logs for the site ranged from 1.1 to 1.3 metres below the ground surface.

In the spring of 2022, groundwater monitoring wells were installed by GHD. Per the water level records, and data analysis, the memorandum seasonal high water groundwater level within the Phase 2 area was estimated to reach surface of the ground. Approximately 86.0 m around the proposed building footprint location and 85.1 m in the vicinity of the proposed SWMF.

Refer to Appendix D for a copy of the report and memorandum.

The project's geotechnical engineer to review the final drawings and specifications to ensure report recommendations are adequately applied before tender

1.5 Approvals

As part of Phase 1 site development, an Environmental Compliance Approval (ECA) approval was obtained for the onsite interim stormwater management system. An amendment to the ECA is required per the site's Phase 2 development. The existing onsite stormwater management facility (swales and dry detention) will be replaced with a larger SWM system designed to service the entire built out site (Phases 1 and 2). Refer to Appendix C for a copy of the approved ECA of the Phase 1 development.

2.0 Surface Drainage

2.1 Pre-Development Conditions

Storm runoff from the Phase 1 area has split drainage flows. The front portion of the site drains to the existing roadside ditch along Frank Kenny Road. The back portion of the site flows to the existing onsite stormwater management facility (grass swales to a dry pond facility having a sand filter and outlet structure), with flows draining via an open ditch offsite (southwest corner) into an existing agricultural drain which ultimate outlets to Bearbrook Creek. This SWM facility was built to service the Phase 1 development to meet the quantity control (1:100 year) and quality treatment requirements. The site's water quality is achieved by lot level, conveyance controls and a pond bottom sand filter. The SWM system was designed to meet the required minimum normal level of protection of 70% Total Suspended Solids (TSS) removal.

2.2 Post-Development Condition and Proposed Grading

In the post condition, the redesigned SWM facility will manage runoff from the entire built-out site (Phases 1 and 2). Post runoff from the site will mimic the pre-condition drainage pattern having split flows. The front eastern portion of the site will convey surface runoff for the site overland towards the existing roadside ditch along Frank Kenny Road. The western portion of the site will convey surface runoff generated by the building rooftops, asphalt parking areas and gravel yard overland toward the new SWMF placed at the southwest corner of the site. The onsite SWMF will provide quality and quantity control for the site. The post development offsite flow rate to release at a controlled rate, equal to the pre-development rates, for all storm events up to and including the 1:100-year occurrence. Reference Appendix B for the Pre- and Post-Development Condition Drainage Area Plans.

2.3 Design Criteria and Servicing Approach

The storm servicing for the redevelopment site is designed to capture stormwater runoff for all storm events, first flush storms up the 1:100-year occurrence. Storm servicing and stormwater management for the proposed site were developed based on the City of Ottawa Sewer Design Guidelines (ODSG). The design criteria items for the development are as follows:

- Rainfall intensities (Intensity-Duration-Frequency (IDF) curves) are as per the ODSG. The site was previously assessed using the 3-hour Chicago as the critical event. The 12-hour SCS storm distribution will be included to assess the critical event for storage under a long duration high volume event.
- A dry pond SWMF is design to control the post-development peak flows to the pre-development flow rates. The pond is configured to control peak flows for storm events ranging from 1:2 year to a 1:100-year occurrence.
- An enhanced protection level was set as the water quality criterion by the South Nation Conservation (SNC) authority as described in Section 1.3. Based on the Ministry of Environment, Conservation and Parks (MECP) publication entitled "Stormwater Management Planning and Design Manual (March 2003)" (SWMPDM), this protection level is associated with an 80% total suspended solids (TSS) removal, per Table 3.2 of the above-noted publication. Hence, the storm servicing strategy for the entire HONI site (Phase 1 and 2) was developed to meet this storm design criterion.

3.0 Stormwater Management

3.1 Modelling Approach

The stormwater management analysis was conducted using the PCSWMM software platform. This software allows the simulation of both hydrologic and hydraulic components within the same platform and was set-up to simulate both minor and major systems as well as the end-of-pipe dry pond.

The analysis for the current site configuration did not assess the stormwater management for the entire site including the currently undeveloped portion. The stormwater management assessment will revise the pre-development modelling in PCSWMM to encompass the entire site and will prepare an existing condition model incorporating the design of the current servicing as well as the undeveloped portion of the property.

Modelling Parameters and output files are contained in Appendix E.

3.2 Pre-Development Conditions

A hydrological model was developed in the PCSWMM platform to evaluate the pre-development peak flows during the 1:2 year to the 1:100-year design storm events. This is the estimated flow from this site before any development and assumes an open space site.

A two-catchment lumped model was constructed with one catchment for the flows to the east and Frank Kenny Road and one for flows to the southwest of the site. The catchments have limited impervious cover accounting for the onsite house and driveway. The impervious values are 10% and 3% Frank Kenny Road and southwest catchments, respectively. Slopes are taken from the average value of the surface slope within the catchment. All other parameters are as per the OSGD.

The results of the existing condition model are shown in Table 3-1.

Table 3-1: Pre-Development Runoff Results

Event	Flow to Southwest (m^3/s)	Flow to Frank Kenny Rd (m^3/s)
25 mm Event	0.04	0.00
1:2 year 3-hour Chicago	0.01	0.01
1:5 year 3-hour Chicago	0.03	0.03
1:10 year 3-hour Chicago	0.05	0.04
1:25 year 3-hour Chicago	0.08	0.06
1:50 year 3-hour Chicago	0.10	0.08
1:100 year 3-hour Chicago	0.14	0.10
Climate Change	0.34	0.14

Event	Flow to Southwest (m^3/s)	Flow to Frank Kenny Rd (m^3/s)
1:100 year 12-hour SCS	0.20	0.11

The results indicate that critical pre-development rate in terms of flow from the site is the 3-hour Chicago storm and confirms the selection of the critical storm from the previous design.

3.3 Existing Conditions

A hydrological model was developed in PCSWMM to be representative of the current existing conditions of the site. The model consists of the current development site draining to a dry pond with parameters as per the original SWMHYMO modelling. The SWMHYMO model had a 1.02 ha area draining to the existing pond at an imperviousness of 61. The remainder of the developed site, 0.06 ha of pervious land, draining to the ditch system on Frank Kenny Road. For the modelling to determine existing conditions, the southwest undeveloped portion of the site has been included as per the pre-development scenario. The arch culvert installed at the time of the previous development was included in the modelling. This culvert is within a utility easement. See the site's legal plan in Appendix A.

The results of the existing conditions model are compared in Table 3-2 with the previous SWMHYMO modelling and the results for the entire site are shown in Table 3-3

Table 3-2: Comparison of release rates from current pond, 2012 SWMHYMO and PCSWMM

Event	2012 SWMHYMO Result (l/s)	PCSWMM Model Results (l/s)
1:2 year 3-hour Chicago	20	21
1:5 year 3-hour Chicago	27	26
1:10 year 3-hour Chicago	31	31
1:25 year 3-hour Chicago	38	39
1:50 year 3-hour Chicago	46	48
1:100 year 3-hour Chicago	58	61

Table 3-3: Existing Condition Runoff Results

Event	Flow to Southwest (m^3/s)	Flow to Frank Kenny Road (m^3/s)
25 mm Event	0.019	0.001
1:2 year 3-hour Chicago	0.027	0.005
1:5 year 3-hour Chicago	0.043	0.013
1:10 year 3-hour Chicago	0.057	0.020
1:25 year 3-hour Chicago	0.077	0.032
1:50 year 3-hour Chicago	0.096	0.043
1:100 year 3-hour Chicago	0.123	0.054
Climate Change	0.186	0.080
1:100 year 12-hour SCS	0.145	0.064

The results at the pond location are consistent with the results from the original SWMHYMO modelling. The results show that the pond provided peak quantity control for the 1:100 year 3-hour Chicago event with the site release under existing conditions being 123 l/s compared to 140 l/s under pre-development conditions (Table 3-1).

3.4 Post-Development Conditions

The hydrological model of the proposed controlled future development incorporates the dry pond, pond's outlet structure and the OGS unit located downstream of the pond outlet. The site has large gravel areas that are represented in the model as an impervious or pervious surfaces depending on the location within the site and the type of mechanisation that will be used on the site. The following assumptions were made for these surfaces:

- Half of the gravel areas are considered as fully impervious as it is expected that they will be in a very hard compacted condition due to use of heavy mechanisation; and

- Half of the site is represented as a pervious surface with a CN value of 70. The higher value allowed the model to simulate the rougher overland flow conveyance and increased depression storage of the gravel compared to asphalt but maintain a high runoff versus infiltration ratio.

The imperviousness and CN value calculations are shown in Table 3-4.

Table 3-4: Impervious and CN Weighted Calculation Values

Cover	Impervious (%)	CN	B1 Area (ha)	B2 Area (ha)
Asphalt	100	0	0.02	0.19
Roof	100	0	0.04	0.20
Gravel 1	100	0	0	0.63
Gravel 2	0	70	0	0.63
Concrete	100	0	0	0.17
Grass	0	80	0.32	0.09
Total			0.37	1.90
Weighted Imperviousness			14.55	62.21
Weighted CN			80	71.23

The pond area assumes water in the pond, and a higher level of imperviousness than typical, grass has been applied as a conservative value.

The model results at the two outlet locations are shown in Table 3-5 with a comparison to the current flows released from the site.

Table 3-5: Comparison of Existing and Post-Development Condition Runoff Results

Event	Existing Flow to Southwest (m^3/s)	Post-Controlled Flow to Southwest (m^3/s)	Existing Flow to Frank Kenny Road (m^3/s)	Post-Controlled Flow to Frank Kenny Road (m^3/s)
25 mm Event	0.019	0.011	0.001	0.000
1:2 year 3-hour Chicago	0.027	0.012	0.005	0.010
1:5 year 3-hour Chicago	0.043	0.023	0.013	0.020
1:10 year 3-hour Chicago	0.057	0.037	0.020	0.030
1:25 year 3-hour Chicago	0.077	0.058	0.032	0.040
1:50 year 3-hour Chicago	0.096	0.076	0.043	0.060
1:100 year 3-hour Chicago	0.123	0.096	0.054	0.070
Climate Change	0.186	0.143	0.080	0.110
1:100 year 12-hour SCS	0.145	0.119	0.064	0.080

The results at the southwest discharge location show that under all storm events, the proposed stormwater management measures for the development of the site control release rates to below existing stormwater runoff from the site.

The results confirm that the grassed area with runoff to the ditch system on Frank Kenny Road does not require stormwater management quantity control to meet pre-development release rates.

3.4.1 Water Quality Unit – PMSU2015-5

An enhanced protection level of 80% TSS removal is targeted for the site as listed in Section 2.3 above. Design target was achieved using the following approach:

1. The pre-treatment of the site's runoff is achieved via a grassed swale type SWMP to enhance the filtration of suspended solids.

2. The swale conveys the flow to the dry pond for further treatment utilizing a water quality treatment unit located downstream of the pond outlet structure prior discharging into the existing arch culvert installed underneath the agricultural access road (refer to Drawing 'C-003').

The water quality unit is sized by Contech Engineering Solutions manufacturer to meet regulatory requirements and achieve the 80% TSS removal rate. The proposed unit is the CDS unit PMSU2015-5 whose capacity to treat flows is matching to pond outflow rates released through the proposed outlet structure. The sizing calculations and unit type model are presented in Appendix 'E'.

4.0 Operation of Stormwater Management Measures

4.1 Pond Configuration

The proposed dry pond has a single outlet structure which consists of a manhole riser with a low flow orifice, and a cut out weir for larger flow events, and an open top to provide an emergency outlet. The outlet structure has an outlet pipe diameter of 525 mm. The elevation data for each of the controls is provided in Table 4-1.

Table 4-1: Pond Configuration

Attribute	Elevation (m)
Pond Bottom	85.00
100 mm diameter low flow outlet	85.00
650 mm length weir	85.41
Top of Manhole Risers	85.94

4.2 Pond Operation

The dry pond detains up to the 1:100-year event and releases runoff into the existing ditch downstream at a controlled rate. The operation of the dry pond is detailed in Table 4-2.

Table 4-2: Dry Pond Operation

Event	Peak inflow (m^3/s)	Peak outflow (m^3/s)	Water Surface Elevation (m)	Pond Depth (mm)	Volume (m^3)
25 mm Event	0.085	0.01	85.3	300	188
1:2 year 3-hour Chicago	0.15	0.01	85.38	380	309
1:5 year 3-hour Chicago	0.26	0.02	85.45	450	444
1:10 year 3-hour Chicago	0.33	0.04	85.48	480	506
1:25 year 3-hour Chicago	0.43	0.06	85.52	520	582
1:50 year 3-hour Chicago	0.50	0.08	85.55	550	639
1:100 year 3-hour Chicago	0.57	0.10	85.58	580	699
Climate Change	0.73	0.14	85.64	640	825
1:100 year 12-hour SCS	0.49	0.12	85.61	610	763

The pond operation results confirm that the 3-hour Chicago storm distribution event remains the critical event in terms of pond elevation. The drawdown time for all events is less than 12 hours.

The pond simulation results indicate that the freeboard of 300 mm to the top of the pond elevation will be achieved.

4.3 Existing Culvert Operation

The existing arch culvert installed at the downstream end of the pond system for the current site will remain with the redevelopment. This culvert is within a legal easement area (refer to Appendix A). Table 4-3 compares the headwater depth and flows to the culvert in the current site compared to the proposed development.

Table 4-3: Culvert Operation Results

Event	Existing Culvert Inflow (m^3/s)	Post-Development Culvert Inflow (m^3/s)	Existing Culvert Headwater Depth (m)	Post-Development Culvert Headwater Depth (m)
25 mm Event	0.019	0.011	84.84	84.82
1:2 year 3-hour Chicago	0.027	0.012	84.86	84.82
1:5 year 3-hour Chicago	0.043	0.023	84.89	84.85
1:10 year 3-hour Chicago	0.057	0.037	84.93	84.89
1:25 year 3-hour Chicago	0.077	0.058	84.95	84.94
1:50 year 3-hour Chicago	0.097	0.076	84.98	84.95
1:100 year 3-hour Chicago	0.123	0.096	85.01	84.98
Climate Change	0.189	0.143	85.10	85.05
1:100 year 12-hour SCS	0.146	0.120	85.04	85.02

The modelling results show that the flow to the culvert is reduced under the proposed post-development stormwater management controls and the headwater depths are reduced or similar in large events. The post-development controls are therefore suitable for the downstream culvert infrastructure.

5.0 Operation and Maintenance

5.1 Dry Pond

The dry pond is being used for quality and quantity control, it needs to be regularly monitored and maintained, ensuring it remains free of debris or any material that would reduce the effective of water treatment and volume held.

Grass cutting within the dry pond is a maintenance activity that is solely undertaken to enhance the aesthetics of the dry pond. Consequently, this task is at the discretion of the owner.

As a minimum, a walk-around the facility should be performed twice a year to remove all debris (i.e., litter, plastic bags/containers, twigs, broken vegetation, etc.); one after spring thaw and one during the summer/fall or after an extreme storm event. Photographs should be taken during each inspection and good records to be kept in a dedicated logbook. Any damage to landscaped surfaces or rip-rap areas to be noted. Repairs should be planned and executed shortly thereafter to prevent further degradation of these surfaces. Should some of the maintenance need to be undertaken with machinery (i.e., bulldozer, loader, shovels, trucks, etc.), fuelling and greasing should be completed away from the facility and with due care to avoid minor fuel, grease and oil spills. Grease tubes, oil cans or any such material must be disposed of properly.

The HONI to ensure that the outlet is operating as intended and inform the MECP if there is debris impacting the normal operation of the structure.

5.2 Water Quality Unit

To ensure optimal performance of PMSU2015-5 water quality unit it is recommended to perform regular minor and major maintenance service throughout the year. Typically, the CDS unit needs to be inspected before and after rainfall season (November to April), after any major storm events (i.e., 25 mm rainfall event) and in the event of chemical spills.

Details on unit inspection, maintenance program and activities are described in manufacturer's document 'CDS Guide Operation, Design, Performance and Maintenance'. The document can be found in Appendix 'E'.

6.0 Stormwater Management Practices

To provide an integrated approach to SWM within the development site, a number of SWMPs and site-level control measures are proposed to be implemented to reproduce the pre-development drainage conditions of the project site. The following measures are proposed to mitigate the potential hydrological resulting from this development:

Reduced Lot Grading

Typical development standards require minimum grades of 2% for drainage of stormwater away from buildings; however, alternative development standards suggest reducing minimum lot grades from 2% to 1.0% in areas where the land is naturally flat, and the soil cover has a minimum percolation rate of 15 mm/hr. This reduces velocities and will promote natural infiltration thereby enhancing groundwater recharge.

Imported Fill Material Conducive to Infiltration

Fill material conducive to infiltration to be imported onto the site and used as fill material for the grass swale areas. High infiltrating soils allow water to permeate the subsurface better and add environmental benefits (i.e., base flow recharge, temperature control, peak flow reduction, etc.).

SWM System

The proposed SWM system for the site consists of grassed swales and a dry pond, composed of grassed side slopes. The swales and pond-side slopes are to be hydroseeded. These vegetation areas, once mature, will provide added environmental benefits and improve the site's water quality (through settling, absorption, filtration and infiltration).

7.0 Erosion and Sediment Control Measures

During the construction of the stormwater management facilities, appropriate erosion and sediment control measures, as outlined in Ministry of Natural Resources and Forestry (MNR) "Guidelines on Erosion and Sediment Control for Urban Construction Sites," will be implemented to trap sediment on site. Drawing C-004 in Appendix B outlines the proposed sedimentation control measures. As a minimum, the following erosion and sedimentation control measures will be provided:

- Supply and install straw bale barriers (per OPSD 219.100) and silt fences (per OPSD 219.110) at locations shown on Drawing C-004.
- Supply and install rip-rap c/w geotextile to OPSD 810.010 at locations shown on Drawing C-004.
- Supply and install silt fence barriers to enclose all borrow and stockpile areas resulting from topsoil stripping activities or any excavating activities (i.e., exact location to be determined during construction) associated with construction of the proposed ditch.

Furthermore, if dewatering and pumping operations become necessary, construction of a detention trap (with filter bags) will be carried out to detain groundwater and promote settling of sediments.

All control measures will be carried out in accordance with the following documents:

- Toronto and Region Conservation Authority (TRCA). 2019. *Erosion and Sediment Control Guideline for Urban Construction*. Toronto and Region Conservation Authority, Vaughan, Ontario.
- Canadian Standards Association (CSA). 2018. *Erosion and Sediment Control Inspection and Monitoring Standard* (CAN/CSA-W202-18). CSA Group.
- Ontario Ministry of the Environment (OMOE). 2003. *Stormwater Management Planning and Design Manual 2003.* Ontario Ministry of the Environment, Toronto, Ontario.
- Ontario Ministry of the Environment (OMOE). 1998. *Erosion and Sediment Control Training Manual*. OME, Toronto, Ontario.
- The minimum applicable best management practices (BMP) to be follow during construction, for erosion and sediment control (ESC) onsite include, but not limited to:
    - Any stockpiled material will be kept on flat areas during construction, well away from any natural flow paths. In the event that the stockpile is placed in other areas where potential wash-off to the conveyance system is expected, silt fences will be installed to enclose the materials and prevent any wash-off to the conveyance system.
    - All pumped stormwater/groundwater will be filtered through a detention trap prior to its release.

8.0 Conclusions

This Stormwater Management Report and associated Drawings describe the proposed storm servicing solution for the Hydro One Networks Inc. development. The stormwater management strategy for this site was developed following the drainage approach where open swales and ditches will capture surface runoff generated by the parking lots, rooftops, and landscaped areas. This proposed SWMF (consisting of conveyance swale and dry detention pond) is designed to hold onsite post runoff flows, and only drain the pre-development rates offsite.

This report has been prepared for the exclusive use of BGIS, for the stated purpose, for the named facility. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of BGIS and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.

J.L. RICHARDS & ASSOCIATES LIMITED

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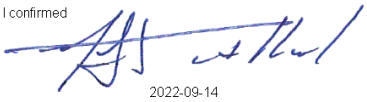


Marie-France Duthilleul, P.Eng.
Senior Civil Engineer

Appendix A

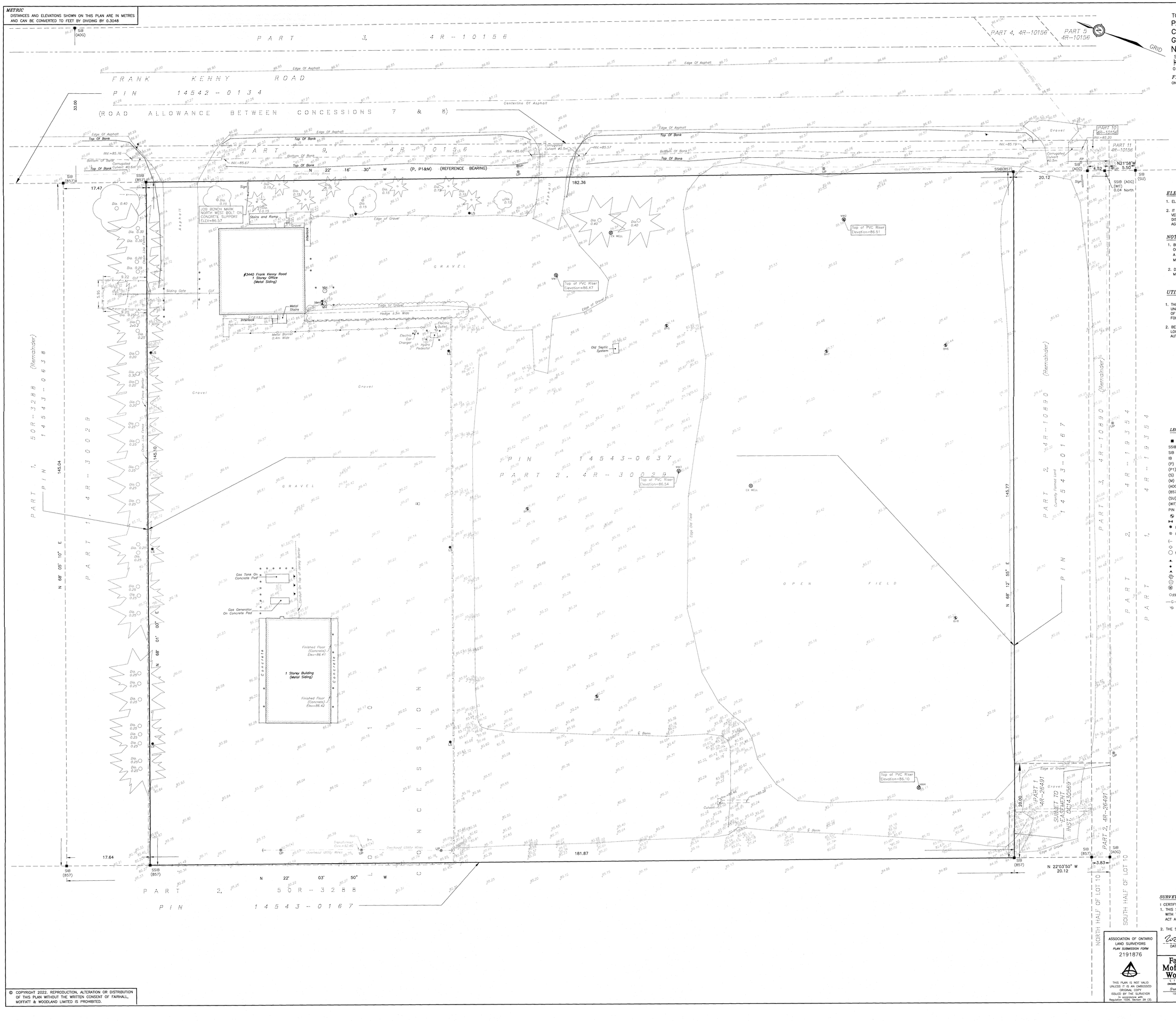
Site Legal Plan

METRIC
DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

TOPOGRAPHIC SURVEY OF
PART OF LOT 10
CONCESSION 8
GEOGRAPHIC TOWNSHIP OF CUMBERLAND
Now CITY OF OTTAWA

SCALE 1 : 250
0 5 10 20 25 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS



ELEVATION NOTES

1. ELEVATIONS SHOWN HEREON ARE REFERRED TO GEODETIC DATUM (CGVD28).
2. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCHMARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT ITS RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THIS DRAWING.

NOTES

1. BEARINGS ARE GRID, DERIVED FROM THE WESTERLY LIMIT OF FRANK KENNY ROAD AS SHOWN ON PLAN 4R-30029 HAVING A BEARING OF N 22°16'30" W AND ARE REFERRED TO THE CENTRAL MERIDIAN, 76°30'W LONGITUDE MTM ZONE 9, NAD83 ORIGINAL.
2. DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR 0.999981.

UTILITY NOTES

1. THIS DRAWING CANNOT BE ACCEPTED AS ACKNOWLEDGING ANY UNDERGROUND UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION OR LOCATION.
2. BEFORE ANY WORK INVOLVING PROBING, EXCAVATING, ETC., A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY.

LEGEND

- ■ – SURVEY MONUMENT FOUND
- SSIB – SHORT STANDARD IRON BAR
- SIB – STANDARD IRON BAR
- IB – IRON BAR
- (P) – PLAN 4R–10890
- (P1) – PLAN 4R–10156
- (S) – SET
- (M) – MEASURED
- (AOG) – ANNIS, O'SULLIVAN & VOLLEBEKK LTD., O.L.S.
- (857) – FAIRHALL, MOFFATT & WOODLAND LIMITED, O.L.S.
- (SU) – SOURCE UNKNOWN
- (WIT) – WITNESS
- PIN – PROPERTY IDENTIFIER NUMBER
- – BORE HOLE
- – VENT
- LS – LAMP STANDARD
- UP – UTILITY POLE
- – GUY WIRE AND ANCHOR
- FH – FIRE HYDRANT
- MH – MANHOLE
- – SIGN
- – BOLLARDS
- – SIGN
- – CONIFEROUS TREE
- – DECIDUOUS TREE
- – WELL
- FP – FENCE POST
- G – GAS LINE
- – ELECTRIC OUTLET

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:
1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON JUNE 10, 2022.

2022/06/17
DATE

JOHN H. GUTRI
ONTARIO LAND SURVEYOR

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2191876

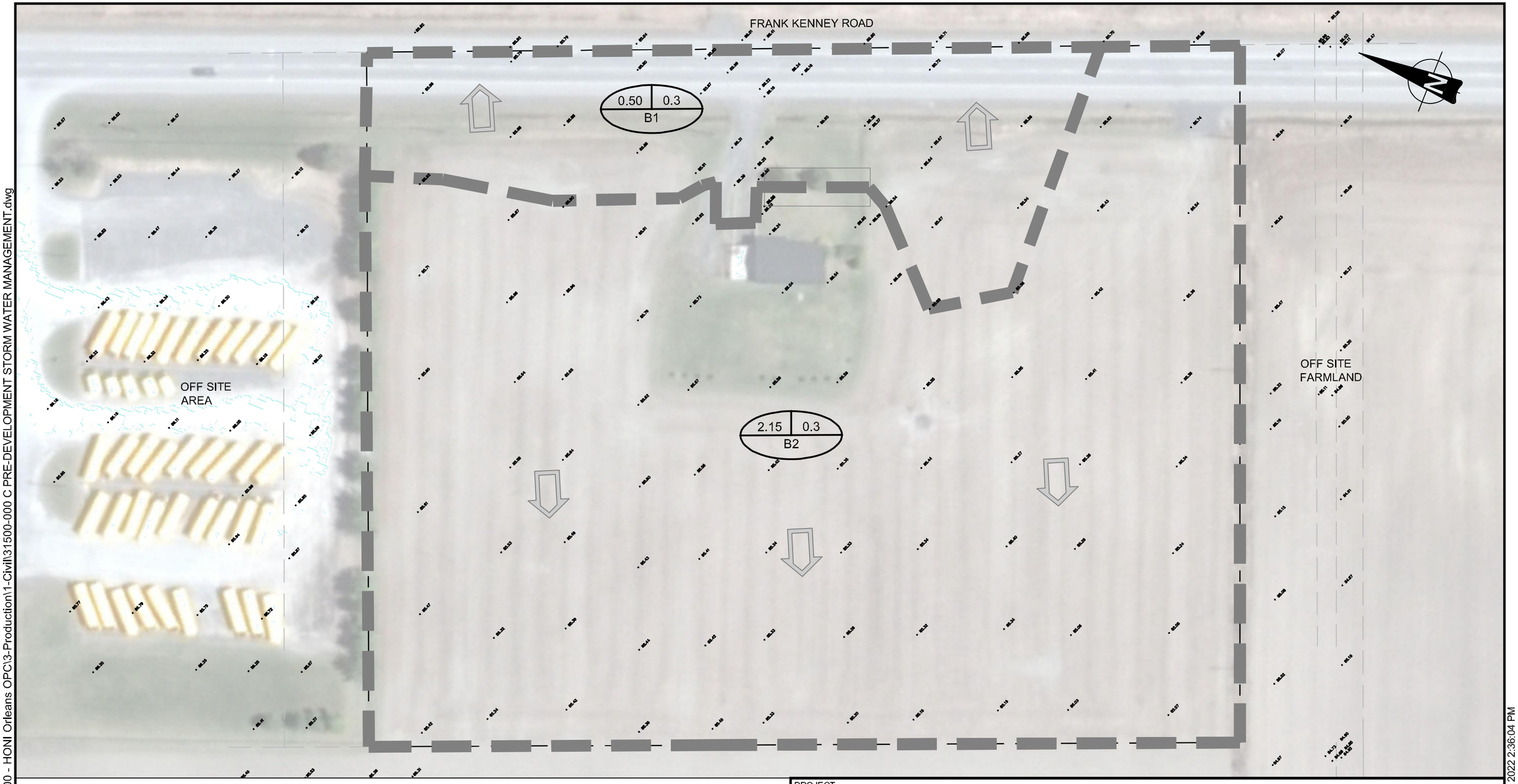
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR in accordance with Regulation 1026, Section 29 (3).

Fairhall Moffatt & Woodland LIMITED
ONTARIO LAND SURVEYORS
OTTAWA
Surveying and Land Information Services
100–600 TERRY FOX DRIVE, KANATA, ONTARIO K2L 4B6
TEL: (613) 591–2080 FAX: (613) 591–1420
www.fmw.on.ca

JOB No. A C 1 6 9 0 0
E 389975 , N 5032317
REFERENCE No. 111 (o) – 8 CUMBERLAND
S:\JOBS\AC1690\DWGS 16JUNE2022
TP_AC169.dwg (ss)

Appendix B

Plans



LEGEND

PROPERTY LINE

DRAINAGE BOUNDARY

AREA IN HECTARES

RUNOFF COEFFICIENT

0.21 | 0.66
B#

AREA ID

DRAINAGE DIRECTION

PROJECT:

HONI ORLEANS OPERATIONS CENTRE

3440 FRANK KENNEY ROAD

DRAWING:

PRE-DEVELOPMENT STORM WATER CONDITIONS

www.jlrichards.ca

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

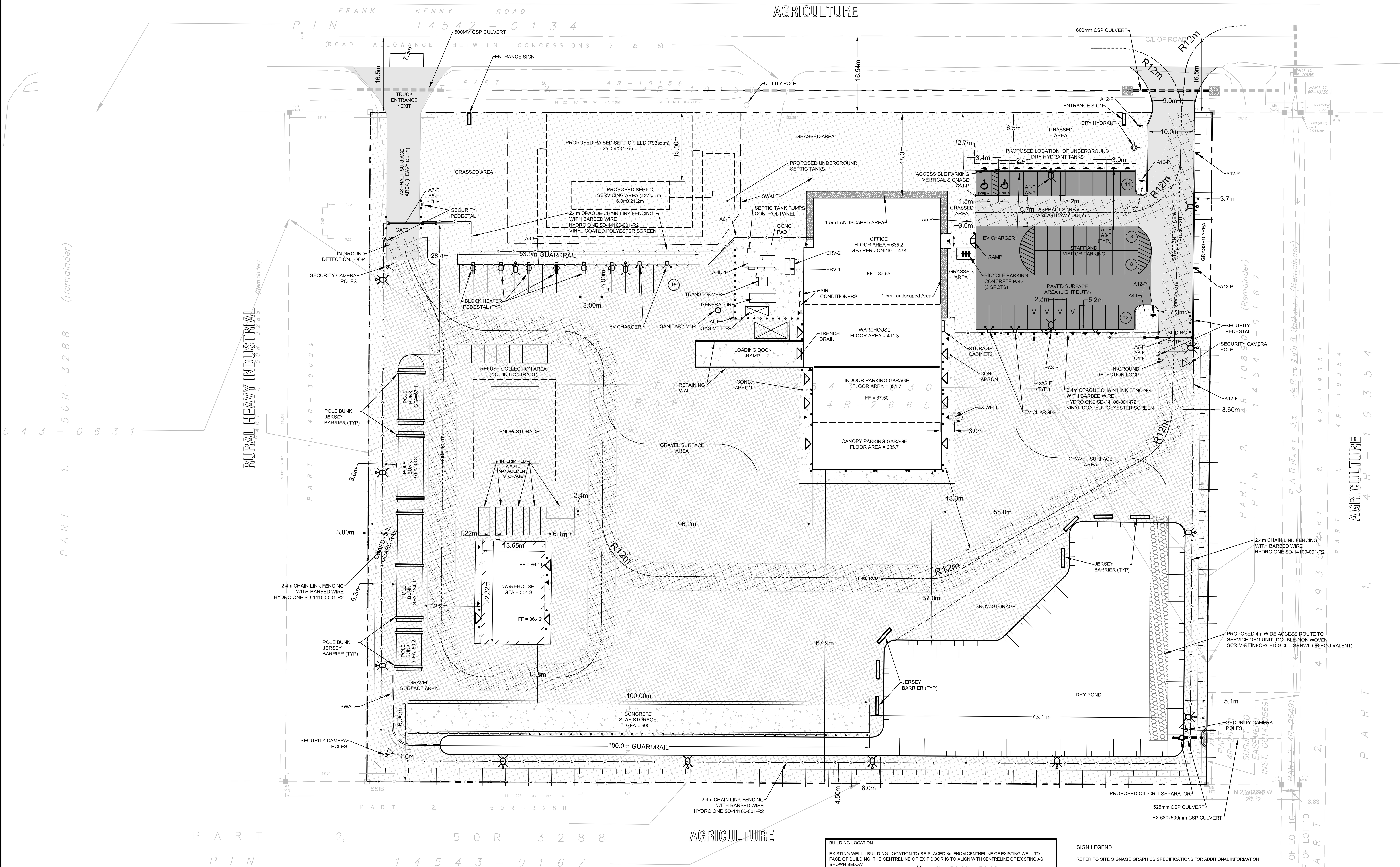
DESIGN:	I.D.
DRAWN:	K.T.
CHECKED:	M.D.
JLR #:	31500-000

SCALE 1:750

DRAWING #: C-000

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C PRE-DEVELOPMENT STORM WATER MANAGEMENT.dwg

PLOT DATE: Friday, September 9, 2022 2:36:04 PM



PRELIMINARY DESIGN

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No.	ISSUE / REVISION	DD/MM/YY
02	RE-ISSUED FOR CITY SITE PLAN APPROVAL	12/09/22
01	ISSUED FOR CITY SITE PLAN APPROVAL	06/04/22
00	ISSUED FOR CLIENT REVIEW	04/04/22

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:400

0 5 10 20 30m

CLIENT: Hydro One BGIS

CONSULTANT: www.jlrichards.ca J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP: ONTARIO ASSOCIATION OF ARCHITECTS JOHN MARSH FRÈRE LICENCE 5445

PROJECT NORTH

PROJECT:

HYRO ONE OPERATIONS CENTRE, ORLEANS

3440 FRANK KENNY ROAD

DRAWING:

SITE PLAN

DESIGN: MR
DRAWN: KTK
CHECKED: MF
JLR #: 31500-000

DRAWING #: C-001

PLOT DATE: Tuesday, September 13, 2022 5:22:07 PM

ADDRESS: 3440 FRANK KENNY ROAD

LEGAL DESCRIPTION: CON 8 PT LOT 10 RP;4R-30029 PART 2

ZONING PROVISION: CITY OF OTTAWA ZONING BYLAW 2008-250
RH[35R], RURAL HEAVY INDUSTRIAL, EXCEPTION 35

PROPERTY AREA: 2.648 HA

1. PART 13 – RURAL ZONES – SECTIONS 221 AND 222 – RURAL HEAVY INDUSTRIAL ZONE

PERMITTED USES: HEAVY INDUSTRIAL USE, WAREHOUSE, STORAGE YARD, PARKING GARAGE

ZONE PROVISIONS

I ZONING MECHANISMS	II ZONE PROVISIONS	PROPOSED
A. MINIMUM LOT AREA (M^2)	8,000	26,480
B. MINIMUM LOT FRONTAGE (M)	50	182.36
C. FRONT YARD SETBACK (M)	15	18.3
D. INTERIOR SIDE YARD SETBACK (M)	10	58.0
E. CORNER SIDE YARD SETBACK (M)	15	
F. REAR YARD SETBACK (M)	15	67.9
G. HEIGHT (M)	15	8.1
F. LOT COVERAGE (%)	50	7

**2. PARKING REQUIRED (SEC. 101-102)
AREA D**

USE		REQUIRED	PROPOSED (TOTAL ON-SITE)
OFFICE	2.4:100 sq m OF GFA 478 sq m	8	38
STORAGE YARD	1:100 sq m GFA 935.2 sq m	9	11
WAREHOUSE	0.8 PER 100 sq m of GFA 716.2 sq m	6	6
PARKING GARAGE	0 REQUIRED 617.4 sq m	0	0
TOTAL		24	55

ACCESSIBLE PARKING	REQUIRED	PROPOSED
TYPE A (3.4 M X 5.2 M MIN)	1	1
TYPE B (2.4 X 5.2 M MIN)	1	1

3. BICYCLE PARKING SPACE (SEC. 111)

USE	REQUIRED	PROVIDED
OFFICE: 1 PER 250 sq m / (665 sq m)	3	3
STORAGE YARD: 1 PER 2000 sq m / (1,553 sq m)	0	
WAREHOUSE: 1 PER 2000 sq m / (300 sq m)	0	

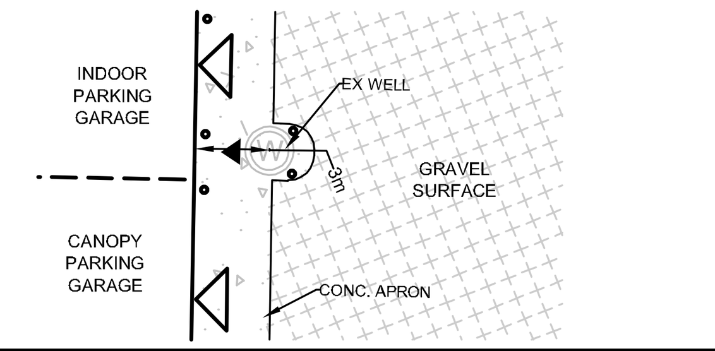
4. LOADING SPACE RATES AND PROVISIONS (SEC. 113)

TABLE 113A- MINIMUM NUMBER OF VEHICLE LOADING SPACES REQUIRED

I LAND USE	REQUIRED	PROVIDED
OFFICE	1	1
STORAGE YARD		
WAREHOUSE		

BUILDING LOCATION

EXISTING WELL - BUILDING LOCATION TO BE PLACED 3m FROM CENTRELINE OF EXISTING WELL TO FACE OF BUILDING. THE CENTRELINE OF EXIT DOOR IS TO ALIGN WITH CENTRELINE OF EXISTING AS SHOWN BELOW.



SIGN LEGEND

REFER TO SITE SIGNAGE GRAPHICS SPECIFICATIONS FOR ADDITIONAL INFORMATION

XX-L MOUNTED ON LIGHT POLE
XX-P MOUNTED ON U-CHANNEL POST
XX-F MOUNTED ON FENCE

PAVEMENT DESIGN

LIGHT-DUTY PAVEMENT STRUCTURE (CAR PARKING AREAS):
50 MM - H.L. 3 SURFACE COURSE OR 12.5 SUPERPAVE
150 MM - BASE - OPSS GRANULAR A
450 MM - SUBBASE - OPSS GRANULAR B TYPE II

HEAVY-DUTY PAVEMENT STRUCTURE (ACCESS LANES AND PAVED TRUCK TRAFFIC AREAS):
40 MM - H.L. 3 SURFACE COURSE OR 12.5 SUPERPAVE
50 MM - H.L. 8 BINDER COURSE OR 19.0 SUPERPAVE
150 MM BASE - OPSS GRANULAR A
450 MM SUBBASE - OPSS GRANULAR B TYPE II

GRANULAR TRAFFIC AREAS (UNPAVED ACCESS LANES AND TRUCK TRAFFIC AREAS):
250 MM BASE - OPSS GRANULAR A
450 MM SUBBASE - OPSS GRANULAR B TYPE II

NOTE:

BOUNDARY SURVEY
BOUNDARY INFORMATION DERIVED FROM REGISTERED SURVEY 4R-30029 PREPARED BY FARIHALL MOFFATT & WOODLAND LIMITED DATED JANUARY 3, 2017
VERIFIED BY FARIHALL MOFFATT & WOODLAND LIMITED DATED JUNE 17, 2022
HORIZONTAL DATUM: MTM ZONE 9, NAD 83 (ORIGINAL)

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FARIHALL MOFFATT & WOODLAND LIMITED DATED JUNE 17, 2022
HORIZONTAL DATUM: MTM ZONE 9, NAD 83 (ORIGINAL)
VERTICAL DATUM: CANADIAN GEODETIC VERTICAL DATUM OF 1928 (CGVD28)

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 P Site Plan.dwg

D07-12-22-0057

NOTE:
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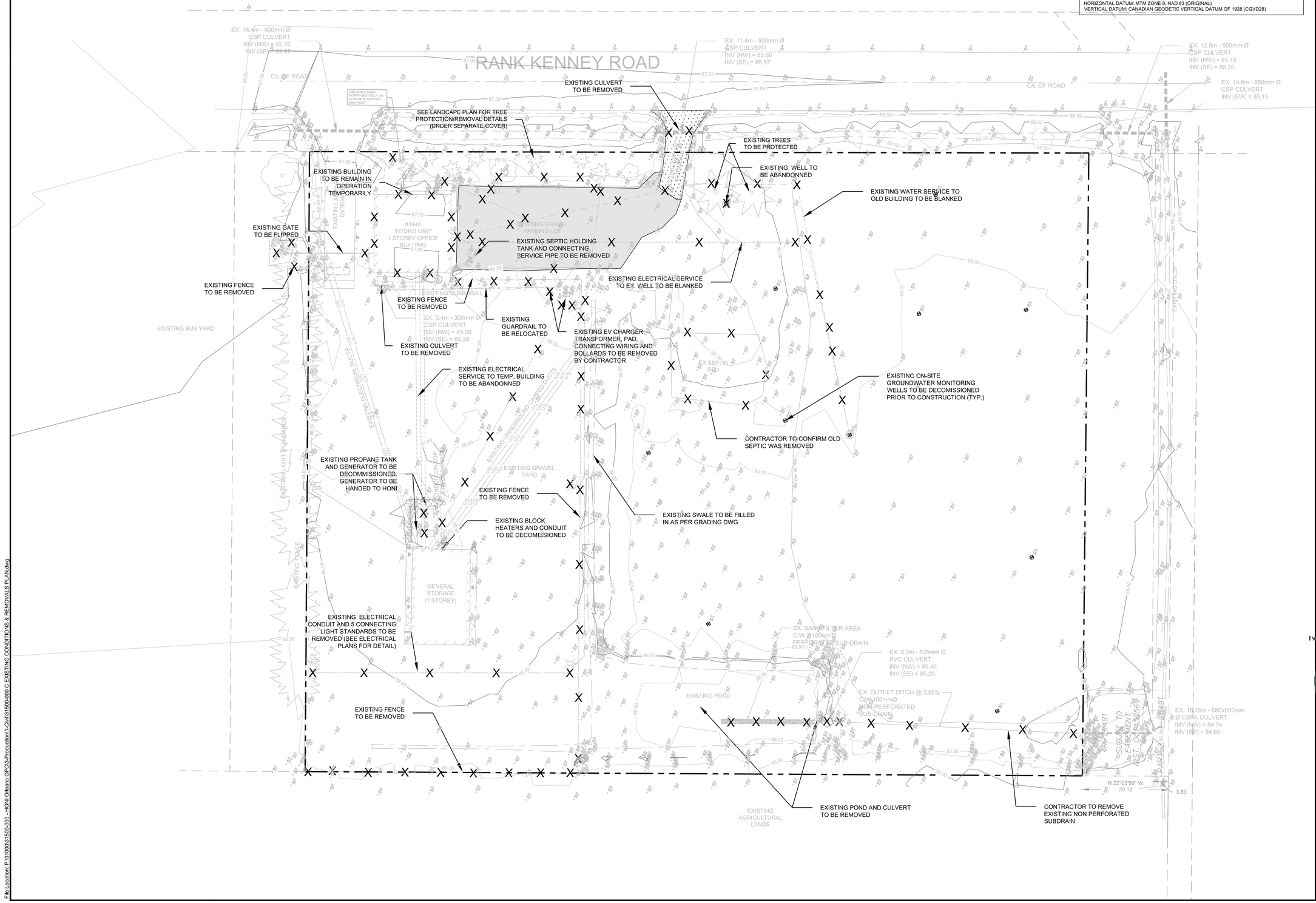

LEGEND

- X — REMOVALS
- EXISTING PAVEMENT REMOVAL
- EXISTING GRAVEL REMOVAL
- LOT LINE
- EXISTING TREE
- EXISTING CHAIN LINK FENCE
- EXISTING BUILDING

PRELIMINARY DESIGN

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SCALE: 1:400
0 5 10 20 30m

CLIENT: hydro one BGIS

CONSULTANT: www.jlrichards.ca
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER M. DUTHILLEUL 100205184 PROVINCE OF ONTARIO 2022-09-13

PROJECT NORTH

PROJECT:
HYDRO ONE OPERATIONS CENTRE, ORLEANS
3440 FRANK KENNY ROAD

DRAWING:
EXISTING CONDITIONS & DEMO PLAN

DESIGN: M.D.	
DRAWN: G.C.	DRAWING #: C-002
CHECKED: D.U.	
JLR #: 31500-000	

D07-12-22-0057

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C EXISTING CONDITIONS & REMOVALS PLAN.dwg

PLOT DATE: Tuesday, September 13, 2022 3:33:24 PM

NOTE:
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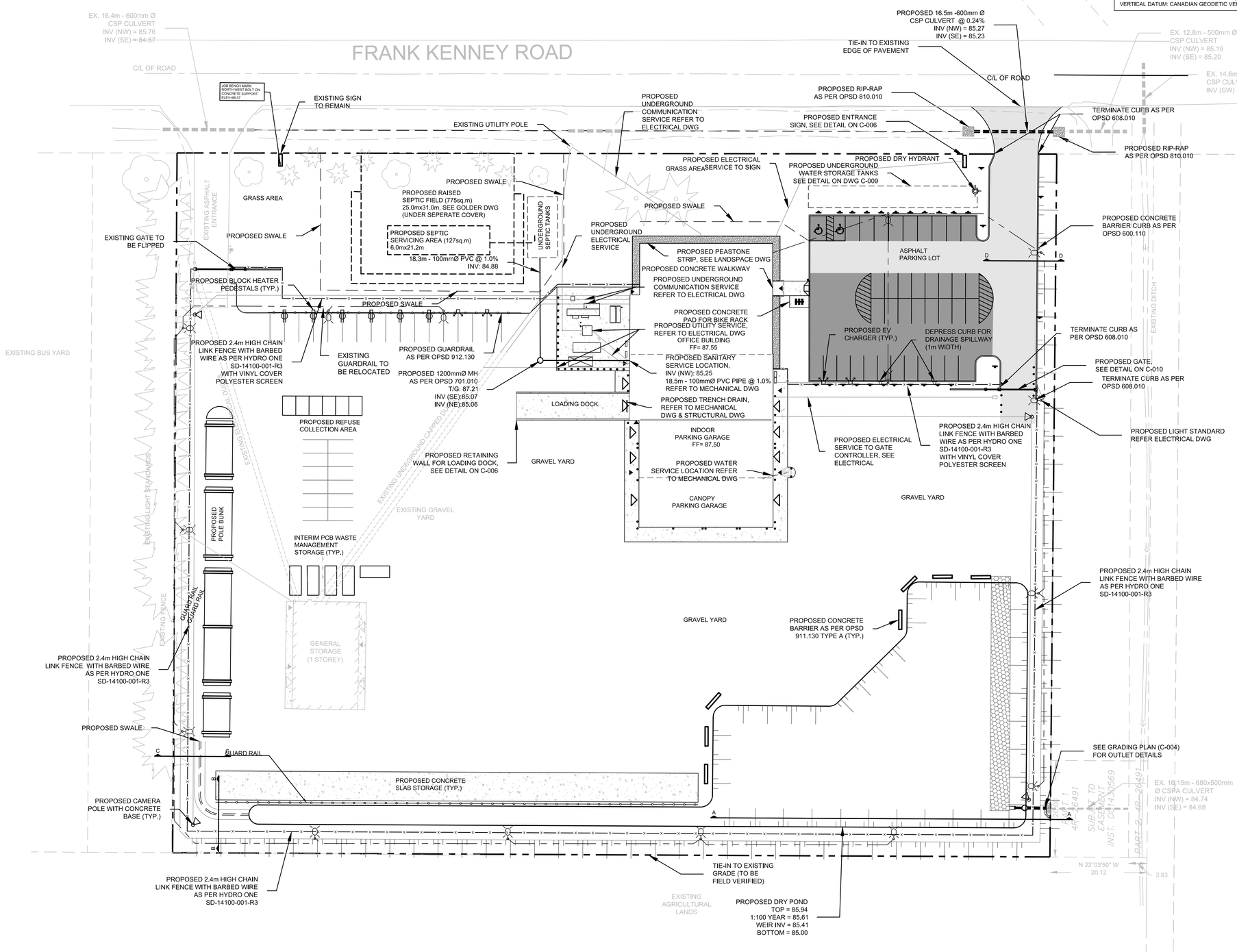

LEGEND:

- PROPERTY LINE
- EXISTING CONTOUR
- TERRACING (MAX. 3:1)
- CONCRETE BARRIER CURB
- PROPOSED CULVERT
- EXISTING CULVERT
- PROPOSED SIGNS
- PROPOSED MAN DOOR
- PROPOSED GARAGE DOOR
- PROPOSED CONCRETE BOLLARD
- EXISTING WELL
- PROPOSED CHAINLINK FENCE
- EXISTING CHAINLINK FENCE
- PROPOSED GUARDRAIL
- EXISTING GUARDRAIL
- PROPOSED DITCH/SWALE AND FLOW DIRECTION
- PROPOSED OVERLAND FLOW DIRECTION
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED HEAVY DUTY ASPHALT
- EXISTING UNDERGROUND UTILITY DUCTS
- PROPOSED UNDERGROUND LIGHT STANDARD WIRING
- EXISTING UNDERGROUND LIGHT STANDARD WIRING
- PROPOSED UNDERGROUND DUCTS
- PROPOSED LIGHT STANDARD
- EXISTING LIGHT STANDARD

PRELIMINARY DESIGN

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SCALE: 1:400
0 5 10 20 30m

CLIENT: hydro one BGIS

CONSULTANT: www.jlrichards.ca
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER M. DUTHILLEUL 100205184 PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT: 2022-09-13

HYDRO ONE OPERATIONS CENTRE, ORLEANS

3440 FRANK KENNY ROAD

DRAWING: SERVICING PLAN

DESIGN: M.D.	
DRAWN: G.C.	DRAWING #: C-003
CHECKED: D.U.	
JLR #: 31500-000	

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C SERVICING.dwg

PLOT DATE: Tuesday, September 13, 2022 3:33:02 PM

D07-12-22-0057

NOTE:
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JOB BENCH MARK
NORTH WEST BOLT ON CONCRETE SUPPORT
ELEV=86.57

EX. DITCH TO BE CLEANED AND RE-ALIGNED FOR POSITIVE FLOW TO THE SOUTH

PROPOSED COVER ABOVE STORAGE TANKS 250mm TOPSOIL 150mm RIGID INSULATION (DOWNSM) UP TO 1.8m DEPTH ALONG THE TANK SIDES TOP TO BE FLUSH WITH THE SURFACE

C/L OF ROAD

EXISTING UTILITY POLE

GRASS AREA

PROPOSED SWALE

PROPOSED RAISED SEPTIC FIELD (775sq.m) 25.0mx31.0m, SEE GOLDER DWG (UNDER SEPERATE COVER)

PROPOSED SEPTIC SERVICING AREA (127sq.m) 6.0mx21.2m

UNDERGROUND SEPTIC TANKS

CONTRACTOR TO RE-GRADE AREA

DEPRESS CURB FOR SPILLWAY

ASPHALT PARKING LOT

OFFICE BUILDING FF= 87.55

EXISTING PARKING LOT TO BE FILLED IN WITH NEW GRANULAR MATERIALS AS REQUIRED TO TIE-IN TO PROPOSED GRADES

PROPOSED REFUSE COLLECTION AREA

LOADING DOCK

TW: 87.25

TW: 87.59

INDOOR PARKING GARAGE FF= 87.50

CANOPY PARKING GARAGE

GRAVEL YARD

DEPRESS CURB FOR DRAINAGE SPILLWAY (1m WIDTH)

PROPOSED RETAINING WALL SEE DETAIL ON C-006

EXISTING SUPPLY WELL CASING TO BE EXTENDED, TOP OF CONCRETE PAD=87.42

PROPOSED POLE BUNK

INTERIM PCB WASTE MANAGEMENT STORAGE (TYP.)

GENERAL STORAGE

GUARD RAIL

PROPOSED CONCRETE SLAB STORAGE (TYP.)

PROPOSED CONVEYANCE SWALE

TIE-IN TO EXISTING GRADE (TO BE FIELD VERIFIED)

PROPOSED DRY POND
TOP = 85.94
1:100 YEAR = 85.61
WEIR INV = 85.41
BOTTOM = 85.00

PROPOSED 4m WIDE ACCESS ROUTE TO SERVICE OSG UNIT (DOUBLE-NON WOVEN SCRIM-REINFORCED GCL – SRNWL OR EQUIVALENT)

PROVIDE MINIMUM 300mm COVER ABOVE HDPE PIPE TO OGS

PROPOSED 4.5m - 450mmØ HDPE PIPE c/w CONCRETE HEADWALL MODIFIED PER OPSD 804.040 AND GRATE PER OPSD 804.050
PIPE OUTLET INV. 84.76
C/W RIP RAP PER OPSD 810.010 (TYPE B)

PRESERVE AND PROTECT EX 680X500mm CSP CULVERT

MOUNDED AREA GROUND SURFACE = 86.20

PROPOSED OIL-GRIT SEPARATOR (CDS-PMSU2015-5-C UNIT)
TREATMENT FLOWRATE = 20 L/S
TC = 86.15
INV. IN/OUT = 84.80
OUTLET PIPE DIA. 450mm

PROPOSED PRECAST CONCRETE DITCH INLET
TYPE B PER OPSD 705.040
T/G = 85.94
OUTLET INV. = 84.85 (450mm DIA.)
C/W RIP RAP PER OPSD 810.010 (TYPE B)

LEGEND:

- PROPERTY LINE
- EXISTING CONTOUR
- PROPOSED ELEVATION
- ORIGINAL GROUND ELEVATION FROM TOPO
- SURFACE SLOPE
- TERRACING (MAX. 3:1)
- CONCRETE BARRIER CURB
- PROPOSED CULVERT
- EXISTING CULVERT
- PROPOSED SIGNS
- PROPOSED MAN DOOR
- PROPOSED GARAGE DOOR
- PROPOSED CONCRETE BOLLARD
- EXISTING WELL
- PROPOSED CHAINLINK FENCE
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- PROPOSED UNDERGROUND LIGHT STANDARD WIRING
- EXISTING UNDERGROUND LIGHT STANDARD WIRING
- PROPOSED UNDERGROUND DUCTS
- PROPOSED LIGHT STANDARD
- EXISTING LIGHT STANDARD

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0 5 10 20 30m

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CONSULTANT: www.jlrichards.ca
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER M. DUTHILLEUL 100205184 PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT: 022-08-13

HYDRO ONE OPERATIONS CENTRE, ORLEANS

3440 FRANK KENNY ROAD

DRAWING:

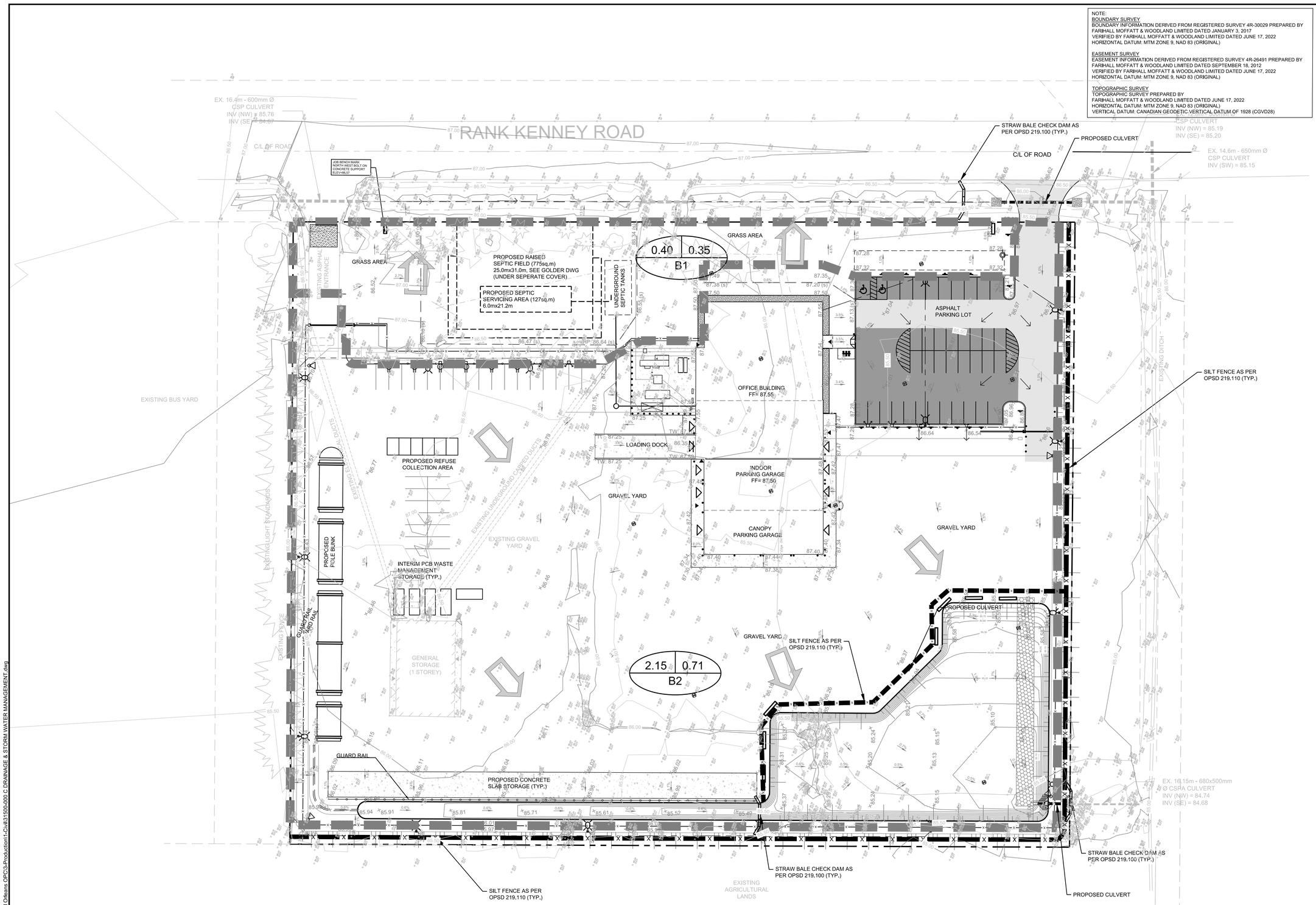
GRADING PLAN

DESIGN: M.D.	
DRAWN: G.C.	DRAWING #: C-004
CHECKED: D.U.	
JLR #: 31500-000	

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C GRADING.dwg

PLOT DATE: Tuesday, September 13, 2022 3:33:47 PM

D07-12-22-0057



NOTE:
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LEGEND

- PROPOSED LIGHT DUTY SILT FENCE AS PER OPSD 219.110
- PROPERTY LINE
- EXISTING CHAIN LINK FENCE
- EXISTING BUILDING
- PROPOSED LIGHT DUTY STRAW BALE BARRIER AS PER OPSD 219.100
- DRAINAGE BOUNDARY
- AREA IN HECTARES
- RUNOFF COEFFICIENT
- AREA ID (e.g. 0.21 | 0.66 | 104-710)
- DRAINAGE DIRECTION
- PROPOSED MUD MAT

PRELIMINARY DESIGN

THESE DOCUMENTS ARE NOT COMPLETE IN ALL DETAILS AND MAY BE SUBJECT TO CHANGE AS DESIGN DEVELOPMENT AND CODE REVIEW IS ADVANCED.

No.	ISSUE / REVISION	DD/MM/YY
02	RE-ISSUED FOR CITY SITE PLAN APPROVAL	12/09/22
01	ISSUED FOR CITY SITE PLAN APPROVAL	06/04/22
00	ISSUED FOR CLIENT REVIEW	04/04/22

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:400
0 5 10 20 30m

CLIENT: hydro one BGIS

CONSULTANT: www.jlrichards.ca
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER, M. DUTHILLEUL, 100205184, PROVINCE OF ONTARIO, 2022-09-13

PROJECT NORTH

PROJECT:
HYDRO ONE OPERATIONS CENTRE, ORLEANS
3440 FRANK KENNY ROAD

DRAWING:
POST DEVELOPMENT DRAINAGE AND EROSION AND SEDIMENT CONTROL PLAN

DESIGN: M.D.	
DRAWN: G.C.	DRAWING #: C-005
CHECKED: D.U.	
JLR #: 31500-000	

PLOT DATE: Tuesday, September 13, 2022 3:34:02 PM

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C DRAINAGE & STORM WATER MANAGEMENT.dwg

D07-12-22-0057

GENERAL CONSTRUCTION NOTES

1. CONTRACTOR TO CARRY OUT WORKS PER THE CURRENT CITY OF OTTAWA STANDARD DRAWINGS AND SPECIFICATIONS AND PER THE ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS.
2. CONTRACTOR TO READ THE SITE'S SERVICING DESIGN PLAN IN CONJUNCTION WITH THE LATEST SITE SERVICING REPORT, PREPARED BY J.L. RICHARDS & ASSOCIATES LIMITED, FOR THE PROPOSED CONSTRUCTION WORKS.
3. ALL SOIL DISPOSAL FROM SITE TO BE COORDINATED WITH THE HYDRO ONE ENVIRONMENTAL TEAM.
4. THE NOMINAL DIAMETER OF PIPES ARE REFERRED TO IN PLAN VIEW.
5. CONTRACTOR RESPONSIBLE FOR OBTAINING ALL SITE UTILITY LOCATES BEFORE CONSTRUCTION.
6. CONTRACTOR RESPONSIBLE FOR ALL EXCAVATION, BACKFILL AND REINSTATEMENT OF ALL AREAS DISTURBED DURING CONSTRUCTION AND ANY ASSOCIATED WORKS TO THE SATISFACTION OF THE ENGINEER AND CITY OF OTTAWA.
7. SEPTIC SYSTEM (TREATMENT TANKS & LEACHING BED) PER WSP GOLDER'S - NEW SEPTIC DESIGN - TECHNICAL MEMORANDUM (SEPT. 2022).
8. ALL CONNECTIONS TO EXISTING WELL TO BE IN ACCORDANCE WITH THE CITY OF OTTAWA DESIGN GUIDELINES. CONTRACTOR TO PROVIDE EXCAVATION BACKFILLING, COMPACTION AND REINSTATEMENTS, IN ACCORDANCE WITH THE LATEST GEOTECHNICAL INVESTIGATION PREPARED BY GOLDER ASSOCIATES FOR THE SITE.
9. CONTRACTOR RESPONSIBLE FOR DETERMINING, VIA EXCAVATION, THE EXACT LOCATION AND ELEVATION OF THE EXISTING UNDERGROUND UTILITIES AND STRUCTURES AS REQUIRED FOR ALL PROPOSED CONNECTIONS, RELOCATIONS, AND BLANKINGS.
10. FOR ALL PROPOSED CONNECTION POINTS (IF ANY), THE CONTRACTOR IS RESPONSIBLE FOR THE REINSTATEMENT OF ALL SURFACES TO EXISTING CONDITIONS OR BETTER. PAVEMENT STRUCTURE RESTORATION (FRANK KENNEY ROAD) SHALL BE PER CITY OF OTTAWA STANDARDS. THE THICKNESS OF GRANULAR AND ASPHALT LAYERS SHALL MATCH EXISTING.
11. CONTRACTOR RESPONSIBLE FOR VERIFYING THAT THE SITE BENCHMARK(S) HAVE NOT BEEN ALTERED OR DISTURBED AND THAT THEIR RELATIVE ELEVATION(S) AND DESCRIPTION(S) AGREE WITH THE INFORMATION DEPICTED ON THE PLAN.
12. CONTRACTOR TO MATCH EXISTING ELEVATIONS AT PROPERTY LIMITS AND ENSURE POSITIVE DRAINAGE TOWARDS A SUITABLE OUTLET, WHETHER INDICATED OR NOT ON THE PLANS.
13. CONTRACTOR TO PROVIDE ALL PAVEMENT MARKINGS AS SHOWN, INCLUDING HANDICAPPED PARKING SYMBOLS.
14. ALL GROUNDWATER PUMPED FROM THE SITE TO BE METERED AND A PERMIT TO TAKE WATER OBTAINED AS APPLICABLE.
15. PAVEMENT DESIGN TO BE PER THE SITE'S GEOTECHNICAL INVESTIGATION REPORT (SEPT. 2022), PREPARED BY GOLDER ASSOCIATES LDT. (21493887):

LIGHT-DUTY PAVEMENT STRUCTURE (CAR PARKING AREAS):

50 MM - H.L. 3 SURFACE COURSE OR 12.5 SUPERPAVE

150 MM - BASE - OPSS GRANULAR A

450 MM - SUBBASE - OPSS GRANULAR B TYPE II

HEAVY-DUTY PAVEMENT STRUCTURE (ACCESS LANES AND PAVED TRUCK TRAFFIC AREAS):

40 MM - H.L. 3 SURFACE COURSE OR 12.5 SUPERPAVE

50 MM - H.L. 8 BINDER COURSE OR 19.0 SUPERPAVE

150 MM BASE - OPSS GRANULAR A

450 MM SUBBASE - OPSS GRANULAR B TYPE II

GRANULAR TRAFFIC AREAS (UNPAVED ACCESS LANES AND TRUCK TRAFFIC AREAS):

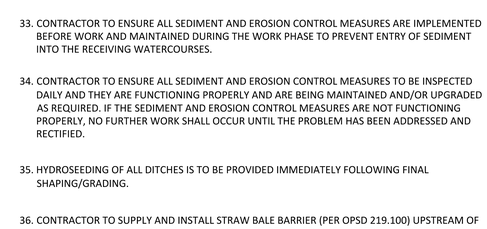
250 MM BASE - OPSS GRANULAR A

450 MM SUBBASE - OPSS GRANULAR B TYPE II

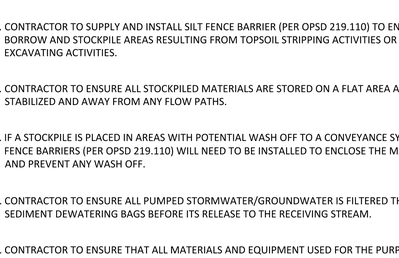
16. CONTRACTOR TO ENSURE ALL PROPOSED PAVEMENT AREAS ARE PREPARED PER THE SITE'S GEOTECHNICAL INVESTIGATION RECOMMENDATIONS AND ALL TOPSOIL AND OTHER UNSUITABLE FILL (FILLS CONTAINING ORGANIC MATTER) ARE EXCAVATED FROM THESE SURFACES.
17. CONTRACTOR TO ENSURE PROPOSED PAVEMENT AREAS SUBGRADE HAS BEEN ACCEPTABLY PREPARED, WHERE THE TRENCH BACKFILL AND GRADE RAISE FILL HAVE BEEN ADEQUATELY COMPACTED TO THE REQUIRED DENSITY AND THE SUBGRADE SURFACE NOT DISTURBED BY CONSTRUCTION OPERATIONS OR PRECIPITATION. DEPENDING ON THE ACTUAL CONDITIONS OF THE PAVEMENT SUBGRADE AT THE TIME OF CONSTRUCTION, IT MAY BE NECESSARY TO INCREASE THE THICKNESS OF THE SUBBASE AND/OR TO PLACE A WOVEN GEOTEXTILE BENEATH THE GRANULAR MATERIALS.
18. CONTRACTOR TO ENSURE GRANULAR BASE AND SUBBASE MATERIALS ARE UNIFORMLY COMPACTED TO AT LEAST 100% OF THE MATERIAL'S STANDARD PROCTOR MAXIMUM DRY DENSITY USING SUITABLE VIBRATORY COMPACTION EQUIPMENT. THE ASPHALTIC CONCRETE IS TO BE COMPACTED PER TABLE 9 OF OPSS 310.
19. REQUIREMENT FOR ADDITIONAL GRANULAR 'B' AND/OR GEOTEXTILE TO BE CONFIRMED ON-SITE BY GEOTECHNICAL ENGINEER
20. CURBS TO BE BARRIER TYPE PER CITY OF OTTAWA STANDARD SC1.1.
21. THE EXISTING ON-SITE MODULAR OFFICE AND ASSOCIATED SERVICES (WELL, SEPTIC TANK, ETC.) TO REMAIN IN SERVICE UNTIL THE PROPOSED OFFICE IS COMPLETED. ONCE THE NEW OFFICE IS OPERATIONAL, THE CONTRACTOR SHALL COORDINATE THE MODULAR REMOVAL AND COMPLETE THE REMAINING PROPOSED WORKS (FENCE, LANDSCAPE, ETC.).
22. CONTRACTOR RESPONSIBLE TO DEVELOP DEMOLITION AND TEMPORARY SERVICING STAGING PLAN FOR APPROVAL BY HONI PRIOR TO CONTRUCTION
23. LINE PAINTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 710.
24. ASPHALT LINE PAINTING FOR THE PARKING STALLS AS PER OPSS 1716.
25. FENCE TO BE IN ACCORDANCE WITH HYDRO ONE STANDARD SD-14100-001-R3 DATED: OCTOBER 2017.
26. WHERE POSSIBLE CONTRACTOR TO RE-USE EXISTING ON SITE JERSEY BARRIER
27. PROPOSE CONCRETE BARRIERS PER OPSD 911.14
28. CONCRETE WALKWAY TO BE INSTALLED IN ACCORDANCE WITH OPSS 351.
29. CONCRETE CURB SHALL BE INSTALLED IN ACCORDANCE WITH OPSS 353.
30. SUBDRAINS SHALL BE COMPLETE WITH FILTER SOCK AND INSTALLED AS PER OPSS 405.
31. CULVERTS SHALL BE INSTALLED IN ACCORDANCE WITH OPSS 421.

EROSION AND SEDIMENT CONTROL NOTES

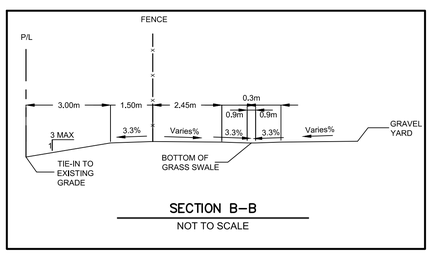
32. ALL SEDIMENTATION CONTROL MEASURES ARE TO BE IMPLEMENTED PER OPSS AND OPSD. SILT FENCE BARRIER PER OPSD 219.110.
33. CONTRACTOR TO ENSURE ALL SEDIMENT AND EROSION CONTROL MEASURES ARE IMPLEMENTED BEFORE WORK AND MAINTAINED DURING THE WORK PHASE TO PREVENT ENTRY OF SEDIMENT INTO THE RECEIVING WATERCOURSES.
34. CONTRACTOR TO ENSURE ALL SEDIMENT AND EROSION CONTROL MEASURES TO BE INSPECTED DAILY AND THEY ARE FUNCTIONING PROPERLY AND ARE BEING MAINTAINED AND/OR UPGRADED AS REQUIRED. IF THE SEDIMENT AND EROSION CONTROL MEASURES ARE NOT FUNCTIONING PROPERLY, NO FURTHER WORK SHALL OCCUR UNTIL THE PROBLEM HAS BEEN ADDRESSED AND RECTIFIED.
35. HYDROSEEDING OF ALL DITCHES IS TO BE PROVIDED IMMEDIATELY FOLLOWING FINAL SHAPING/GRADING.
36. CONTRACTOR TO SUPPLY AND INSTALL STRAW BALE BARRIER (PER OPSD 219.100) UPSTREAM OF ALL CULVERT INSTALLATIONS AND SHALL ONLY BE REMOVED ONCE UPSTREAM VEGETATION HAS BEEN ESTABLISHED.
37. CONTRACTOR TO SUPPLY AND INSTALL SILT FENCE BARRIER (PER OPSD 219.110) TO ENCLOSE ALL BORROW AND STOCKPILE AREAS RESULTING FROM TOPSOIL STRIPPING ACTIVITIES OR ANY EXCAVATING ACTIVITIES.
38. CONTRACTOR TO ENSURE ALL STOCKPILED MATERIALS ARE STORED ON A FLAT AREA ARE STABILIZED AND AWAY FROM ANY FLOW PATHS.
39. IF A STOCKPILE IS PLACED IN AREAS WITH POTENTIAL WASH OFF TO A CONVEYANCE SYSTEM, SILT FENCE BARRIERS (PER OPSD 219.110) WILL NEED TO BE INSTALLED TO ENCLOSE THE MATERIALS AND PREVENT ANY WASH OFF.
40. CONTRACTOR TO ENSURE ALL PUMPED STORMWATER/GROUNDWATER IS FILTERED THROUGH SEDIMENT DEWATERING BAGS BEFORE ITS RELEASE TO THE RECEIVING STREAM.
41. CONTRACTOR TO ENSURE THAT ALL MATERIALS AND EQUIPMENT USED FOR THE PURPOSE OF SITE PREPARATION AND PROJECT COMPLETION ARE OPERATED AND STORED IN A MANNER THAT PREVENTS ANY DELETERIOUS SUBSTANCES (I.E., PETROLEUM PRODUCTS, SILT, ETC.) FROM ENTERING THE RECEIVING WATERCOURSE.
42. CONTRACTOR TO ENSURE ANY VEHICLE AND EQUIPMENT RE-FUELLING AND MAINTENANCE TO BE CONDUCTED AWAY FROM DRAINAGE CHANNELS AND ANY PART OF EQUIPMENT ENTERING A CHANNEL TO BE FREE OF FLUID LEAKS AND EXTERNALLY CLEANED/DEGREASED TO PREVENT ANY DELETERIOUS SUBSTANCES FROM ENTERING THE RECEIVING WATERCOURSE.
43. ALL SPILL PREVENTION AND CONTIGENCY PLANS SHALL BE MAINTAINED AND MONITORED/RECORDED ON A REGULAR BASIS AS REQUIRED TO ENSURE CONTAMINANTS DO NOT ENTER THE NATURAL ENVIRONMENT.
44. CONTRACTOR TO ANTICIPATE THE USE OF CONSTRUCTION MAT (GEOTERRA OT EQUIVALENT) WITHIN THE PHASE 2 BUILDING SITE AREA.



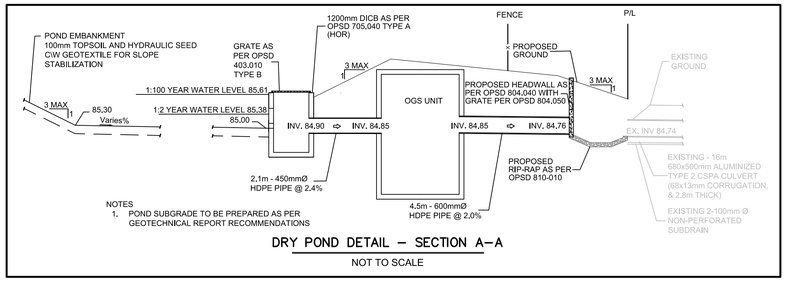
SECTION D–D
NOT TO SCALE



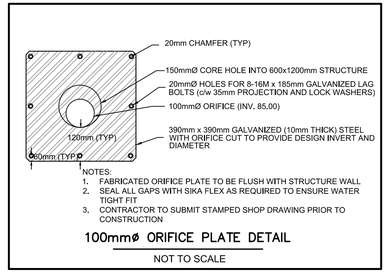
SECTION C–C
NOT TO SCALE



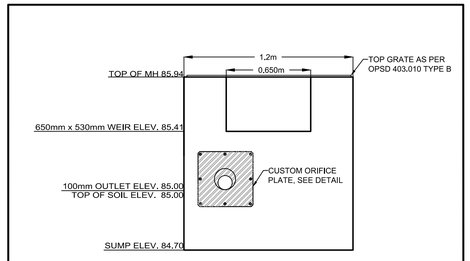
SECTION B–B
NOT TO SCALE



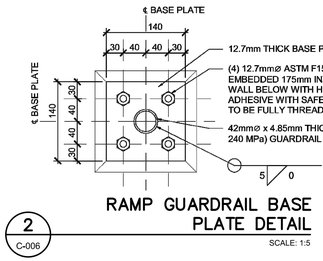
DRY POND DETAIL – SECTION A–A
NOT TO SCALE



100mmØ ORIFICE PLATE DETAIL
NOT TO SCALE



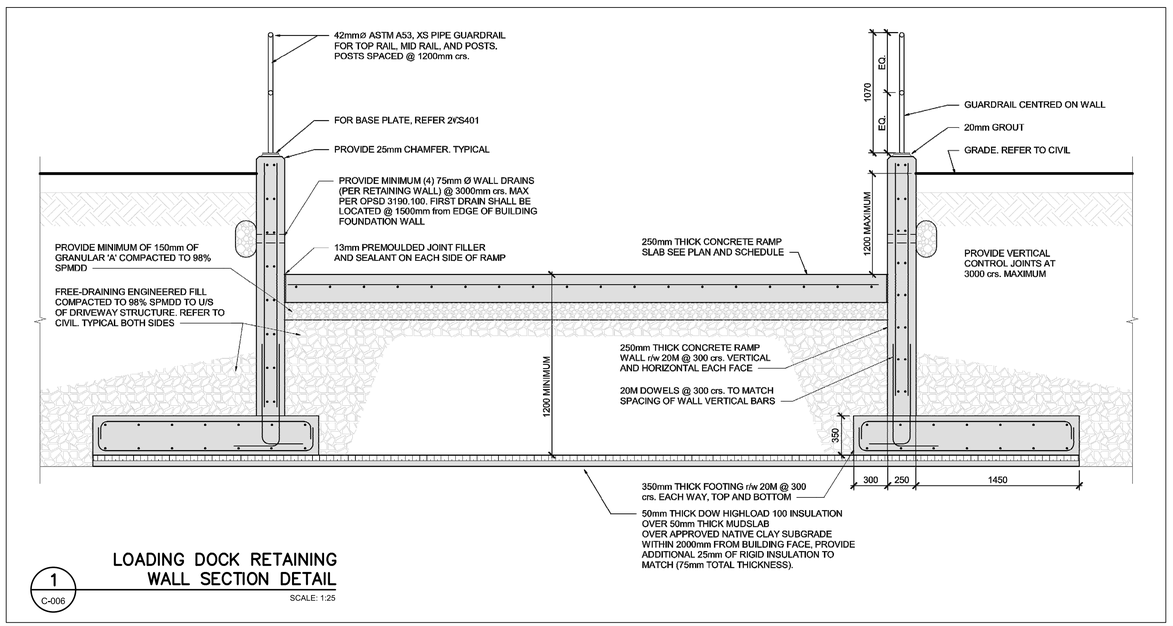
DITCH INLET CATCH BASIN (600mmx1200mm) DETAIL – FRONT VIEW
NOT TO SCALE



RAMP GUARDRAIL BASE PLATE DETAIL
2 / C-006
SCALE: 1:5

RETAINING WALL NOTES:

1. DESIGN BASED ON CSA S6-19 AND OBC 2012 (AMENDED 2020). LOADING AS FOLLOWS:
   A. BACKFILL PRESSURES IN ACCORDANCE WITH GOLDER/WSP GEOTECHNICAL REPORT.
   B. LIVE LOAD SURCHARGE PRESSURE: 12 kPa
   C. COMPACTION PRESSURES AS PER CSA S6-19.
   D. DRAINED BACKFILL CONDITIONS
   E. DESIGN FOR SEISMIC PRESSURES AS PER CSA S6-19 AND GOLDER/WSP GEOTECHNICAL REPORT.
   F. GUARDRAIL HAS BEEN DESIGNED IN ACCORDANCE WITH OBC 2012, CLAUSE 4.1.5.14 FOR LOCATIONS WITH LIMITED OCCUPANCY WHERE GATHERING OF MANY PEOPLE IS IMPROBABLE.
2. FOUNDATIONS SHALL BE FOUNDED ON NATIVE WEATHERED CLAY CRUST WITH A MINIMUM BEARING CAPACITY OF 165 kPa (ULS) AND 125 kPa (SLS).
3. CAST-IN-PLACE CONCRETE: CLASS 'C1', MINIMUM SPECIFIED COMPRESSIVE STRENGTH = 35 MPa @ 56 DAYS.
4. ALL REINFORCING TO CSA G30.18, GRADE 400W.
5. ALL LAP SPLICES SHALL BE CLASS 'B' LAP SPLICES IN ACCORDANCE WITH CSA A23.3-14.
6. MINIMUM COVER IS 75mm CAST DIRECTLY AGAINST SOIL AND 60mm EXPOSED TO SALTS AND CHLORIDES.
7. STEEL DESIGN IN ACCORDANCE WITH CSA S16-14.



LOADING DOCK RETAINING WALL SECTION DETAIL
1 / C-006
SCALE: 1:25

PRELIMINARY DESIGN

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VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE:

CLIENT: hydro one BGIS

CONSULTANT: www.jlrichards.ca
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER M. DUTHILLEUL 100205184 PROVINCE OF ONTARIO
2022-09-13

PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER J. M. OLINSKI 100161197 PROVINCE OF ONTARIO
2022-09-13

PROJECT:

HYDRO ONE OPERATIONS CENTRE, ORLEANS

3440 FRANK KENNY ROAD

DRAWING:

DETAILS 1

DESIGN:	M.D.
DRAWN:	G.C.
CHECKED:	D.U.
JLR #:	31500-000

DRAWING #: C-006

PLOT DATE: Tuesday, September 13, 2022 3:34:13 PM

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C DETAILS.dwg

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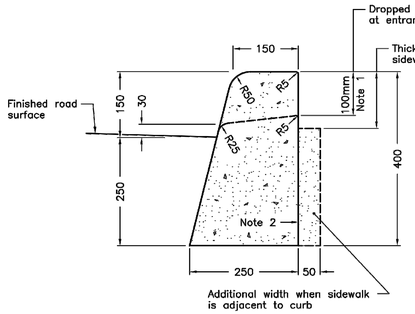
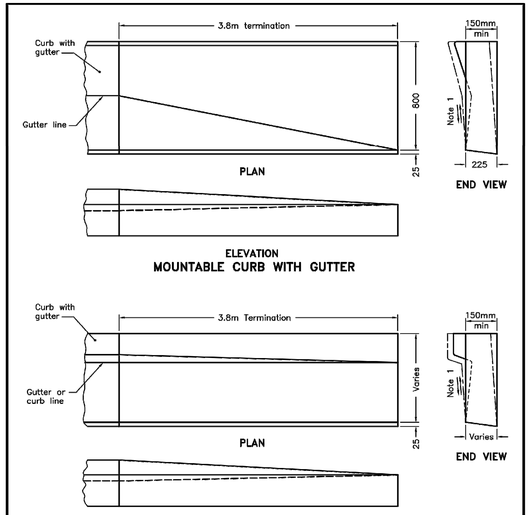


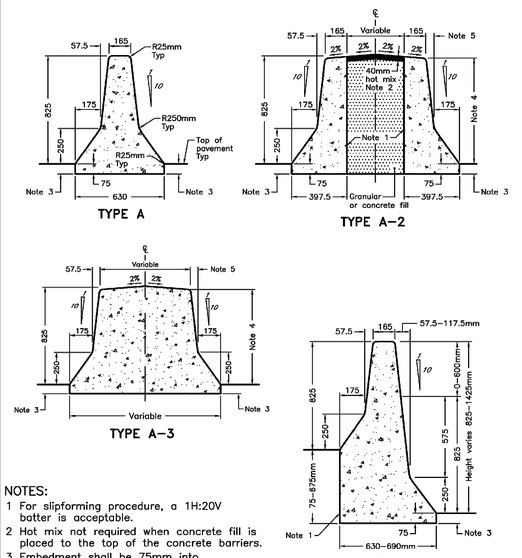
NOTES:
1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
CONCRETE BARRIER CURB		OPSD 600.110



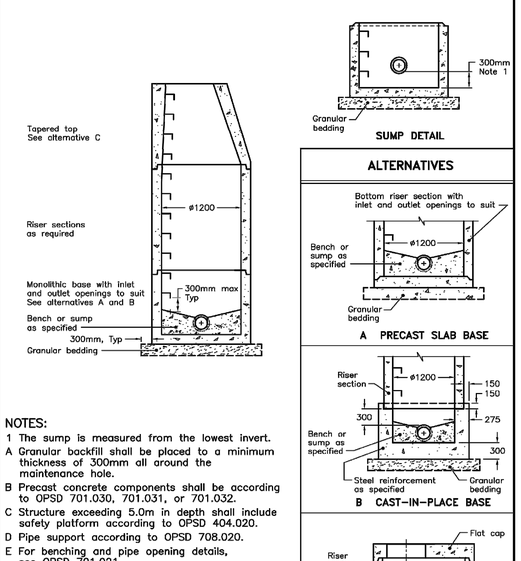
NOTES:
1 Slope shall match existing shoulder.
A This drawing shall be read in conjunction with OPSD 600 series curb with gutter drawings.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
METHOD OF TERMINATION FOR CONCRETE CURB WITH GUTTER		OPSD 608.010



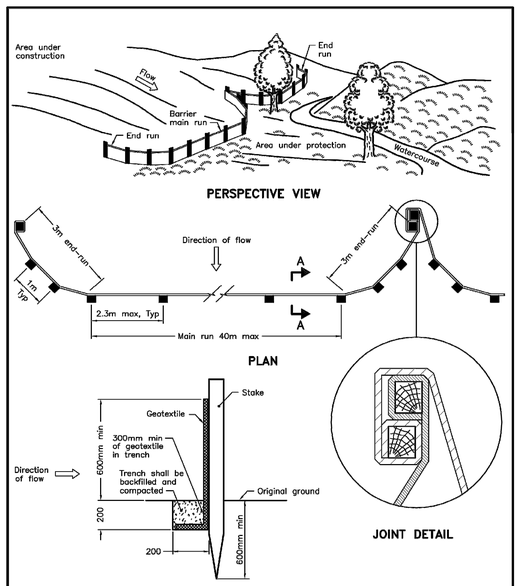
NOTES:
1 For slipforming procedure, a 1H:20V batter is acceptable.
2 Hot mix not required when concrete fill is placed to the top of the concrete barriers.
3 Embedment shall be 75mm into pavement at least 3m on both sides of barrier.
4 Height may vary from 825 to 1425mm in an asymmetric cross section.
5 Width may vary from 57.5 to 117.5mm in an asymmetric cross section.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Apr 2021	Rev 2
GUIDE RAIL SYSTEM, CONCRETE BARRIER CAST-IN-PLACE, TYPE A INSTALLATION		OPSD 911.130



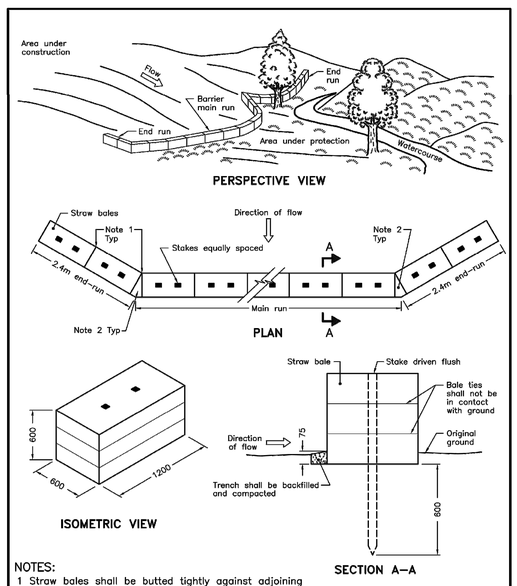
NOTES:
1 The sump is measured from the lowest invert.
A Granular backfill shall be placed to a minimum thickness of 300mm all around the maintenance hole.
B Precast concrete components shall be according to OPSD 701.030, 701.031, or 701.032.
C Structure exceeding 5.0m in depth shall include safety platform according to OPSD 404.020.
D Pipe support according to OPSD 708.020.
E For benching and pipe opening details, see OPSD 701.021.
F For adjustment unit and frame installation, see OPSD 704.010.
G All dimensions are nominal.
H All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2014	Rev 5
PRECAST CONCRETE MAINTENANCE HOLE 1200mm DIAMETER		OPSD 701.010



NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT-DUTY SILT FENCE BARRIER		OPSD 219.110

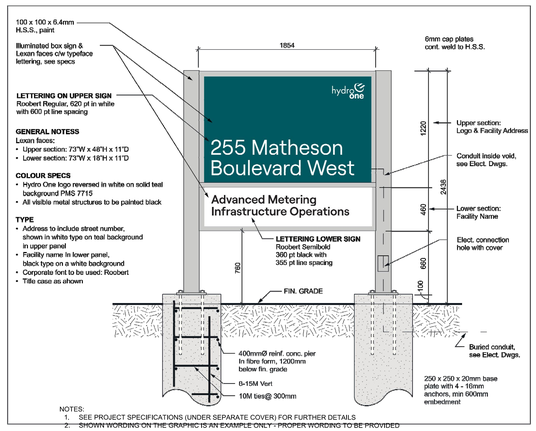


NOTES:
1 Straw bales shall be butted tightly against adjoining bales to prevent sediment flow through barrier.
2 Fill and compact gaps with loose straw.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev 3
LIGHT-DUTY STRAW BALE BARRIER		OPSD 219.100

Facilities & Real Estate - Job Aid

Pylon Sign Standard



3 C-007

SIGN DETAIL

SCALE: NTS

PRELIMINARY DESIGN

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VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE:

CLIENT: hydro one BGIS

CONSULTANT: www.jlrichards.ca
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

I verified

PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER M. DUTHILLEUL 100205184 PROVINCE OF ONTARIO
2022-09-13

PROFESSIONAL STAMP

PROJECT:
HYDRO ONE OPERATIONS CENTRE, ORLEANS
3440 FRANK KENNY ROAD

DRAWING:
DETAILS 2

DESIGN: M.D.	
DRAWN: G.C.	DRAWING #: C-007
CHECKED: D.U.	
JLR #: 31500-000	

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C DETAILS.dwg

PLOT DATE: Tuesday, September 13, 2022 3:34:19 PM

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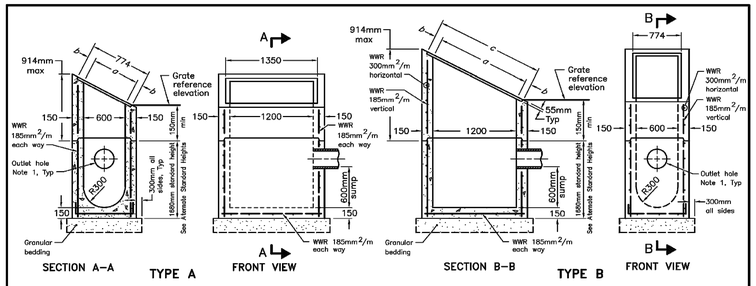


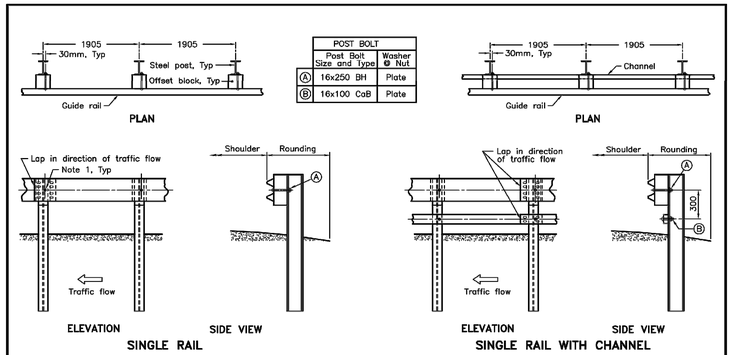
Opening Dimensions			
Grate Type	Slope	a	b
B	2H:1V	670	52
	3H:1V	632	71
	4H:1V	618	78
	HOR	600	87

Alternate Standard Heights	
Alternate	Dimension
A	1980
B	1520
C	1380

Opening Dimensions				
Grate Type	Slope	a	b	c
C	2H:1V	1341	66	1473
	3H:1V	1265	104	1473
	4H:1V	1237	118	1473
B	6H:1V	1216	65	1346
	HOR	1200	73	1346

NOTES:
1 Outlet hole size 525mm max diameter.
A Where inlet is placed across ditch and is accessible to vehicular traffic, grating slope shall be 6H:1V or flatter.
B Center reinforcing in wall and base slab ±25mm.
C Lap riser horizontal wires 300mm. Laps shall be placed at corners.
D Granular backfill shall be placed to a minimum thickness of 300mm all around the ditch inlet.
E Grating shall be according to OPSD 403.010.
F Pipe support shall be according to OPSD 708.020.
G All dimensions are nominal.
H All dimensions are in millimetres unless otherwise shown.

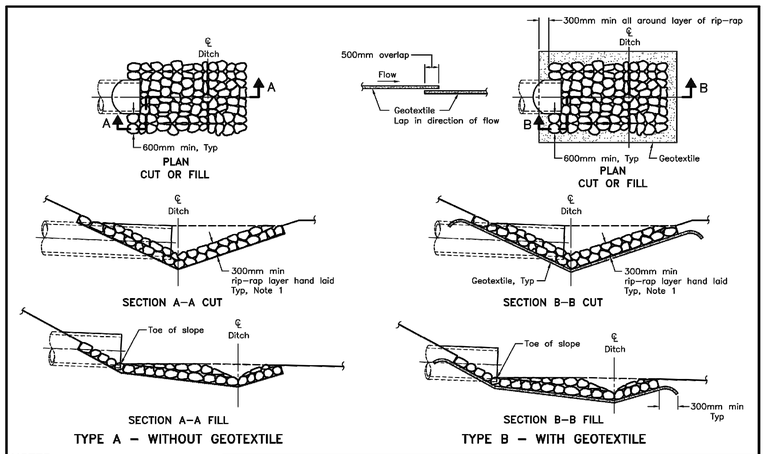
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2019	Rev 4
PRECAST CONCRETE DITCH INLETS 600 x 1200mm		
	OPSD 705.040	



POST BOLT		
	Post Bolt Size and Type	Washer @ Nut
A	16x250 BH	Plate
B	16x100 CaB	Plate

NOTES:
1 Washer shall not be installed at front face of rail. One bolt located at centre of steel beam guide rail.
A This OPSD to be read in conjunction with OPSD 912.101, 912.102, 912.103, and 912.104.
B Steel beam guide rail mounting heights shall be as specified.
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2016	Rev 3
GUIDE RAIL SYSTEM, STEEL BEAM STEEL POST WITH OFFSET BLOCK ASSEMBLY INSTALLATION – SINGLE RAIL		
	OPSD 912.130	



NOTES:
1 The thickness of the rip–rap layer shall be at least 1.5 times the rip–rap mean diameter.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev 3
GENERAL RIP–RAP LAYOUT FOR SEWER AND CULVERT OUTLETS		
	OPSD 810.010	

PRELIMINARY DESIGN

THESE DOCUMENTS ARE NOT COMPLETE IN ALL DETAILS AND MAY BE SUBJECT TO CHANGE AS DESIGN DEVELOPMENT AND CODE REVIEW IS ADVANCED.

No.	ISSUE / REVISION	DD/MM/YY
02	RE-ISSUED FOR CITY SITE PLAN APPROVAL	12/09/22
01	ISSUED FOR CITY SITE PLAN APPROVAL	06/04/22
00	ISSUED FOR CLIENT REVIEW	04/04/22

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE:

CLIENT: hydro one BGIS

CONSULTANT: www.jlrichards.ca
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER
M. DUTHILLEUL
100205184
PROVINCE OF ONTARIO

PROFESSIONAL STAMP

PROJECT: 2022-08-15
HYDRO ONE OPERATIONS CENTRE, ORLEANS
3440 FRANK KENNY ROAD

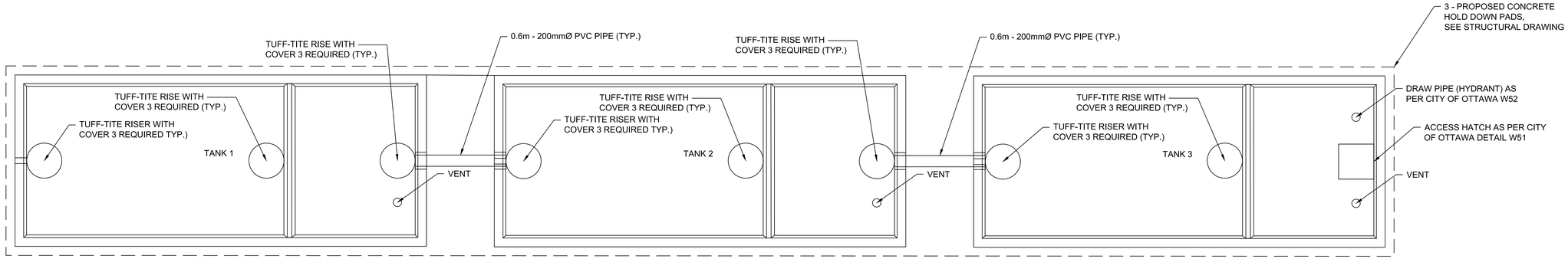
DRAWING:
DETAILS 3

DESIGN: M.D.	
DRAWN: G.C.	DRAWING #: C-008
CHECKED: D.U.	
JLR #: 31500-000	

PLOT DATE: Tuesday, September 13, 2022 3:34:23 PM

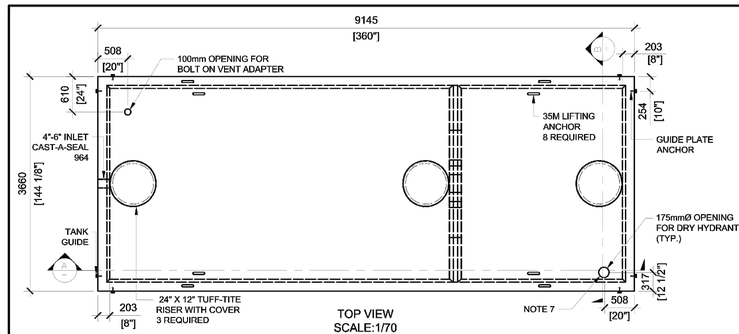
File Location: P:\31000\31500-000 - HONI Orleans OPCI\3-Production\1-Civil\31500-000 C DETAILS.dwg

D07-12-22-0057

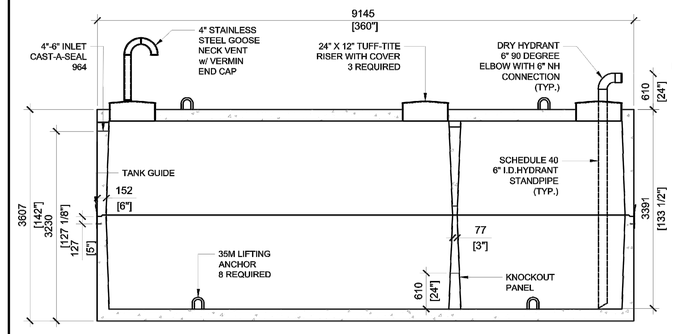


END TO END CONNECTION– 3 TANKS

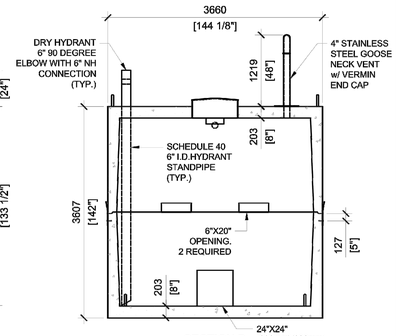
NOT TO SCALE



TOP VIEW
SCALE:1/70



SECTION A
SCALE:1/70



SECTION B
SCALE:1/70

SINGLE FIRE WATER TANK

GENERAL NOTES:

1. UNITS ARE SEALED WITH BUTYL TAPE AT THE JOINTS
2. CONTRACTOR TO ENSURE CRANE IS ON-SITE TO OFFLOAD AND SET TANK
3. EXCAVATION MUST BE READY FOR INSTALL
4. MIN OVERHEAD CLEARANCE OF 18FT (5.5 METRES) IS REQUIRED
5. ALL UNITS MUST BE HANDLED WITH PROPER LIFTING EQUIPMENT
6. TANK DESIGNED FOR A MAXIMUM FILL COVER DEPTH OF 1000mm, MO MINIMUM FILL COVER DEPTH, AND 12 kPa VEHICLE LOADING.
7. SCHEDULE 80 FLANGE FOR DRY HYDRANT TO BE FITTED ON SITE

* TANKS SUITABLE FOR TRAFFIC LOADING

POWER PRECAST SOLUTIONS

MANUFACTURED: OTTAWA, ON 1-800-655-3430

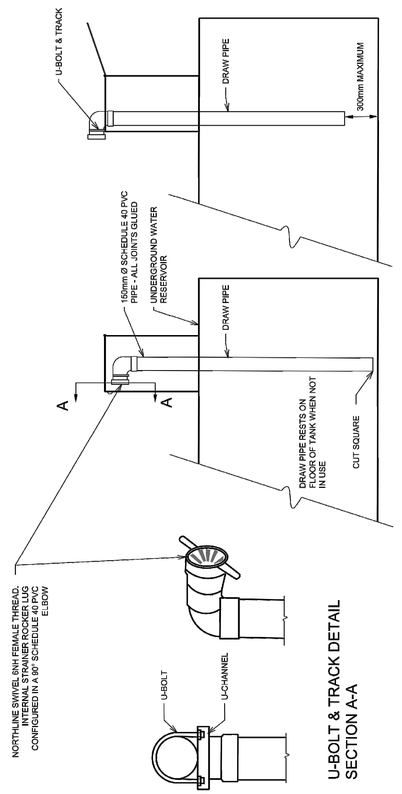
CONCRETE TYPE: SCC
CONCRETE: 45MPa at 28 days / 6,500PSI
AIR ENTRAINMENT: 5-8%
REINFORCEMENT: STEEL TO CSA CAN A23.1 /A23.3 G30.18 Fy=400MPa

WEIGHT:
BOTTOM - 78,034lbs / 35,470kg
TOP - 77,753lbs / 35,342kg
CSA APPROVED
MEETS CAN/CSA-B66
"AGINP"

DRAWN BY: JAY PATEL
DATE: MAR/2022

84000 LITRES

WORKING CAPACITY: 86752L TO INVERT OF INLET
TOTAL CAPACITY: 91606L TO UNDERSIDE OF CHAMBER LID



U-BOLT & TRACK DETAIL
SECTION A-A

Ottawa

UNDERGROUND WATER RESERVOIR DRAW PIPE DETAIL

DATE: MARCH 2016
REV. DATE:
DWG. No.: W52

PRELIMINARY DESIGN

THESE DOCUMENTS ARE NOT COMPLETE IN ALL DETAILS AND MAY BE SUBJECT TO CHANGE AS DESIGN DEVELOPMENT AND CODE REVIEW IS ADVANCED.

No.	ISSUE / REVISION	DD/MM/YY
02	RE-ISSUED FOR CITY SITE PLAN APPROVAL	12/09/22
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VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE:

CLIENT: hydro one BGIS

CONSULTANT: www.jlrichards.ca
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER
M. DUTHILLEUL
100205184
PROVINCE OF ONTARIO
DATE: SEP 16

PROFESSIONAL STAMP

PROJECT:
HYDRO ONE OPERATIONS CENTRE, ORLEANS
3440 FRANK KENNY ROAD

DRAWING:
TANK DETAILS

DESIGN:	M.D.	DRAWING #:	C-009
DRAWN:	G.C.		
CHECKED:	D.U.		
JLR #:	31500-000		

PLOT DATE: Tuesday, September 13, 2022 3:34:28 PM

File Location: P:\31000\31500-000 - HONI Orleans OPC\3-Production\1-Civil\31500-000 C DETAILS.dwg

D07-12-22-0057

Appendix C

Environmental
Compliance Approval
(Phase 1)

Ontario

Ministry of the Environment
Ministère de l'Environnement

ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 3750-92FKEH
Issue Date: December 6, 2012

743120 Ontario Inc.
3450 Frank Kenny Road
Post Office Box No. 70
Ottawa, Ontario
K4B 1J3

Site Location: Orleans Operations Centre
3450 Frank Kenny Road
City of Ottawa

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

the establishment of stormwater management works to serve the Hydro One Networks Inc. Operations Service Centre, in the City of Ottawa, for the treatment and disposal of stormwater runoff from a total catchment area of 1.02 hectares, to provide Normal Level water quality protection and erosion control and to attenuate post-development peak flows to pre-development release rates, discharging to an outlet ditch located along the western property boundary and ultimately to Bearbrook Creek, for all storm events up to and including the 100-year return storm, comprising;

- ***grassed swale,*** located along the eastern boundary of the gravel surface area, designed to accommodate up to and including the 100-year return storm runoff from a catchment area of 0.18 hectare, having a length of approximately 55 m, a maximum flow depth of 250 mm, a longitudinal slope of 0.44%, a "V" shaped bottom, and side slopes of 3:1, discharging to a swale located along the southern boundary of the gravel surface area;

- ***grassed swale,*** located along the southern boundary of the gravel surface area, designed to accommodate up to and including the 100-year return storm runoff from a catchment area of 0.62 hectare, having a length of approximately 88.3 m, a maximum flow depth of 300 mm, a longitudinal slope of 0.49%, a bottom width of 1 m, and side slopes of 3:1, discharging a dry pond facility;

- ***grassed swale,*** located along the western boundary of the gravel surface area, designed to accommodate up to and including the 100-year return storm runoff from a catchment area of 0.22 hectare, having a length of approximately 63 m, a maximum flow depth of 150 mm, a bottom grade of 0.56%, a bottom width of 1 m, and side slopes of 3:1, discharging to a dry pond facility; and

- ***one (1) dry pond facility*** located at the south-west corner of the site, having an available storage volume of approximately 634 cubic metres and a maximum depth of approximately 850 mm, complete with ***one (1) sand filter*** located at the base of the facility -having an available active treatment storage volume of approximately 39.4 cubic metres, a surface area of approximately 33 square metres, a width of approximately 1.5 m, a length of approximately 22 m, and a maximum depth of approximately 700 mm, consisting of an approximately 150 mm thick layer of top soil, an approximately 400 mm thick layer of sand wrapped in non-woven geotextile and an approximately 150 mm thick layer of clear stone, complete with two (2) 100 mm diameter perforated subdrains wrapped in non-woven geotextile -one (1) 750 mm diameter wide weir and emergency spillway and one (1) outlet structure consisting of a 525 mm diameter storm outlet pipe equipped with two (2) 150 mm diameter orifices allowing a maximum discharge of 58 L/s (the 100-year storm event), discharging via an outlet ditch complete with two (2) 100 mm diameter non-perforated subdrains, a 680 mm by 500 mm culvert and riprap to the existing drainage ditch located south of the site, and ultimately to Bearbrook Creek;

all in accordance with the application dated June 25, 2012, including final plans and specifications prepared by J.L. Richards & Associates Limited.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Approval" means this Environmental Compliance Approval and any Schedules to it, including the application and supporting documentation.

2. "Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the Part II.1 of the Environmental Protection Act;

3. "District Manager" means the District Manager of the Ottawa District Office of the Ministry;

4. "Ministry" means the Ontario Ministry of the Environment;

5. "Owner" means 743120 Ontario Inc., and includes its successors and assignees;

6. "Works" means the sewage works described in the Owner's application, this Approval and in the supporting documentation referred to herein, to the extent approved by this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1.1 The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the Works and the submitted supporting documents and plans and specifications as listed in this Approval.

1.3 Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this Approval are severable. If any requirement of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

3. CHANGE OF OWNER

The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; and

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

4. OPERATION AND MAINTENANCE

4.1 The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the stormwater management Works do not constitute a safety or health hazard to the general public.

4.2 The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's corporate office for inspection by the Ministry. The logbook shall include the following:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the stormwater management Works.

4.3 The Owner shall undertake an inspection of the condition of the stormwater management Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the above noted stormwater management Works to prevent the excessive build-up of sediment, debris and/or decaying vegetation to avoid reduction of capacity of the stormwater management Works and any reduction of filters permeability. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.

5. RECORD KEEPING

The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

6. SPILL CONTINGENCY PLAN

6.1 Within six (6) months from the issuance of this Approval, the Owner shall implement a spill contingency plan - that is a set of procedures describing how to mitigate the impacts of a spill within the area serviced by the Works. This plan shall include as a minimum:

(i) the name, job title and location (address) of the Owner, person in charge, management or person(s) in control of the facility;

(ii) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(iii) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers), any receiving body(ies) of water that could potentially be significantly impacted by a spill and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(iv) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(v) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in

responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(vi) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the Works;

(vii) the means (internal corporate procedures) by which the spill contingency plan is activated;

(viii) a description of the spill response training provided to employees assigned to work in the area serviced by the Works, the date(s) on which the training was provided and by whom;

(ix) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(x) the date on which the contingency plan was prepared and subsequently, amended.

6.2 The spill contingency plan shall be kept in a conspicuous, readily accessible location on-site.

6.3 The spill contingency plan shall be amended from time to time as required by changes in the operation of the facility.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which Approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The Condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval of the existence of this Approval.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from this approved stormwater management Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. It is also required to ensure that adequate storage is maintained in the stormwater management facilities at all times as required by the design, and to prevent stormwater impounded in the works from becoming stagnant. Furthermore, Condition 4 is included to ensure that the stormwater management Works are operated and maintained to function as designed.

5. Condition 5 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

6. Condition 6 is included to ensure that the Owner will implement the Spill Contingency Plan, such that the environment is protected and deterioration, loss, injury or damage to any person(s) or property is prevented.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 6th day of December, 2012

THIS APPROVAL WAS MAILED
ON Dec. 12, 2012
9 C
(Signed)

Sherif Hegazy, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

JO/

c: District Manager, MOE Ottawa District Office.
Derrick Upton, J.L. Richards & Associates Limited.

RECEIVED
DEC 17 2012
J.L. Richards & Associates Limited
OTTAWA OFFICE

Appendix D

Geotechnical Investigation Report & Hydrogeological Assessment

GOLDER
MEMBER OF WSP

UPDATED REPORT

Geotechnical Investigation
Proposed Hydro One Operations Facility
3440 Frank Kenny Road, Ottawa, Ontario

Submitted to:

J.L. Richards & Associates Limited

343 Preston Street, Suite 1000
Ottawa, Ontario K1S 1N4

Submitted by:

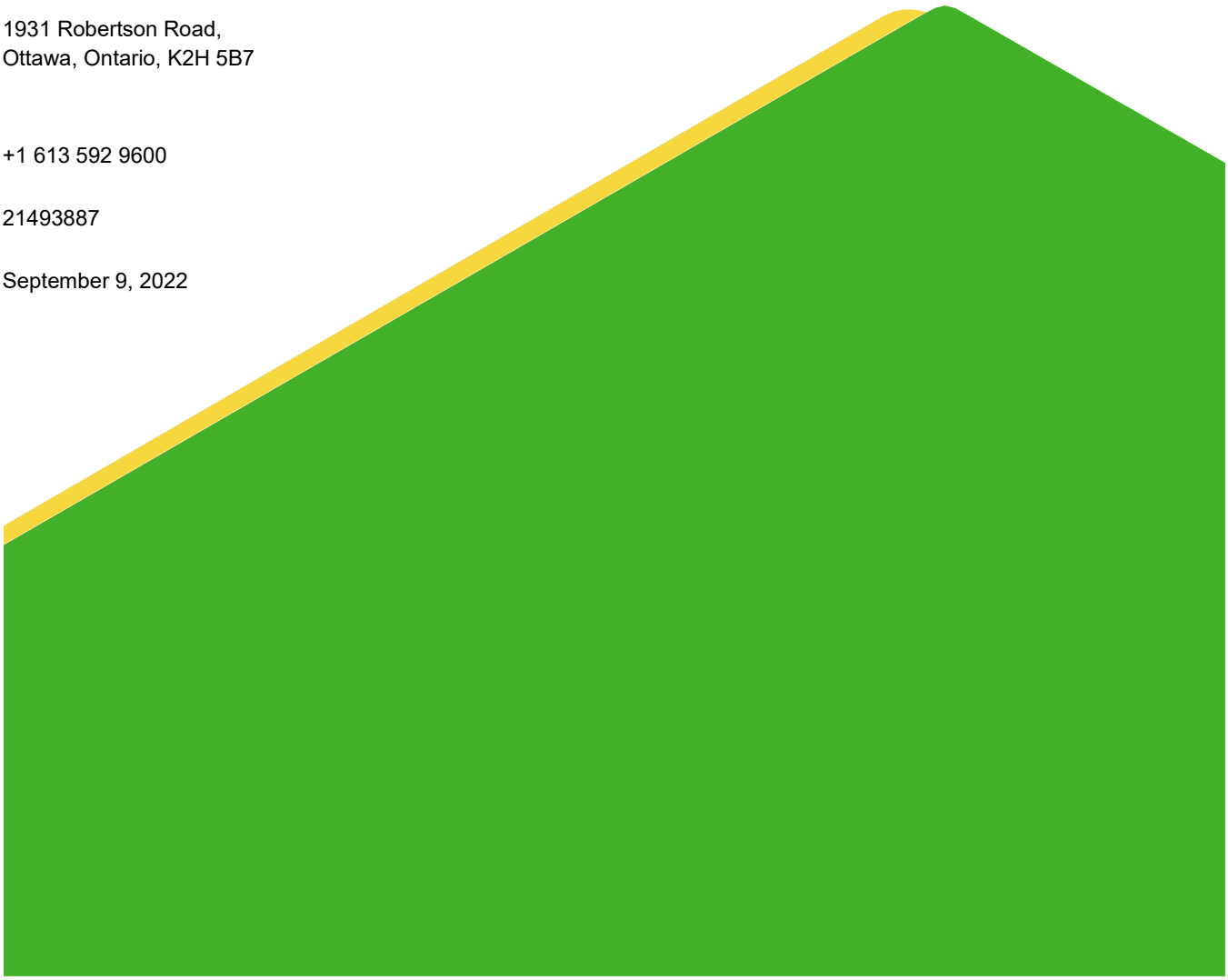
Golder Associates Ltd.

1931 Robertson Road,
Ottawa, Ontario, K2H 5B7

+1 613 592 9600

21493887

September 9, 2022



Distribution List

1 e-copy - J.L. Richards & Associates Limited

1 e-copy - Golder Associates Ltd

Table of Contents

TABLES

Important Information and Limitations of This Report

TABLES FOLLOWING TEXT OF REPORT

FIGURES

APPENDICES

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation carried out at the site of a proposed Hydro One operations facility to be located at 3440 Frank Kenny Road in Ottawa, Ontario.

This report was previously issued under report number 11-1122-0129-2000 in January 2012. This report provides updated geotechnical guidance for Phase 2 of the proposed facility and supersedes the previously issued report. Further, this report is based solely on the results of the previous geotechnical investigations, with the exception of updated water levels, and the site conditions may have changed due to construction or other activities on the site since those investigations were completed.

The purpose of the geotechnical investigation was to assess the subsurface conditions at the site by means of a limited number of test pits and boreholes.

Based on an interpretation of the factual information available for this site, a general description of the subsurface conditions across the site is presented. These interpreted subsurface conditions and available project details were used to prepare engineering guidelines on the geotechnical design aspects of the project, including construction considerations which could influence design decisions.

The reader is referred to the “Important Information and Limitations of This Report” which follows the text but forms an integral part of this document.

2.0 DESCRIPTION OF PROJECT AND SITE

Plans are being prepared for the construction of a Hydro One operations facility to be located at 3440 Frank Kenny Road in Ottawa, Ontario (see Key Plan, Figure 1).

The following is known about the existing property:

- The overall site measures approximately 145 metres by 360 metres in plan area.
- The northern part of the site (3406 Frank Kenny Road) is occupied by M. L. Bradley Bus Lines (Bradley) and contains several buildings.
- The southern part of the site (3440 Frank Kenny Road) is occupied by a residential dwelling and is agricultural land.
- The overall site topography is relatively flat.

It is understood that the proposed operations facility is to be constructed in two phases. The first phase will include:

- A temporary office building located on the western portion of the 3440 Frank Kenny Road property. The temporary office building will measure about 15 metres by 20 metres in plan area, will be one storey in height, and will be of slab-on-grade construction (i.e., no basement level).
- A general storage building to be located on the north side of the 3440 Frank Kenny Road property. The general storage building will measure about 14 metres by 22 metres in plan area, will be one storey in height, and will be of slab-on-grade construction (i.e., no basement level).
- Gravel surfaced roadways and parking areas.

It is also understood that the grades will not be raised within the phase 1 area.

The second phase will include:

- A permanent office/storage building located on the south side of the 3440 Frank Kenny Road property. The office building will measure about 32 metres by 66 metres in plan area (including the covered vehicle storage area), will be one storey in height, and will be of slab-on-grade construction (i.e., no basement level).
- The office/storage building will be provided with a storage ramp on the north side.
- A concrete pad for placement of two fire water storage tanks.
- A storm water management pond in the southern corner of the site.
- Asphalt and gravel surfaced roadways and parking areas. The asphalt parking area includes lanes for heavy vehicle (truck) traffic.

It is also understood that the grades will be raised by up to about 1.5 metres within the phase 2 area.

Published geological mapping indicates that the subsurface conditions at the site consist of silty clay. The bedrock surface is expected to be at a depth of 5 to 10 metres below ground surface at the northern portion of the site and 3 to 5 metres below ground surface at the southern portion of the site.

Geological bedrock mapping indicates that the site is located near the contact between two bedrock formations. At the northern portion of the site, the bedrock is indicated to consist of interbedded limestone and shale of the Lindsay Formation while, at the southern portion of the site, the bedrock is indicated to consist of shale of the Billings Formation.

3.0 PROCEDURE

The field work for this investigation was carried out between October 31 and November 1, 2011. During this period, a total of seven boreholes (numbered BH 11-1 to BH 11-7) and five test pits (numbered TP 11-1 to TP 11-4) were put down at the approximate locations shown on Figure 2.

The boreholes were advanced using a track-mounted hollow-stem auger drill rig supplied and operated by Marathon Drilling Company Ltd. of Ottawa, Ontario. The boreholes were advanced to depths which vary from 2.0 to 7.0 metres below existing ground surface.

Within the boreholes, standard penetration tests were carried out at regular intervals of depth and samples of the soils encountered were recovered using drive open sampling equipment. In situ vane testing was carried out where possible in the silty clay to determine the undrained shear strength of this soil unit. In addition, two relatively undisturbed, 73-millimetre diameter thin-walled Shelby tube samples of the silty clay were obtained using a fixed piston sampler.

Standpipes were sealed into boreholes 11-3 and 11-5 to allow subsequent measurement of the stabilized groundwater level at the site.

The test pits were excavated using a rubber-tired backhoe supplied and operated by Glenn Wright Excavating of Ottawa, Ontario. The test pits were advanced to depths ranging from approximately 1.6 to 2.4 metres below the existing ground surface.

The soils exposed on the sides of the test pits were classified by visual and tactile examination. The groundwater seepage conditions were observed in the open test pits and the test pits were loosely backfilled upon completion of excavating and sampling.

The subsurface conditions encountered in the test pits are shown on Table 1 - Record of Test Pits.

The field work was supervised by an experienced technician from our staff who located the boreholes and test pits, directed the drilling and excavating operations, logged the boreholes and test pits, took custody of the samples, and carried out the in situ testing. The soil samples obtained during the field work were brought to our laboratory for further examination by the project engineer and for laboratory testing.

One sample of soil from borehole 11-5 was submitted to Exova Accutest Laboratories Ltd. for basic chemical analysis related to potential sulphate attack on buried concrete elements and corrosion of buried ferrous elements.

The boreholes and test pits were selected, staked in the field, and subsequently surveyed by Golder Associates personnel. The positions and ground surface elevations at the borehole and test locations were determined using a Trimble R8 GPS survey unit. The elevations are referenced to Geodetic datum.

4.0 SUBSURFACE CONDITIONS

4.1 General

The subsurface conditions encountered in the boreholes during the current investigation are shown on the Record of Borehole Sheets in Appendix A. The subsurface conditions encountered in the test pits are shown on Table 1 – Record of Test Pits. The results of the laboratory water content and Atterberg limit testing on the selected soil samples are given on the Record of Borehole Sheets. The results of the basic chemical analyses are provided in Appendix B.

In general, the subsurface conditions at this site consist of surficial topsoil or fill (where present) overlying sensitive silty clay and glacial till, with the underlying shale bedrock surface varying from about 3 to 4 metres depth at the south portion of the site and greater than 7 metres depth at the north portion of the site.

The following sections present a more detailed overview of the subsurface conditions encountered in the boreholes and test pits advanced during the present investigation. The subsurface conditions encountered in the monitoring well (MW 11-1) are provided on the Record of Borehole Sheet in Appendix A, but are not discussed in the following sections.

GHD carried out a separate hydrogeological investigation which included the installation of four monitoring wells in the Phase 2 area. The results of this investigation are contained in the following reports:

Hydrogeological Assessment, Proposed Development, Orleans Station Yard, 3440 Frank Kenny Road, Navan Ontario, GHD Report Number 12575389(1), dated June 24, 2022; and,

Hydrogeological Assessment - Amendment, Groundwater Level Monitoring, Proposed Development, Orleans Operations Centre (OC), 3440 Frank Kenny Road, Navan Ontario, GHD Reference Number 12575389-Let-3-Spence, dated August 5, 2022.

The GHD monitoring well locations are shown on Figure1 and the stratigraphic and instrumentation logs are provided in Appendix C. The water level information from the GHD records is included below in Section 4.6.

4.2 Topsoil and Fill

A surficial topsoil layer exists at all of the test pit and borehole locations, with the exception of boreholes 11-1 and 11-4. The topsoil varies from about 80 to 150 millimetres in thickness.

Fill materials exist at the ground surface in boreholes 11-1 and 11-4. At these locations, the fill materials are about 310 and 150 millimetres in thickness, respectively. The fill materials consist of clayey topsoil, sand, organic matter, and crushed stone.

4.3 Silty Clay

The topsoil and fill materials are underlain by a deposit of sensitive silty clay. The upper portion of the deposit has been weathered to a stiff grey brown crust. Towards the south (i.e., Phase 2), the entire deposit has been weathered and extends to about 2.0 to 2.7 metres below the existing ground surface. Towards the north (i.e., Phase 1), the weathered zone extends to about 2.7 to 3.1 metres below the existing ground surface.

The results of in-situ vane testing carried out in the lower portions of the weathered crust gave undrained shear strengths ranging from 44 to 69 kilopascals. Standard penetration tests carried out within the weathered crust gave ‘N’ values ranging from 1 to 12 blows per 305 millimetres of penetration. The results of this in situ testing indicate a firm to very stiff (but generally stiff) consistency. The measured water content of the weathered crust ranges from approximately 30 to 82 percent.

In boreholes 11-1 and 11-3 (i.e., Phase 1), the silty clay below the depth of weathering is grey in colour (borehole 11-2 did not fully penetrate the weathered crust). The unweathered silty clay was fully penetrated in borehole 11-3 and was about 1.2 metres in thickness (i.e., extending down to a depth of about 4.1 metres). The unweathered silty clay was not fully penetrated in borehole 11-1 but was proven to a depth of about 7.0 metres.

The results of in-situ vane testing in the unweathered silty clay gave undrained shear strengths ranging from 25 to 44 kilopascals, indicating a firm consistency.

The results of Atterberg limit testing carried out on two samples of the grey silty clay gave plasticity index values of 58 and 63 percent and liquid limit values of 89 and 93 percent, indicating high plasticity soil. The measured water content of the two grey silty clay samples were 83 and 88 percent, which are slightly below the measured liquid limits.

4.4 Glacial Till

Glacial till was encountered underlying the silty clay (where fully penetrated) in all borehole locations. The glacial till consists of a heterogeneous mixture of gravel, cobbles, and boulders in a matrix of silty sand and shale fragments. The glacial till was fully penetrated in four of the boreholes and varied in thickness from about 0.3 to 1.7 metres. In borehole 11-3, the glacial till was not fully penetrated, but was proven to a depth of about 5.6 metres prior to the borehole being terminated.

Standard penetration test ‘N’ values for this material ranged from 11 to 38 blows per 305 millimetres of penetration, which indicates a compact to dense state of packing for this deposit. However, the higher ‘N’ values likely reflect the presence of cobbles and boulders, rather than the actual state of packing of the soil matrix.

4.5 Bedrock

Bedrock was encountered underlying the glacial till on the south of the site (i.e., Phase 2) in boreholes 11-4 to 11-7 (inclusive). The depth to bedrock ranges from about 3.1 to 4.3 metres below the existing ground surface.

In these boreholes, the upper portion of the bedrock is highly weathered and the boreholes were advanced into the bedrock by up to an additional 0.5 to 2.4 metres prior to the boreholes being terminated.

The bedrock consists of black shale. Published geological mapping indicates that this shale bedrock is of the Billings Formation.

4.6 Groundwater

The groundwater levels (GWL's) recorded in the piezometers and monitoring wells installed at the site are summarized in the following table:

Hole Designation	Approximate Screen Depth Interval (m)	Screen Strata	Date	GWL Depth below Ground Surface (m)	GWL Elev (m)*
11-3	4.2 – 4.9	Glacial Till	Nov. 14, 2011	1.1	84.4
11-5	3.4 – 4.0	Glacial Till/Bedrock	Nov. 1, 2011	1.3	84.4
DBW001	1.5 – 4.0	Clay/Clayey Gravel	Apr. 19, 2022	1.0	85.6
DBW002	0.9 – 3.1	Clay/Gravelly Clay	Apr. 19, 2022	0.1	85.5
DBW003	1.5 – 3.1	Clay/Clayey Gravel	Apr. 19, 2022	0.2	85.4
DBW004	1.2 – 3.7	Clay	Apr. 19, 2022	0.4	84.7

* The water levels shown for the GHD monitoring wells are the maximum recorded during the monitoring period from April 19, 2022 to July 7, 2022.

Groundwater levels are expected to fluctuate seasonally. Higher groundwater levels are expected during wet periods of the year, such as spring.

5.0 DISCUSSION

5.1 General

This section of the report provides engineering guidelines on the geotechnical design aspects of the project based on our interpretation of the available information described herein and project requirements and is subject to the limitations in the "Important Information and Limitations of this Report" attachment which follows the text of this report.

The foundation engineering guidelines presented in this section have been developed in a manner consistent with the procedures outlined in Part 4 of the Ontario Building Code (OBC) for Limit States Design.

5.2 Foundations

The subsurface conditions vary across the overall site.

Within the Phase 1 area, the subsurface conditions generally consist of fill material over 3 metres of weathered silty clay, overlying unweathered silty clay, which are underlain by glacial till.

Within the Phase 2 area, the subsurface conditions generally consist of 2 to 2.5 metres of weathered silty clay, overlying glacial till, with the surface of the shale bedrock at about 3 to 4 metres depth.

5.2.1 Phase 1 Area

The existing surficial fill materials present on this site are not suitable for the support of the footings, or the slab, and should be removed from within the building footprint. The footings should then be founded on/within the weathered silty clay crust or on engineered fill placed on that bearing surface.

The foundation design parameter values (Serviceability Limit States (SLS) and Ultimate Limit States (ULS) resistances) for spread footing foundations at this phase of the site are based on limiting the stress increases on the grey silty clay at depth to an acceptable level so that foundation settlements do not become excessive. Four important parameters in calculating the stress increase on the grey silty clay under the weathered crust are:

- The thickness of the weathered crust below the underside of the footings;
- The size (dimensions) of the footings;
- The amount of surcharge in the vicinity of the foundation due to landscape fill, underslab fill, floor loads, etc; and,
- The effects of groundwater lowering caused by this or other construction.

It is understood that the proposed finished floor slab levels of the Phase 1 buildings will be at about the existing grade.

For frost protection purposes, the exterior footings should be founded at least 1.5 metres below the finished exterior grade, placing the exterior footings for the structures no deeper than about elevation 84.3 metres. The floor loading for the structures is understood not to exceed 5 kilopascals.

Based on the above elevations and floor loadings, the SLS net bearing resistance and the factored ULS bearing resistance values for spread footing foundations (for buildings and retaining walls) may be taken as follows:

Building Footing Type	Minimum Founding Elevation (metres)	Footing Width or Size (metres)	Net Bearing Resistance at SLS (kPa)	Factored Bearing Resistance at ULS (kPa)
Temporary Office Building Strip Footing	84.3	< 1.0	125	165
Temporary Office Building Pad Footing	84.3	< 1.0	150	165
General Storage Building Strip Footing	84.3	< 1.0	95	165

Building Footing Type	Minimum Founding Elevation (metres)	Footing Width or Size (metres)	Net Bearing Resistance at SLS (kPa)	Factored Bearing Resistance at ULS (kPa)
General Storage Building Pad Footing	84.3	< 1.0	150	165

For larger footings, footings placed at greater depth, increases in floor loading or increases in exterior grade levels, the above design parameters will change and new values must be calculated taking any such changes into account.

The post construction total and differential settlements of footings sized using the above SLS net bearing resistance values should be less than about 25 and 15 millimetres, respectively, provided that the soil at or below founding level is not disturbed during construction. Further, these bearing resistances correspond to a settlement resulting from consolidation of the silty clay. Consolidation of the silty clay is a process which takes months or longer and, as such, results from sustained loading. Therefore, the foundation loads to be used in conjunction with the SLS resistance values given above should be the full dead load plus sustained live load. The factored dead plus full factored live load should be used in conjunction with the ULS factored bearing resistance.

5.2.2 Phase 2 Area

Grade raises of up to 3 m are acceptable on the Phase 2 area of the site and the foundations guidance below has been developed on that basis.

The existing surficial fill materials and the disturbed silty clay (at borehole 11-4) present on this site are not suitable for the support of the footings, or the slab, and should be removed from within the building footprint.

It is considered that the footings could be founded on/within the weathered silty clay crust or on engineered fill placed on that bearing surface.

The net bearing resistance at Serviceability Limit States (SLS) for pad footings up to 3.0 metres square and for strip footings up to 3.0 metres in width, may be taken as 125 kilopascals. The factored bearing resistance at Ultimate Limit States (ULS) may be taken as 165 kilopascals.

The post construction total and differential settlements of footings sized using the above SLS net bearing resistance values should be less than about 25 and 15 millimetres, respectively, provided that the soil at or below founding level is not disturbed during construction. Further, these bearing resistances correspond to a settlement resulting from consolidation of the silty clay. Consolidation of the silty clay is a process which takes months or longer and, as such, results from sustained loading. Therefore, the foundation loads to be used in conjunction with the SLS resistance values given above should be the full dead load plus sustained live load. The factored dead plus full factored live load should be used in conjunction with the ULS factored bearing resistance.

The underside of both the perimeter and interior footings for the building and canopy may be above the surface of the native soils. In addition, when the existing buildings (house, garage, etc) are demolished, the existing foundations and backfill must be removed from within the zone of influence of the new foundations and floor slabs. The zone of influence is considered to extend out and down from the edge of the new footings and edge of slabs at a slope of 1 horizontal to 1 vertical. Where the site preparation leaves the native subgrade level below the proposed underside of footing level, the grade should be raised, within the zone of influence, with Ontario Provincial Standard Specification (OPSS) Granular B Type II placed in maximum 300 millimetre thick lifts and compacted to at least 98 percent of the material's standard Proctor maximum dry density using suitable vibratory

compaction equipment. The same foundation design parameters can be used for this design option, as given above.

At locations where the footings are founded on the weathered silty clay, the short-term shear resistance within the silty clay should be checked using a factored shear strength (Su) value of 40 kPa. The lateral resistance to long term loading of footings on weathered silty clay may be evaluated using a factored tan δ* lateral sliding resistance value of 0.34.

Where foundations will be supported on engineered fill, a factored tan δ* lateral sliding resistance value of 0.40 may be used at the base of footing – engineered fill interface.

5.3 Groundwater Management

Based on the design details provided, it is anticipated the underside of foundations will be at about elevation 85.6. The groundwater levels at the site were indicated to be at about elevations ranging from 84.4 to 85.6 m. Based on the underside of footing elevations and the measured groundwater levels, the building excavation inverts may extend to the maximum measured groundwater levels, depending on the time of year, and any dewatering required should be manageable by pumping from sumps within the excavations.

The base of the stormwater management pond (dry retention area) is indicated to be at about 85.1 m (i.e., about 0.5 m below the highest measured groundwater level). Pumping from sumps should also be feasible for groundwater management but higher inflows may be expected depending on the groundwater level at the time of construction. Surface water inflows from precipitation events will also add to the pumping requirements. Ideally excavations would be planned for drier periods, such as summer.

Consideration should be given to carrying out further hydrogeolological assessments to assess the potential risks associated with construction when the facility design is finalized.

Construction Water takings in excess of 50 m^3/day are regulated by the Ministry of the Environment, Conservation and Parks (MECP). Certain takings of groundwater and stormwater for construction dewatering purposes with a combined total less than 400 m^3/day qualify for self-registration on the MECP's Environmental Activity and Sector Registry (EASR). Registry on the EASR replaces the need to obtain a PTTW for water taking less than 400 m^3/day and a Section 53 approval for discharge of water to the environment. A "Water Taking Plan" and a "Discharge Plan" are required by the MECP if water is taken in accordance with an EASR. In all cases, discharge under the EASR must be in accordance with a Discharge Plan. A Category 3 PTTW would be required for water takings in excess of 400 m^3/day. The construction water taking permit and registration should be prepared adequately in advance of site excavation works so as not to unduly affect the construction schedule.

5.4 Seismic Site Response Classification

The seismic design provisions of the Ontario Building Code depend, in part, on the shear wave velocity of the upper 30 metres of soil and/or rock below founding level. Due to the differing soil conditions across the site, the site class has been evaluated for each of the three proposed buildings.

For design purposes, the proposed Phase 1 temporary office building and general storage building can be assigned a Site Class D.

The Phase 2 permanent office building can be assigned a Site Class C for design.

The glacial till soils and the native silty clay at this site are not considered to be susceptible to liquefaction or cyclic softening in response to the design seismic event.

5.5 Slab on Grade

Conventional slab on grade construction can be used for the structures on this site.

However, for predictable performance of the floor slabs, the existing topsoil, fill materials, and disturbed clay should be removed from within the proposed building areas. Provision should be made for at least 150 millimetres of Ontario Provincial Standard Specification (OPSS) Granular A to form the base for the floor slabs. Any bulk fill required to raise the grade to the underside of the Granular A should consist of OPSS Granular B Type II. The underslab fill should be placed in maximum 300-millimetre thick lifts and should be compacted to at least 98 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

It is understood that the slabs for the building and for support of the fire water tanks will be point loaded and for structural analysis of the slab deflections a modulus of subgrade reaction, ks, is required. It should be noted however that the modulus of subgrade reaction is not a fundamental soil property and its value depends, in part, on the size and shape of the loaded area. For the analysis of the contact stress distribution beneath a raft foundation, its value would depend on the size of the areas over which increased/concentrated contact stresses are anticipated (analogous to equivalent footings beneath the walls and columns) and the size of these areas is in turn related to the value the modulus of subgrade reaction, i.e., they are inter-related. Accordingly, the analysis of the raft slabs should ideally involve an iterative analysis between the determination of the contact stress distribution by the structural engineer and the geotechnical determination of the modulus of subgrade reaction value, until the two are consistent with each other.

For a 0.3 metre by 0.3 metre section of the slab supported on the native weathered silty clay, the modulus of subgrade reaction may be assumed to be in the range of 10 to 30 megapascals per metre. The structural design of the slab at any location should be determined based on whichever value causes the larger effect, since the maximum and minimum values may govern for different locations and load effects.

5.6 Frost Protection

The soils at this site are considered to be frost susceptible. Therefore, all exterior foundation elements should be provided with a minimum of 1.5 metres of earth cover for frost protection purposes. Isolated, unheated footings adjacent to surfaces which are cleared of snow cover during winter months should be provided with a minimum of 1.8 metres of earth cover.

Insulation of the bearing surface with high density polystyrene rigid foam insulation could be considered as an alternative to earth cover for frost protection. The details for footing insulation could be provided if and when required.

Insulation will likely be required at the loading dock, unless the retaining wall footings can be founded at least 1.8 m below the ramp surface (i.e., below the underside of the building foundations). The footings for the retaining walls at the ramp should be provided with insulation, at least 50 mm in thickness, at the underside extending a distance of 1.8 m, less the depth of earth cover, beyond the edge of the footings.

In preparation for the insulation, a levelling mat consisting of 25 millimetres of concrete/mortar sand or 50 millimetres of lean concrete should be placed on the approved bearing surface. Care must be taken to ensure that the insulation is not damaged during construction. Joints should be carefully lap jointed and glued where and if possible. Footings may then be constructed on the surface of the insulation. The type of insulations should be selected such that the bearing pressure on the insulation placed under the footings does not

exceed about 35 percent of the insulation's quoted compressive strength. This is due to the time dependant creep characteristics of this material. For example, the allowable bearing pressures for several strengths of insulation are:

Insulation Type	SLS Resistance (kilopascals)	ULS Factored Resistance (kilopascals)
Dow SM	65	100
Dow Highload 40	90	135
Dow Highload 60	145	205
Dow Highload 100	240	340

To reduce the potential for differential frost heaving across the loading dock ramp, the insulation below the ramp should extend from retaining wall to retaining wall (i.e., across the full width of the ramp).

The insulation which projects beyond the edge of the footings can consist of Dow SM or equivalent, except beneath pavements where HI 60 should be used beyond the footing.

In addition, the building foundations should also be insulated at the loading dock (unless founded 1.8 m below the ramp pavement surface).

A transition detail may be required at the top of the loading dock ramp, where the insulation ends, depending if the footings are maintained at the same elevation or steeped as the ramp grade rises. Further details can be provided as the design progresses.

5.7 Foundation Wall Backfill

The soils at this site are frost susceptible and should not be used as backfill against exterior or unheated foundation elements. To avoid problems with frost adhesion and heaving, these foundation elements should be backfilled with non-frost susceptible sand, or sand and gravel conforming to the requirements for OPSS Granular B Type I.

In areas where pavement or other hard surfacing will abut the building, differential frost heaving could occur between the granular fill and other areas, particularly where clay is present. To control this differential heaving, the backfill adjacent to the foundation wall should be placed to form a frost taper. The frost taper should be brought up to pavement subgrade level from 1.5 metres below finished exterior grade at a slope of 3 horizontal to 1 vertical, or flatter, away from the wall. The granular fill should be placed in maximum 300 millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

It is understood that the native subgrade at or below foundation depth will be sloped away from the foundations at a grade of at least 1% and that the backfill within the building and covered vehicle storage area will consist of free draining OPSS Granular A or Granular B Type II. Considering the planned filling on site and the maximum groundwater levels recorded, foundation drainage is not considered to be required.

5.8 Site Servicing

Excavation for the installation of the site services will generally be through topsoil, fill, weathered silty clay, and possibly into the glacial till.

No unusual problems are anticipated in excavating in the overburden materials using conventional hydraulic excavating equipment, recognizing that boulders may be encountered within the glacial till. Boulders larger than 0.3 metres in size should be removed from the excavation side slopes for worker safety.

The Occupational Health and Safety Act (OHSA) of Ontario indicates that side slopes could be sloped at a minimum of 1 horizontal to 1 vertical (i.e., Type 3 soils).

Some groundwater inflow into the excavations should be expected. However, it should be possible to handle the groundwater inflow by pumping from well filtered sumps established in the floor of the excavations.

At least 150 millimetres of OPSS Granular A should be used as pipe bedding for sewer and water pipes. Where unavoidable disturbance to the subgrade surface does occur, it may be necessary to place a sub-bedding layer consisting of 300 millimetres of compacted OPSS Granular B Type II beneath the Granular A or to thicken the Granular A bedding. The bedding material should in all cases extend to the spring line of the pipe and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density. The use of clear crushed stone as a bedding layer should not be permitted anywhere on this project since fine particles from the sandy backfill materials could potentially migrate into the voids in the clear crushed stone and cause loss of lateral pipe support.

Cover material, from the spring line of the pipe to at least 300 millimetres above the top of pipe, should consist of OPSS Granular A or Granular B Type I with a maximum particle size of 25 millimetres. The cover material should be compacted to at least 95 percent of the material's standard Proctor maximum dry density.

It should generally be possible to re-use the grey brown silty clay and glacial till as trench backfill. Where the trench will be covered with hard surfaced areas, the type of native material placed in the frost zone (between subgrade level and 1.8 metres depth) should match the soil exposed on the trench walls for frost heave compatibility. Trench backfill should be placed in maximum 300 millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment.

5.9 Slope Stability

It is understood that retaining walls, potentially up to about 1.2 m in exposed height, will be required at the loading dock. The retaining walls were evaluated using the GeoStudio 2021 Slope/W software for limit equilibrium analysis.

The subsurface stratigraphy used in the analyses was based on the subsurface conditions encountered in Borehole 11-4, which was advanced in relatively close proximity to the proposed loading dock. Input parameters for the analysis are provided in Table 1. Reference should be made to Golder's geotechnical investigation report for this development dated May 2022 provided under separate cover.

The interpreted subsurface conditions consist of general earth fill, engineered fill (anticipated to replace a surficial layer of topsoil and to raise the founding surface to the underside of footings, if required), overlying a deposit of stiff to very stiff silty clay weathered crust, over glacial till and bedrock.

Table 1: Geotechnical Design Parameters for Stability Analysis

Soil Type	Bulk Unit Weight, γ (kN/m³)	Shear Strength Parameters		
		Undrained Shear Strength, Su (kPa)	Effective Angle of Internal Friction, ϕ' (°)	Effective Cohesion, c' (kPa)
Earth (Grade Raise) Fill	20	N/A	30	0
Engineered Fill	21.5	N/A	34	0
Weathered Silty Clay	17.5	60	35	5
Glacial Till	21	0	34	0
Bedrock	Impenetrable			

The following conditions were also assumed in the analysis:

- The ground behind the wall will be level.
- Site Class C Seismic site classification, (2022 Geotechnical Investigation report).
- A seismic horizontal loading of 0.201, equal to ½ of the site adjusted PGA value (0.402g for Site Class C).
- A static long term groundwater level of 85.0 m.

With appropriate subgrade preparation and proper placement of earth or granular soils, the up to 1.2 m high cast in place concrete retaining wall, will have a factor of safety greater than 1.5 against deep seated slope instability and a factor of safety greater than 1.1 against seismic global instability. The results of the slope stability analysis are shown on Figures 1 and 2 in Appendix D.

It also understood that the storm water management pond will have side slopes less than 1 m in height with side slopes no steeper than 3 horizontal to 1 vertical. The pond side slopes will have factors of safety of greater than 1.5 or 1.1 against static and seismic instability. The pond side slopes should be provided with erosion control measures (e.g., rip rap) to reduce the potential for sloughing and ravelling of the sideslopes.

5.10 Pavement

In preparation for pavement construction, all topsoil and other unsuitable fill (i.e., fills containing organic matter) should be excavated from the pavement areas.

Those portions of the fill material not containing organic matter may be left in place provided that some long term settlement of the pavement surface can be tolerated. However, the surface of the fill material at subgrade level should be proof rolled with a heavy smooth drum roller under the supervision of qualified geotechnical personnel to compact the surface of the existing fill and to identify soft areas requiring sub-excavation and replacement with more suitable fill.

Sections requiring grade raising to proposed subgrade level should be filled using acceptable (compactable and inorganic) earth borrow or OPSS Select Subgrade Material. These materials should be placed in maximum 300-millimetre thick lifts and should be compacted to at least 95 percent of the material's standard Proctor maximum dry density using suitable compaction equipment.

The surface of the subgrade or fill should be crowned to promote drainage of the pavement granular structure. Perforated pipe subdrains should be provided at subgrade level extending from the catch basins for a distance of at least 3 metres in four orthogonal directions, or longitudinally where parallel to a curb.

The pavement structure for car parking areas should consist of:

Pavement Component	Thickness (millimetres)
Asphaltic Concrete	50
OPSS Granular A Base	150
OPSS Granular B Type II Subbase	450

The pavement structure for access roadways and truck traffic areas should consist of:

Pavement Component	Thickness (millimetres)
Asphaltic Concrete	90
OPSS Granular A Base	150
OPSS Granular B Type II Subbase	450

The pavement structure for unpaved access roadways and truck traffic areas should consist of:

Pavement Component	Thickness (millimetres)
OPSS Granular A Base	250
OPSS Granular B Type II Subbase	450

The granular base and subbase materials should be uniformly compacted to at least 100 percent of the material's standard Proctor maximum dry density using suitable vibratory compaction equipment. The asphaltic concrete should be compacted in accordance with Table 9 of OPSS 310.

The composition of the asphaltic concrete pavement in car parking areas should be as follows:

Superpave 12.5 or HL 3 Surface Course – 50 millimetres

The composition of the asphaltic concrete pavement in access roadways and truck traffic areas should be as follows:

Superpave 12.5 or HL 3 Surface Course – 40 millimetres

Superpave 19.0 or HL 8 Binder Course – 50 millimetres

The above pavement designs are based on the assumption that the pavement subgrade has been acceptably prepared (i.e., where the trench backfill and grade raise fill have been adequately compacted to the required density and the subgrade surface not disturbed by construction operations or precipitation). Depending on the actual conditions of the pavement subgrade at the time of construction, it could be necessary to increase the thickness of the subbase and/or to place a woven geotextile beneath the granular materials.

5.11 Corrosion and Cement Type

One sample of soil from borehole 11-5 was submitted to EXOVA Accutest Laboratories Ltd. for chemical analysis related to potential corrosion of exposed buried steel and concrete elements (corrosion and sulphate attack). The results of this testing are provided in Appendix B.

The results indicate that concrete made with Type GU Portland cement should be acceptable for substructures. The results also indicate a high potential for corrosion of exposed ferrous metal.

5.12 Material Reuse

It is understood that excavated materials from the site are to be re-used on site as much as possible. In general, the excavated weathered silty clay and glacial till may be re-used in pavement and landscaped areas. Re-use of the material will depend on the water content of the excavated material. Material that is wetter than optimum will need to be stockpiled and possibly spread to dry prior to re-use. Excavation during wetter times of year should be avoided. Any organics, such as topsoil, should be stripped and saved for re-use in landscaped areas.

The glacial till will likely be wetter than optimum and it should be planned to place the glacial till in landscaped areas. The glacial till should be placed in maximum 0.3 m thick lifts and compacted using a 15 tonne roller compactor in non-vibratory mode to 95% of the materials maximum standard Proctor dry density, if achievable.

The weathered silty clay should placed in maximum 0.3 m thick lifts and compacted using a 15 tonne sheepsfoot compactor in non-vibratory mode to 95% or 98% of the materials maximum standard Proctor dry density in landscaped areas or beneath paved areas, respectively. The surface of the clay should be compacted using a 15 tonne smooth drum roller compactor in non-vibratory mode prior to placement of granular materials.

Ideally, the clay fill should be allowed to sit for 2 to 4 weeks and should be proofrolled after that period prior to the placement of granulars for pavements. Consideration should be given to using a geogrid within the pavement subbase granulars in the pavement structure in areas constructed on clay fill. Delaying final paving of the parking area, for as long as feasible, should be considered as well.

Site excavated materials should be approved by a geotechnical professional prior to placement and prior to placement of pavement granulars.

5.13 Trees

The silty clay deposit that is present at the site is highly sensitive to water depletion by trees of high-water demand during periods of dry weather. When trees draw water from clayey soils, the clay undergoes shrinkage which can result in settlement of adjacent structures. The zone of influence of a tree is considered to be approximately equal to the full mature height of the tree. Therefore, in this area, trees which have a high-water demand should not be planted closer to structures than the ultimate height of the trees. Table 2 provides a list of the common trees in decreasing order of water demand and, accordingly, decreasing risk of potential effects on structures.

It is understood that no trees will be planted in the Phase 1 area of the development. In Phase 2, trees will be planted in front of the building (i.e., on the street side of the building). Based on the current landscaping plan, the trees will be at least 12 m from the foundations walls, and this set back distance will meet the current City guidelines for trees on sensitive marine soils (i.e., reduced set backs from the guidelines will not be required).

It should also be noted that the foundation depths for the proposed building are less than the required 2.1 metres in the current City guidelines and reduced set back distances for tree planting will not be feasible, should the landscaping plan change.

6.0 CLOSURE

The soils at this site are sensitive to disturbance from ponded water, construction traffic and frost.

All footing and subgrade areas should be inspected by experienced geotechnical personnel prior to filling to establish that the bearing surfaces have been properly prepared. The placing and compaction of any engineered fill should be inspected to confirm that the materials used conform to the specifications from both a grading and compaction view point.

Golder Associates should be retained to review the final drawings and specifications for this project prior to tendering to ensure that the guidelines in this report have been adequately interpreted.

Signature Page

Golder Associates Ltd.

William (Bill) Cavers, P.Eng., PMP
Senior Geotechnical Engineer

WC/CH/hdw/ml

https://golderassociates.sharepoint.com/sites/152302/project files/6 deliverables/updated geotechnical report/final report 08-23-2022/21493887 rpt-001 updated proposed hydro one facility 2022_09_09_r1.docx

GOLDER
MEMBER OF WSP

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Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Groundwater Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. **The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report.** The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

TABLE 1

RECORD OF TEST PITS

Test Pit Number (Elevation)	Depth (metres)	Description
11-1 (85.74 metres)	0.00 – 0.15	TOPSOIL
	0.15 – 2.00	Grey brown SILTY CLAY (Weathered Crust)
	2.00	END OF TEST PIT
		Note: Groundwater seepage at 2.00 metres depth
		Sample 1 — Depth (m) 1.00
11-2 (85.72 metres)	0.00 – 0.15	TOPSOIL
	0.15 – 1.00	Grey brown SILTY CLAY (Weathered Crust)
	1.00 – 2.40	Grey brown SILTY SAND, some gravel and clay, with cobbles and boulders (GLACIAL TILL)
	2.40	END OF TEST PIT
		Note: Groundwater seepage at 2.00 metres depth
		Sample 1 — Depth (m) 2.00
11-3 (85.90 metres)	0.00 – 0.15	TOPSOIL
	0.15 – 2.00	Grey brown SILTY CLAY (Weathered Crust)
	2.00	END OF TEST PIT
		Note: Groundwater seepage at 2.00 metres depth
11-4 (85.08 metres)	0.00 – 0.15	TOPSOIL
	0.15 – 1.60	Grey brown SILTY CLAY (Weathered Crust)
	1.60	END OF TEST PIT
		Note: Groundwater seepage at 1.50 metres depth
		Sample 1 — Depth (m) 0.50
		Sample 2 — Depth (m) 1.00

RECORD OF TEST PIT 11-5

Test Pit Number (Elevation)	Depth (metres)	Description
11-5 (±85.9 metres)	0.00 – 0.27	TOPSOIL
	0.27 – 2.00	Very stiff grey brown SILTY CLAY (Weathered Crust)
		- Field vane test at 0.9 metres > 100 kilopascals
	2.00 – 2.45	Very stiff grey SILTY CLAY
		- Field vane test at 2.1 metres > 100 kilopascals
	2.45 – 2.60	Grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)
	2.60	END OF TEST PIT
		Note: Groundwater seepage at 0.9 metres depth

Sample	Depth (m)
1	0.9
2	2.3
3	2.5

TABLE 2

SOME COMMON TREES
IN DECREASING ORDER OF WATER DEMAND

Broad Leaved Deciduous

Poplar

Alder

Aspen

Willow

Elm

Maple

Birch

Ash

Beech

Oak

Deciduous Conifer

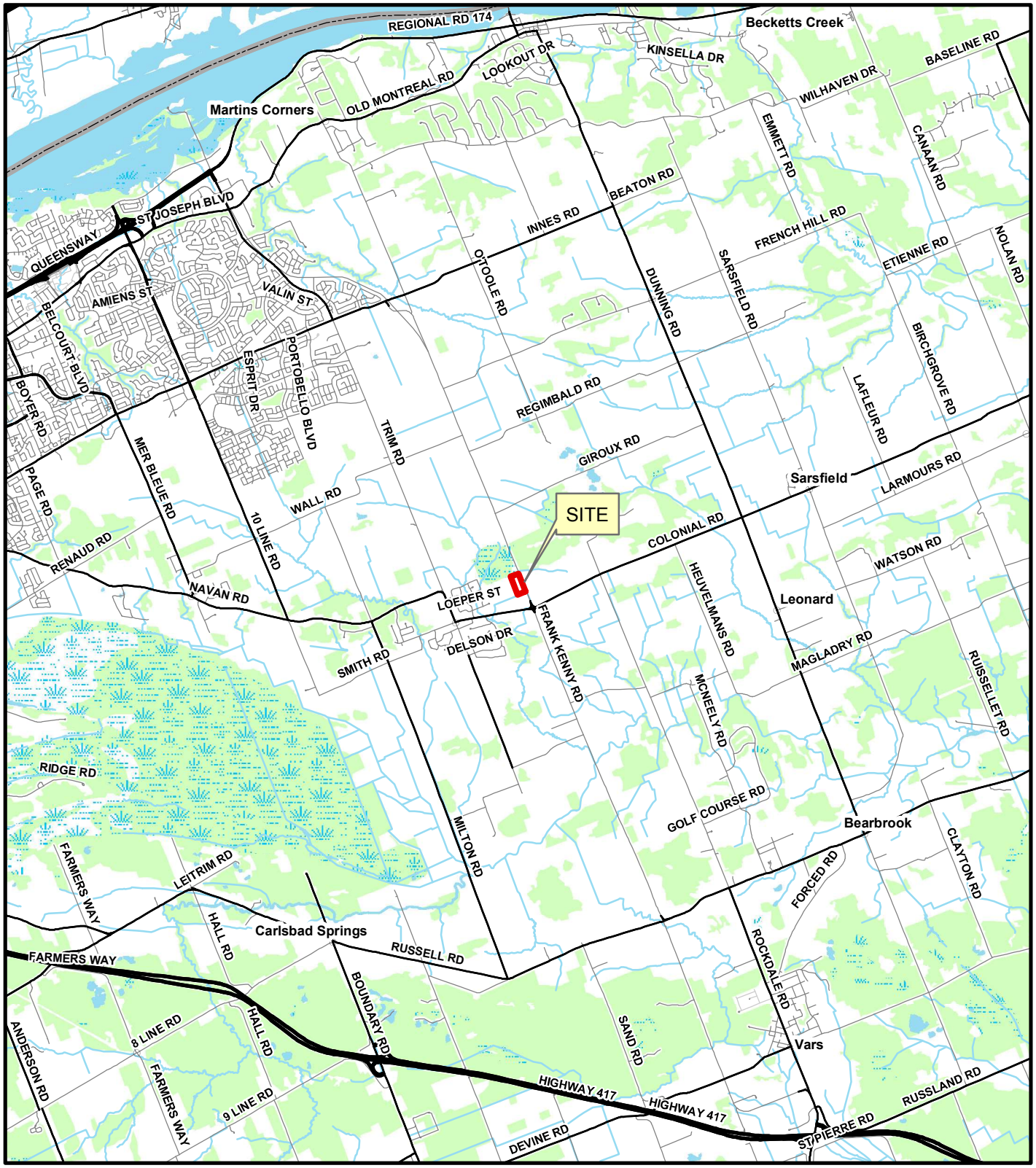
Larch

Evergreen Conifers

Spruce

Fir

Pine



NOTE

THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 11-1122-0129-2000

REFERENCE

DIGITAL BASE MAP DATA SUPPLIED BY DMTI SPATIAL INC. CANMAP, 2008
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: MTM ZONE 9

2,500 0 2,500
SCALE 1:100,000 METRES

Golder Associates
Ottawa, Ontario

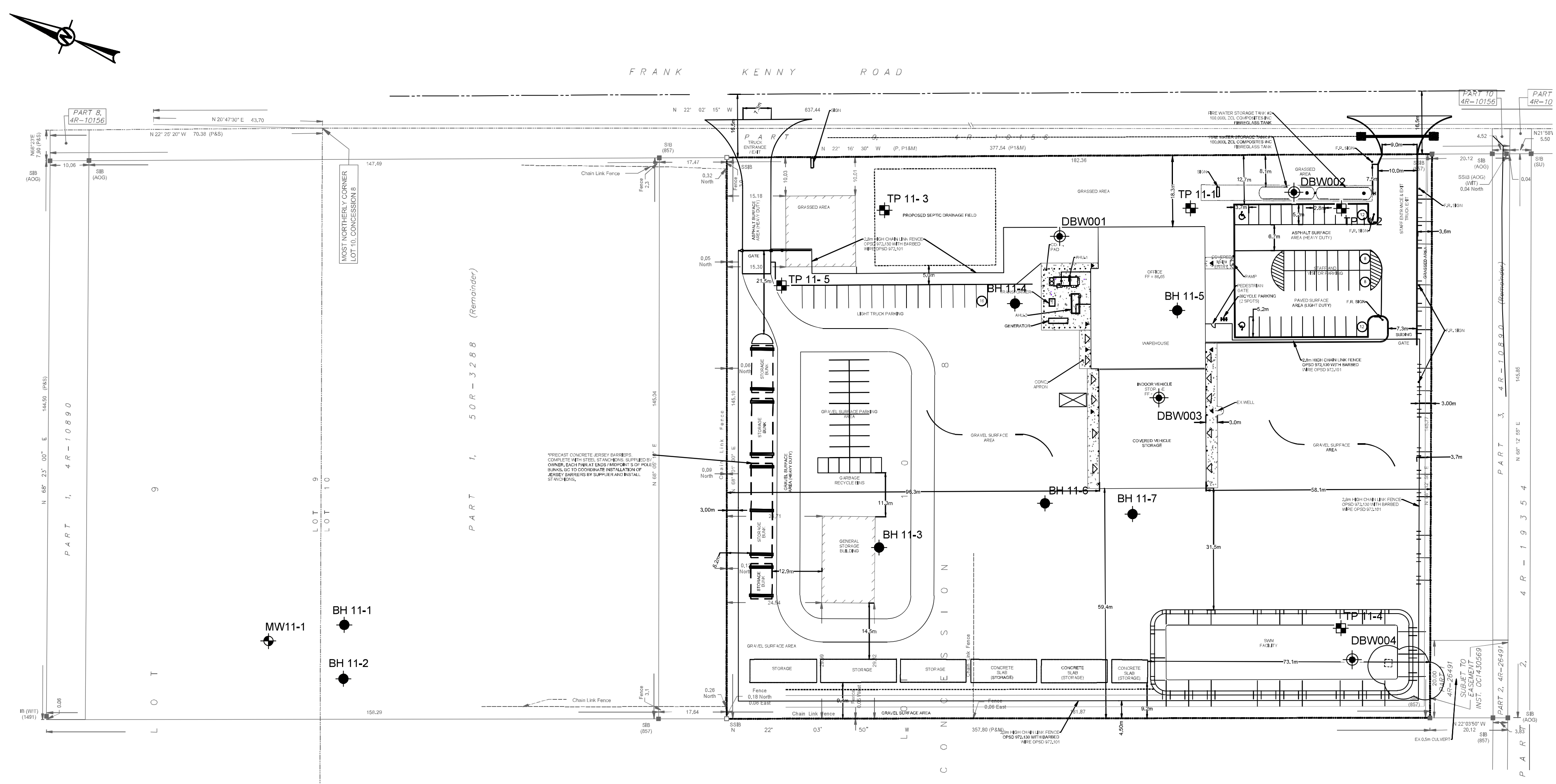
PROJECT No.	11-1122-0129-2000
SCALE	AS SHOWN
REV.	0
DATE	Nov. 2011
DESIGN	BGS
GIS	BJ
CHECK	BGS
REVIEW	DHP

TITLE

KEY PLAN

PROJECT PROPOSED HYDRO ONE OPERATIONS FACILITY
3406-3450 FRANK KENNY ROAD, OTTAWA, ONTARIO

FIGURE 1


FRANK KENNY ROAD
TP 11-3
PROPOSED SEPTIC DRAINAGE FIELD
DBW001
DBW002
TP 11-1
TP 11-2
TP 11-5
BH 11-4
BH 11-5
DBW003
BH 11-6
BH 11-7
BH 11-3
TP 11-4
DBW004
BH 11-1
BH 11-2
MW11-1
LIGHT TRUCK PARKING
WAREHOUSE
COVERED VEHICLE STORAGE
GRAVEL SURFACE PARKING AREA
GARBAGE RECYCLE BINS
GENERAL STORAGE BUILDING
GRAVEL SURFACE AREA
SWM FACILITY
STORAGE
CONCRETE SLAB (STORAGE)
GRASSED AREA
ASPHALT SURFACE AREA (HEAVY DUTY)
Chain Link Fence
MOST NORTHERLY CORNER LOT 10, CONCESSION 8
PART 1, 50R-3288 (Remainder)
PART 1, 4R-10890
LOT 9
LOT 10
CONCESSION 8
PART 3, 4R-10890
PART 8, 4R-10156
PART 10 4R-10156
PART 2, 4R-26491
N 68° 23' 00" E
N 22° 16' 30" W
377.54 (P1&M)
357.80 (P&M)
147.49
158.29

LEGEND

- APPROXIMATE MONITORING WELL LOCATION, GHD INVESTIGATION
- APPROXIMATE TEST PIT LOCATION, PREVIOUS INVESTIGATION
- APPROXIMATE BOREHOLE LOCATION, PREVIOUS INVESTIGATION
- APPROXIMATE MONITORING WELL LOCATION, PREVIOUS INVESTIGATION

REFERENCE(S)

1. BASE PLAN SUPPLIED IN ELECTRONIC FORMAT BY J.L. RICHARDS AND ASSOCIATES, DATED MARCH 23, 2022.

DRAFT

0 25 50
1:1,000 METRES

CLIENT
HYDRO ONE

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2022-06-20
DESIGNED	----
PREPARED	ZS/JEM
REVIEWED	----
APPROVED	----

PROJECT
GEOTECHNICAL INVESTIGATION PROPOSED HYDRO ONE OPERATIONS FACILITY 3406-3450 FRANK KENNY ROAD, OTTAWA, ONTARIO

TITLE
SITE PLAN

PROJECT NO.	CONTROL	REV.	FIGURE
21493887	0001	A	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm

APPENDIX A

List of Abbreviations and Symbols Record of Borehole Sheets

LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I. SAMPLE TYPE

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO	Drive open
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample
DT	Dual Tube sample

II. PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:
The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open Sampler for a distance of 300 mm (12 in.)
DD- Diamond Drilling

Dynamic Penetration Resistance; N_d:
The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive Uncased a 50 mm (2 in.) diameter, 60^0 cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

Peizo-Cone Penetration Test (CPT):
An electronic cone penetrometer with a 60^0 conical tip and a projected end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded Electronically at 25 mm penetration intervals.

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	**N** Blows/300 mm Or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

Consistency	**C_u or S_u** Kpa	Psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very stiff	100 to 200	2,000 to 4,000
Hard	Over 200	Over 4,000

IV. SOIL TESTS

w	water content
w_p	plastic limited
w_l	liquid limit
C	consolidaiton (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, G_s)
DS	direct shear test
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	modified Proctor compaction test
SPC	standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V	field vane test (LV-laboratory vane test)
γ	unit weight

Note:
1. Tests which are anisotropically consolidated prior shear are shown as CAD, CAU.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	= 3.1416
ln x,	natural logarithm of x
$\log_{10}$ x or log x,	logarithm of x to base 10
g	Acceleration due to gravity
t	time
F	factor of safety
V	volume
W	weight

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma'$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
ν	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma''-u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1\sigma_2\sigma_3$	principal stresses (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress = $(\sigma_1+\sigma_2+\sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight*)
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma'=\gamma-\gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R= p_s/p_w$) formerly (G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is p. Unit weight symbol is γ where γ=pg(i.e. mass density x acceleration due to gravity)

(a) Index Properties (cont'd.)

w	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity Index=(w_l-w_p)
w_s	shrinkage limit
I_L	liquidity index=$(w-w_p)/I_p$
I_c	consistency index=$(w_l-w)/I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index-$(e_{max}-e)/(e_{max}-e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (overconsolidated range)
C_s	swelling index
C_a	coefficient of secondary consolidation
m_v	coefficient of volume change
c_v	coefficient of consolidation
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation pressure
OCR	Overconsolidation ratio=σ'_p/σ'_{vo}

(d) Shear Strength

$\tau_p\tau_r$	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction=tan δ
c'	effective cohesion
c_u, s_u	undrained shear strength (ϕ=0 analysis)
p	mean total stress $(\sigma_1+\sigma_3)/2$
p'	mean effective stress $(\sigma'_1+\sigma'_3)/2$
q	$(\sigma_1-\sigma_3)/2$ or $(\sigma'_1-\sigma_3)/2$
q_u	compressive strength $(\sigma_1-\sigma_3)$
S_t	sensitivity

Notes: 1. $\tau=c'\sigma'\tan\phi'$

2. Shear strength=(Compressive strength)/2

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: 11-1

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: October 31, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		86.36							
0	Power Auger 200 mm Diam. (Hollow Stem)	Dark brown silty fine sand, trace organic matter (FILL)		0.00 0.08							
		Loose brown fine sand (FILL)		86.05 0.31	1	50 DO	6				
1		Very stiff to stiff brown to grey brown SILTY CLAY (Weathered Crust)			2	50 DO	12				
2					3	50 DO	5				
					4	50 DO	3				
3				83.31							
		Firm grey SILTY CLAY		3.05	5	50 DO	1				
4											
					6	50 DO	WH				
5											
6											
					7	50 DO	WH				
7		End of Borehole		79.40 6.96							
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: HEC

CHECKED: SD

Golder Associates

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: 11-2

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: October 31, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		85.78							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL		0.00							
		Very stiff to stiff grey brown SILTY CLAY (Weathered Crust)		0.08	1	50 DO	12				
1					2	50 DO	7				
					3	50 DO	4				
2				83.80							
		End of Borehole		1.98							
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: HEC

CHECKED: SD

Golder Associates

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: 11-3

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: November 1, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		85.48							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL		0.00							
		Very stiff to stiff grey brown SILTY CLAY (Weathered Crust)		0.15	1	50 DO	5				Native Backfill
1											
					2	50 DO	2				
2											
					3	50 DO	1				
				82.58							
3		Firm grey SILTY CLAY		2.90	4	50 DO	WH				
4				81.42							Bentonite Seal
		Compact to dense dark grey to black SILTY SAND, some gravel, with shale fragments, cobbles, and boulders (GLACIAL TILL)		4.06							Silica Sand
					5	50 DO	17				Standpipe
5											
					6	50 DO	38				W.L. in Standpipe at Elev. 84.38 m on Nov. 14, 2011
				79.84							
		End of Borehole		5.64							
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: HEC

CHECKED: SD

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: 11-3A

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: November 2, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		85.48							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL		0.00							
		Very stiff to stiff grey brown SILTY CLAY (Weathered Crust)		0.15							
1											
2				82.74							
		Firm grey SILTY CLAY		2.74	1	73 TP	PH				
3											
					2	73 TP	PH				
4					3	50 DO	WH				
				80.73	4	50 DO	6				
		Compact dark grey to black SILTY SAND, with shale fragments (GLACIAL TILL)		4.75							
5				80.43							
		End of Borehole		5.05							
		Note: Shallow portion of stratigraphy inferred from BH 11-3									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: HEC

CHECKED: SD

Golder Associates

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: 11-4

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: November 2, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp W Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		85.90									
0	Power Auger 200 mm Diam. (Hollow Stem)	Dark brown clayey topsoil (FILL)		0.00									
		Grey crushed stone (FILL)		0.15									
		Grey brown SILTY CLAY (Disturbed)			1	50 DO	6						
1				84.68									
		Stiff grey brown SILTY CLAY (Weathered Crust)		1.22	2	50 DO	3	⊕	+		○		
2								⊕	+				
				83.36	3	50 DO	16	⊕	+		○		
		Compact dark grey to black SILTY SAND, with shale fragments, cobbles, and boulders (GLACIAL TILL)		2.54									
3					4	50 DO	12						
					5	50 DO	16						
4				81.63									
		Highly weathered black SHALE BEDROCK		4.27	6	50 DO	>50						
				81.38									
		End of Borehole Sampler Refusal		4.52									
5													
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: HEC

CHECKED: SD

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: 11-5

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: November 1, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		85.64							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL		0.00							
		Very stiff to stiff grey brown SILTY CLAY (Weathered Crust)		0.15	1	50 DO	9				
1					2	50 DO	7				
					3	50 DO	2				
2				83.51							
		Compact dark grey to black SILTY SAND, some gravel, with cobbles, boulders, and shale fragments (GLACIAL TILL)		2.13	4	50 DO	11				
3					5	50 DO	16				
				81.83							
		Highly weathered black SHALE BEDROCK		3.81	6	50 DO	>50				
4				81.58							
		End of Borehole		4.06							
5											
6											
7											
8											
9											
10											

Native Backfill

Bentonite Seal

Silica Sand

Standpipe

W.L. in Standpipe at Elev. 84.37 m on Nov. 14, 2011

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: HEC

CHECKED: SD

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: 11-6

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: November 1, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		85.44									
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL		0.00									
		Very stiff to stiff brown SILTY CLAY (Weathered Crust)		0.15									
1					1	50 DO	4						
2					2	50 DO	2						
					3	50 DO	7						
				82.70									
		Compact dark grey to black SILTY SAND, with shale fragments (GLACIAL TILL)		2.74									
3				82.39									
		Highly weathered black SHALE BEDROCK		3.05	4	50 DO	21						
				81.78									
		End of Borehole		3.66									
4													
5													
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: HEC

CHECKED: SD

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: 11-7

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: November 1, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		85.42									
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL		0.00									
		Very stiff to stiff grey brown SILTY CLAY (Weathered Crust)		0.15									
1					1	50 DO	5						
					2	50 DO	2						
2		Compact dark grey to black SILTY SAND, with shale fragments, cobbles, and boulders (GLACIAL TILL)		83.44 1.98	3	50 DO	16						
3					4	50 DO	17						
		Highly weathered SHALE BEDROCK		81.91 3.51	5	50 DO	20						
4					6	50 DO	>50						
		End of Borehole		80.70 4.72									
5													
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: HEC

CHECKED: SD

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

PROJECT: 11-1122-0129-2000

RECORD OF BOREHOLE: MW11-1

SHEET 1 OF 1

LOCATION: See Site Plan

BORING DATE: October 31, 2011

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		85.96									
0	Power Auger 200 mm Diam. (Hollow Stem)	Grey crushed stone (FILL)		0.00	1	50 DO	22						Gravel
				85.35									
		Very stiff to stiff grey brown SILTY CLAY (Weathered Crust)		0.61	2	50 DO	8						Bentonite Seal
1					3	50 DO	5						Silica Sand
2					4	50 DO	4						
				83.52									
		Firm grey SILTY CLAY		2.44	5	50 DO	1						51 mm Diam. PVC #10 Slot Screen
3					6	50 DO	1						
				82.30									
		End of Borehole		3.66									W.L. in Screen at Elev. 84.77 m on November 4, 2011
4													
5													
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: HEC

CHECKED: SD

MIS-BHS 001 1111220129.GPJ GAL-MIS.GDT 1/12/12 JEM

APPENDIX B

Results of Basic Chemical Analysis Exova Accutest Report No. 1126218

REPORT OF ANALYSIS

Client: **Golder Associates Ltd. (Ottawa)**
32 Steacie Drive

Kanata, ON
K2K 2A9
Attention: **Mr. Stephen Dunlop**

Report Number: 1126218
Date: 2011-11-15
Date Submitted: 2011-11-08

Project: 11-1122-0129

P.O. Number:

Chain of Custody Number: **127521**

Matrix: Soil

			LAB ID:					GUIDELINE		
			Sample Date:							
			Sample ID:							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Chloride	%	0.002	0.004							
Electrical Conductivity	mS/cm	0.05	0.27							
pH			7.5							
Resistivity	ohm-cm	1	3700							
Sulphate	%	0.01	0.01							

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL: _____
Lorna Wilson
Inorganic Lab Supervisor

Methods references and/or additional QA/QC information available on request.

APPENDIX C

Stratigraphic and Instrumentation Logs (DBW001 to DBW004) GHD Project Number 12575389

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Hydrogeological Assessment and Soil Quality Investigation - New Orleans OC

PROJECT NUMBER: 12575389

CLIENT: Hydro One Networks Inc.

LOCATION: 3440 Frank Kenny Road, Navan, Ontario

HOLE DESIGNATION: DBW001

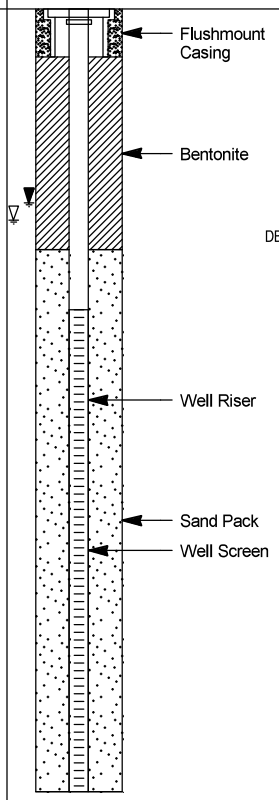
DATE COMPLETED: 7 April 2022

DRILLING METHOD: 205mm O.D HSA + Split Spoon

FIELD PERSONNEL: L. McCann

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL
	GROUND SURFACE	86.60
	TOP OF RISER	86.47
0.5	FILL-SAND and GRAVEL; dense; coarse grained; poorly graded; brown to grey; moist	
		85.99
1.0	FILL-SANDY SILT; very stiff; low plasticity; brown; dry	
		85.53
1.5	CL-CLAY (NATIVE); firm; low plasticity; brown; dry to moist	
2.0		
2.5	- becomes soft, brown to grey, moist at 2.49m BGS	
		83.73
3.0	GP-GC-CLAYEY GRAVEL; compact; medium grained; poorly graded; grey; very wet	
3.5		
4.0	END OF BOREHOLE @ 3.96m BGS	82.64
	Refusal at 3.96 mBGS	
4.5		
5.0		
5.5		
6.0		
6.5		

Monitoring Well



WELL DETAILS
Screened interval:
85.08 to 82.64m AMSL
1.52 to 3.96m BGS
Length: 2.44m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
86.45 to 82.64m AMSL
0.15 to 3.96m BGS
Material: Bentonite
Sand Pack:
85.38 to 82.64m AMSL
1.22 to 3.96m BGS
Material: #2 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' Value	PID (ppm)
1 DBW001-1-2		70	35	0.1
2 DBW001-3-4/DUP003		80	17	0.0
3		80	9	0.0
4 DBW001-7.5-9.5		60	2	0.1
5		25	27	0.0
6		20	<50	0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND ▽ 4/13/2022 STATIC WATER LEVEL ▼ 4/19/2022

CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

File: \\GHDNET\GHD\CA\OTTAWA\PROJECTS\662\12575389\TECH\GINT\12575389 ORLEANS H1.GPJ Library File: GHD_ENVIRO_V04.GLB Report: OVERBURDEN LOG Date: 13/6/22

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Hydrogeological Assessment and Soil Quality Investigation - New Orleans OC

PROJECT NUMBER: 12575389

CLIENT: Hydro One Networks Inc.

LOCATION: 3440 Frank Kenny Road, Navan, Ontario

HOLE DESIGNATION: DBW002

DATE COMPLETED: 6 April 2022

DRILLING METHOD: 205mm O.D HSA + Split Spoon

FIELD PERSONNEL: L. McCann

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL
	TOP OF RISER	86.51
	GROUND SURFACE	85.58
0.0	TOPSOIL-CLAYEY SILT; firm; low plasticity; brown; dry to moist	
0.5	CL-CLAY (NATIVE); firm; low plasticity; brown; dry	85.27
1.0	- becomes grey, very stiff, dry to moist from 0.97 to 1.22m BGS	
1.5	CLG-GRAVELLY CLAY; hard; low plasticity; dark brown; wet	84.36
2.0		
2.5	- sand lense from 2.59 to 2.64m BGS	
3.0		
3.5		81.92
4.0	END OF BOREHOLE @ 3.66m BGS	
4.5		
5.0		
5.5		
6.0		
6.5		

Monitoring Well: Monument Casing; Cement; Bentonite; Well Riser; Sand Pack; Well Screen; Bentonite

WELL DETAILS
Screened interval:
84.66 to 82.53m AMSL
0.91 to 3.05m BGS
Length: 2.13m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
85.43 to 84.97m AMSL
0.15 to 0.61m BGS
Material: Bentonite
Sand Pack:
84.97 to 82.53m AMSL
0.61 to 3.05m BGS
Material: #2 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' Value	PID (ppm)
DBW002-0-1 / 1		80	33	0.1
DBW002-2-3 / 2		90	9	0.1
3 / DBW002-5-7		60	41	0.1
4		30	40	0.0
5		85	35	0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND ▽ 4/13/2022 STATIC WATER LEVEL ▼ 4/19/2022

CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

File: \\GHDNET\GHD\CA\OTTAWA\PROJECTS\662\12575389\TECH\GINT\12575389 ORLEANS H1.GPJ Library File: GHD_ENVIRO_V04.GLB Report: OVERBURDEN LOG Date: 13/6/22

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Hydrogeological Assessment and Soil Quality Investigation - New Orleans OC

PROJECT NUMBER: 12575389

CLIENT: Hydro One Networks Inc.

LOCATION: 3440 Frank Kenny Road, Navan, Ontario

HOLE DESIGNATION: DBW003

DATE COMPLETED: 6 April 2022

DRILLING METHOD: 205mm O.D HSA + Split Spoon

FIELD PERSONNEL: L. McCann

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	REC (%)	'N' Value	PID (ppm)
	TOP OF RISER	86.54	Monument Casing					
	GROUND SURFACE	85.64						
0.5	TOPSOIL-CLAYEY SILT; firm; low plasticity; brown; dry; rootlets	85.44	Cement	DBW003-0-1 1		90	6	0.1
1.0	CL-CLAY (NATIVE); firm; low plasticity; brown; dry to moist		Bentonite	DBW003-2-3 2		80	5	0.0
1.5	- becomes very soft, brown to grey, moist from 1.52 to 2.13m BGS		Well Riser	3		100	0	0.1
2.0			Sand Pack					
2.5	GP-GC-CLAYEY GRAVEL; compact; medium grained; poorly graded; dark brown; very wet	83.35	Well Screen	4		50	27	0.0
3.0								
3.5			Bentonite	5		25	21	0.0
	END OF BOREHOLE @ 3.66m BGS	81.98						
4.0								
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
84.12 to 82.59m AMSL
1.52 to 3.05m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
85.49 to 84.42m AMSL
0.15 to 1.22m BGS
Material: Bentonite
Sand Pack:
84.42 to 82.59m AMSL
1.22 to 3.05m BGS
Material: #2 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND ▽ 4/13/2022 STATIC WATER LEVEL ▼ 4/19/2022

CHEMICAL ANALYSIS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Hydrogeological Assessment and Soil Quality Investigation - New Orleans OC

PROJECT NUMBER: 12575389

CLIENT: Hydro One Networks Inc.

LOCATION: 3440 Frank Kenny Road, Navan, Ontario

HOLE DESIGNATION: DBW004

DATE COMPLETED: 6 April 2022

DRILLING METHOD: 205mm O.D HSA + Split Spoon

FIELD PERSONNEL: L. McCann

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m AMSL
	TOP OF RISER	86.10
	GROUND SURFACE	85.11
0.0	TOPSOIL-CLAYEY SILT; firm; low plasticity; brown; dry; rootlets	84.91
0.5	CL-CLAY (NATIVE); firm; low plasticity; brown; dry	
1.0	- becomes softer, moist from 1.07 to 1.37m BGS	
1.5	- very soft, wet from 1.60 to 3.66m BGS	
2.0		
2.5		
3.0		
3.5		81.45
	END OF BOREHOLE @ 3.66m BGS	
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		

Monitoring Well: Monument Casing; Cement; Bentonite; Well Riser; Sand Pack; Well Screen

WELL DETAILS
Screened interval:
83.89 to 81.45m AMSL
1.22 to 3.66m BGS
Length: 2.44m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
84.96 to 84.19m AMSL
0.15 to 0.91m BGS
Material: Bentonite
Sand Pack:
84.19 to 81.45m AMSL
0.91 to 3.66m BGS
Material: #2 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' Value	PID (ppm)
DBW004-0-1 / 1		100	4	0.2
DBW004-2-3 / 2		100	5	0.0
3		100	0	0.1
4		100	0	0.1
5 / DBW004-10-12		100	0	0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

WATER FOUND ▽ 4/13/2022 STATIC WATER LEVEL ▼ 4/19/2022

CHEMICAL ANALYSIS ◯ GRAIN SIZE ANALYSIS ▭

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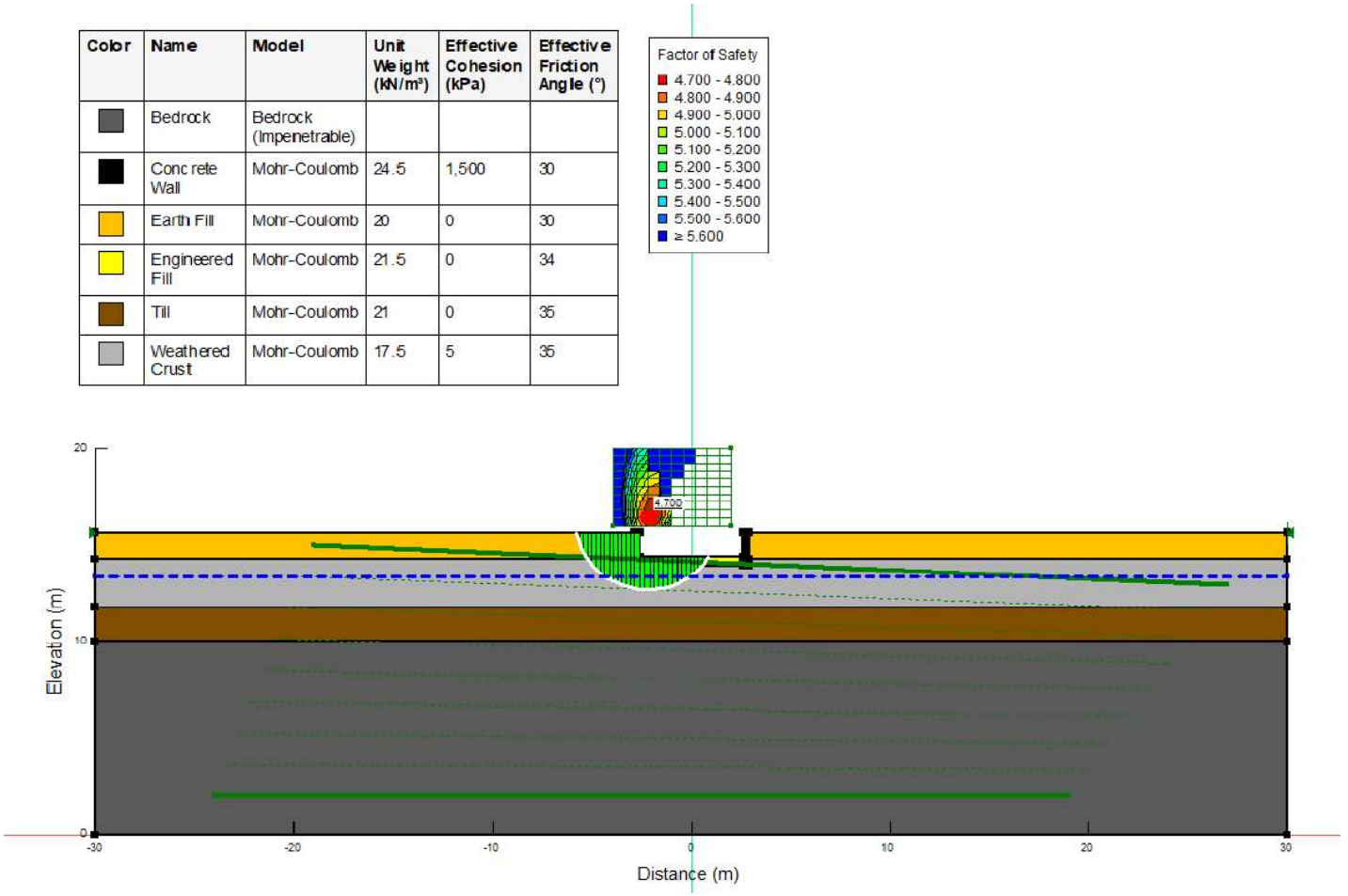
APPENDIX D

Slope Stability Figures

Section AA'

Case 1 – Static Analysis

Color	Name	Model	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)			
	Concrete Wall	Mohr-Coulomb	24.5	1,500	30
	Earth Fill	Mohr-Coulomb	20	0	30
	Engineered Fill	Mohr-Coulomb	21.5	0	34
	Till	Mohr-Coulomb	21	0	35
	Weathered Crust	Mohr-Coulomb	17.5	5	35



GOLDER
MEMBER OF WSP

Slope Stability Analysis

D07-12-22-0057-3440 Frank Kenny Road

Project No:	21490288
Drawn:	KG
Date:	May 20, 2022
Checked:	WC
Review:	WC

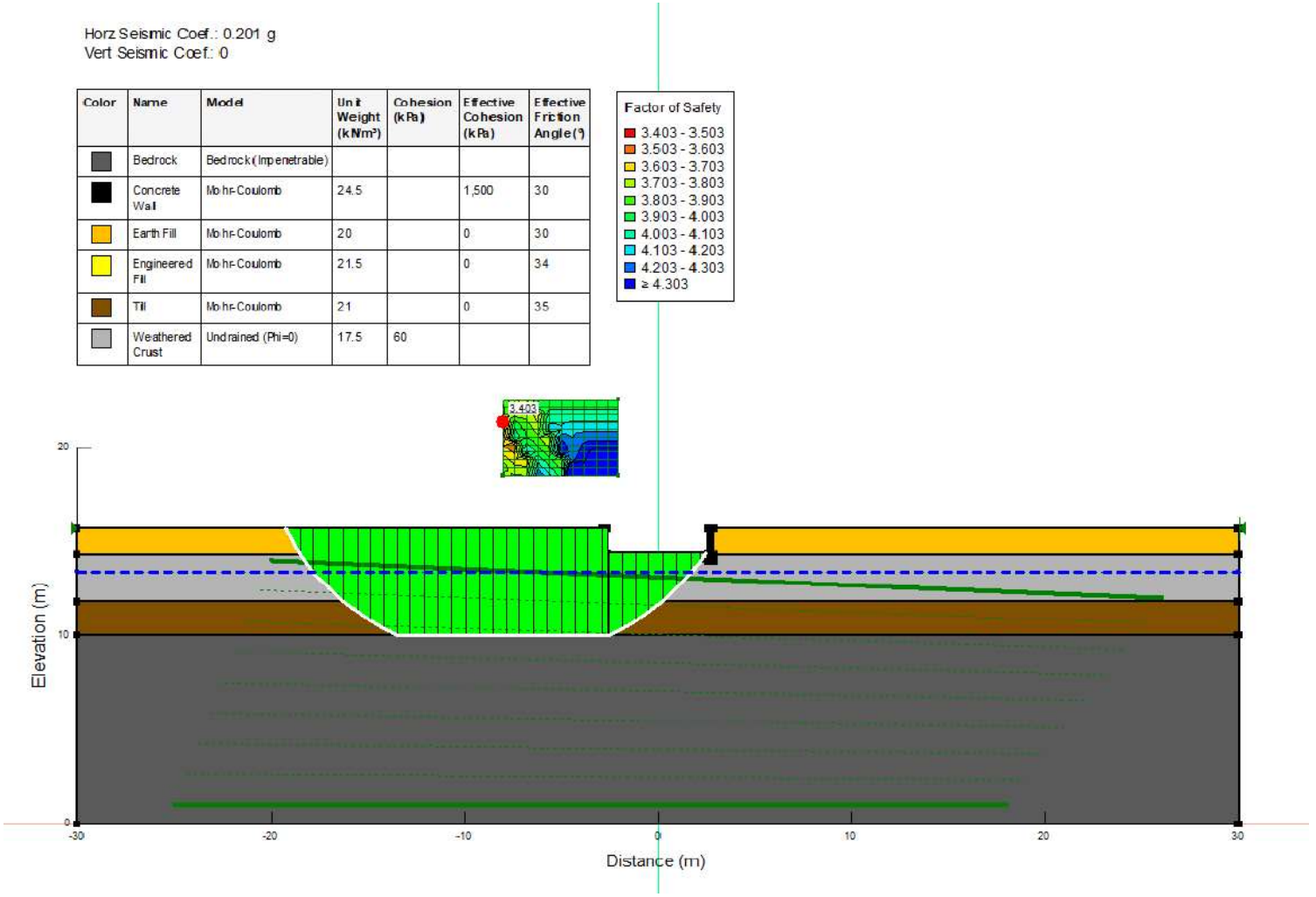
FIGURE 1

Section AA'

Case 2 – Seismic Analysis

Horz Seismic Coef.: 0.201 g
Vert Seismic Coef.: 0

Color	Name	Model	Unit Weight (kN/m³)	Cohesion (kPa)	Effective Cohesion (kPa)	Effective Friction Angle (°)
	Bedrock	Bedrock (Impenetrable)				
	Concrete Wall	Mohr-Coulomb	24.5		1,500	30
	Earth Fill	Mohr-Coulomb	20		0	30
	Engineered Fill	Mohr-Coulomb	21.5		0	34
	Till	Mohr-Coulomb	21		0	35
	Weathered Crust	Undrained (Phi=0)	17.5	60		



GOLDER MEMBER OF WSP	**Slope Stability Analysis** **D07-12-22-0057-3440 Frank Kenny Road**	Project No: 21490288 Drawn: KG Date: May 20, 2022 Checked: WC Review: WC	**FIGURE 2**

golder.com

111 Brunel Road, Suite 200
Mississauga, Ontario L4Z 1X3
Canada
www.ghd.com

GHD Reference No: 12575389-LTR-3-Spence

August 05, 2022

Mr. David Spence
Hydro One Networks Inc.
230 Bayview Drive
Barrie, Ontario
L4N 4Y8

Hydrogeological Assessment – Amendment
Groundwater Level Monitoring
Orleans Operations Centre (OC)
3440 Frank Kenny Road, Navan, Ontario

Dear Mr. Spence,

1. Introduction

GHD Limited (GHD) provide the following updated groundwater level monitoring data and assessment as part of the Hydrogeological Assessment for the proposed construction of the Orleans Operations Centre (OC) located at 3440 Frank Kenny Road in Navan, Ontario (Site or Property) (GHD June 24, 2022)[1]. GHD presented the initial groundwater level monitoring data collected on April 19th, 2022 in the Hydrogeological Assessment. This letter presents completion of the groundwater level monitoring over the spring freshet from April 2022 to July 2022 for the Site.

This Hydrogeological Assessment Letter presents the updated groundwater level monitoring performed on the Site and contains all previous groundwater monitoring data. The hydrogeological interpretations and conclusions presented in this letter supersede and override the understanding of the Site stated in previous reports. It is noted that the updated data does not significantly alter the previous interpretation of the Site.

1.1 Groundwater Level Monitoring

Groundwater level monitoring was undertaken on a seasonal basis to assess the “high” groundwater levels through a wet season (spring) and to determine stable levels and seasonal fluctuations. Groundwater monitoring was observed between April 2022 and July 2022. Manual groundwater level measurements were collected using a water level meter (Solinst Model 101) and DBW003 was equipped with a water level data logger (Solinst Model 3001 – Levelogger Edge). The data logger continuously recorded water levels and provide a detailed record of the response of groundwater to climatic conditions throughout the monitoring period.

[1] Hydrogeological Assessment – Proposed Development – Orleans Station Yard 3440 Frank Kenny Road, Navan, Ontario. Prepared for Hydro One Networks Inc. Dated June 24, 2022.

2. Monitoring Results

2.1 Groundwater Level Monitoring

The high seasonal groundwater levels were observed in April 2022, based on the seasonal groundwater monitoring. The most recent round of groundwater level contours are presented on **Figure 1**. Groundwater levels collected from the monitoring wells are presented in **Tables 1 and 2,** and a hydrograph of the groundwater levels is presented in **Attachment A1**. The highest and lowest observed groundwater levels recorded by the data logger are presented in **Table 3**.

Groundwater levels measured in metres below ground surface (mBGS) are presented in **Table 1**. Review of the groundwater monitoring data indicates that the groundwater table fluctuated during the monitoring period with seasonal highs occurring during the month of April. The groundwater table was on average 0.7 mBGS at all monitoring wells, ranging from 0.12 mBGS at DBW002 to 1.55 mBGS at DBW001.

Groundwater levels measured in metres above mean sea level (mAMSL) are presented in **Table 2**. Based on review of the groundwater levels collected, the groundwater levels ranged from 84.27 mAMSL at DBW004 to 85.62 mAMSL at DBW001. Based on **Figure 1**, the groundwater flow direction on Site is south to southwest.

The seasonal high water table occurred during the spring period of April 2022, with a high of 85.64 mAMSL at DBW003 based on the data logger data (**Table 3**). The seasonal low occurred during July 2022 with a groundwater level of 84.27 mAMSL at DBW004, according to data logger data and manual measurements.

2.2 Groundwater Elevations – Detailed Design

The manual and electronic (data logger) data was reviewed to determine the high groundwater levels measured over the monitoring period. Based on review of the data, the groundwater table was observed to be very close to ground surface during the spring freshet. Groundwater elevations in April were observed to be within 0.1 m to 0.4 m of the ground surface.

The spring freshet typically begins in late February to early March and the manual and electronic (data logger) data for this Site were not initiated until April, not capturing the full extent of the spring thaw and snowpack melt. A hydrograph of the projected groundwater levels to the early spring period based on the groundwater monitoring trend lines is presented in **Attachment A2**. Based on the ‘trend’ of the measured groundwater levels, the projected early spring groundwater levels on the site would range from approximately 85 to 86 mAMSL.

To be conservative, a groundwater elevation at ground surface should be considered during detailed design to account for the potential high groundwater elevations during the early part of the spring freshet for each structure. For reference, the table below outlines the surveyed ground elevations at each of the monitoring wells installed in proximity to the proposed Orleans Operations Centre structures.

Structure	Monitoring Well	Ground Surface (mAMSL)
Septic tank	DBW001	85.53*
Fire storage tanks	DBW002	85.58
Building foundation	DBW003	85.64
Stormwater Management facility	DBW004	85.11

*Note – Due to DBW001 being located in a built-up area of fill material, the elevation of the native material is utilized as ground surface

The highest design groundwater level would be 86 mAMSL over the majority of the Site based on the projected groundwater level monitoring (see **Attachment A2**). The stormwater management pond ground surface is at a

lower elevation. Based on review of the topography, borehole logs, and measured and projected groundwater levels, a high groundwater level of 85.1 mAMSL in the area of the stormwater management pond is appropriate for design.

Please do not hesitate to contact us, should you have any question or require clarification.

Regards,

GHD

Michael McKerrall, P. Geo.

Philip Smart, MSc., P. Geo.

Encl.

Figures

LEGEND

- MONITORING WELL
- BOREHOLE LOCATIONS
- EXISTING MONITORING WELL
- POTABLE WELL

(85.22) GROUNDWATER ELEVATION (mAMSL)

85.25 GROUNDWATER ELEVATION CONTOUR (mAMSL)

GROUNDWATER FLOW DIRECTION

mAMSL METRES ABOVE MEAN SEA LEVEL

0 7.5 15 22.5m

1:750

Coordinate System: UTM83-18

HYDRO ONE NETWORKS INC.
3440 FRANK KENNY DR, NAVAN, ONTARIO
HYDROGEOLOGICAL ASSESSMENT

GROUNDWATER ELEVATION CONTOURS JULY 7, 2022

Project No. **12575389**
Date **July 2022**

FIGURE 1.0

Filename: \\ghdnet\ghd\CA\Ottawa\Projects\662\12575389\Digital_Design\ACAD\Figures\PRE002\12575389-GHD-00-00-PRE-EN-D101_WA-002.dwg
Plot Date: 22 July 2022 12:58 PM

Tables

Table 1

Groundwater Elevations (mBGS)
Hydrogeological Assessment
3440 Frank Kenny Road, Navan, Ontario
Hydro One Networks Inc.

	DBW001	DBW002	DBW003	DBW004
Top of Riser (mAMSL)	86.47	86.51	86.54	86.10
Ground Surface (mAMSL)	86.60	85.58	85.64	85.11
19-Apr-22	0.98	0.12	0.22	0.38
7-Jul-22	1.55	0.64	0.75	0.84

Notes:

-	No data available
mBGS	metres below ground surface
mAMSL	metres above mean sea level

Table 2

Groundwater Elevations (mAMSL)
Hydrogeological Assessment
3440 Frank Kenny Road, Navan, Ontario
Hydro One Networks Inc.

	DBW001	DBW002	DBW003	DBW004
Top of Riser (mAMSL)	86.47	86.51	86.54	86.10
Ground Surface (mAMSL)	86.60	85.58	85.64	85.11
19-Apr-22	85.62	85.46	85.42	84.73
7-Jul-22	85.05	84.94	84.89	84.27

Notes:

-	No data available
mBGS	metres below ground surface
mAMSL	metres above mean sea level

Table 3

Logger Elevations (mAMSL)
Hydrogeological Assessment
3440 Frank Kenny Road, Navan, Ontario
Hydro One Networks Inc.

Highest / Lowest	Monitoring Well ID	Date	Groundwater Elevation (mAMSL)
Highest recorded logger groundwater elevation during the monitoring period (April 19th to July 7th, 2022)	**DBW003**	April 22, 2022	85.64
Lowest recorded logger groundwater elevation during the monitoring period (April 19th to July 7th, 2022)	**DBW003**	July 5, 2022	84.82

Notes:

mAMSL meters above mean sea level

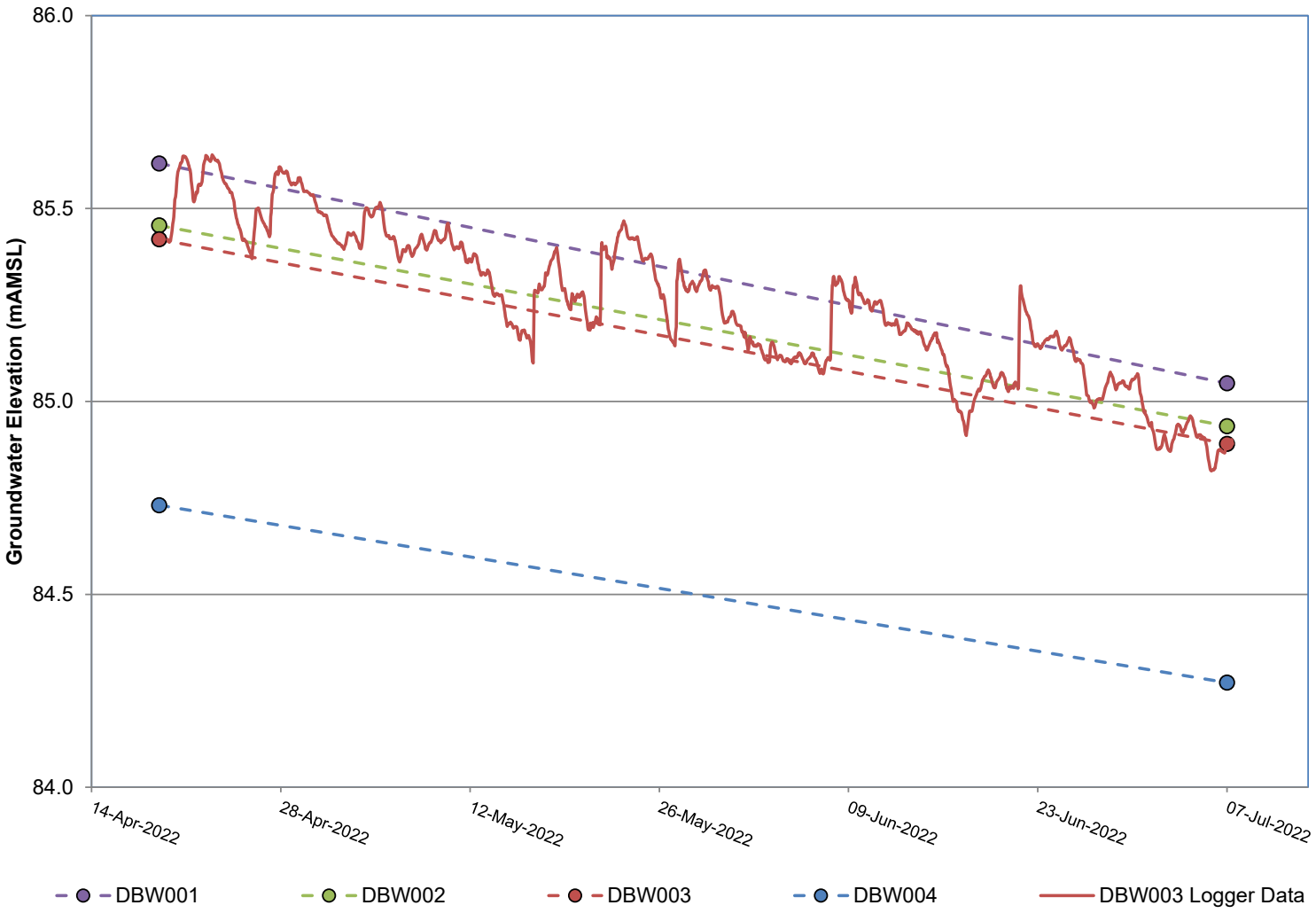
Attachments

Attachment A

Hydrographs

Attachment A11

Hydrograph

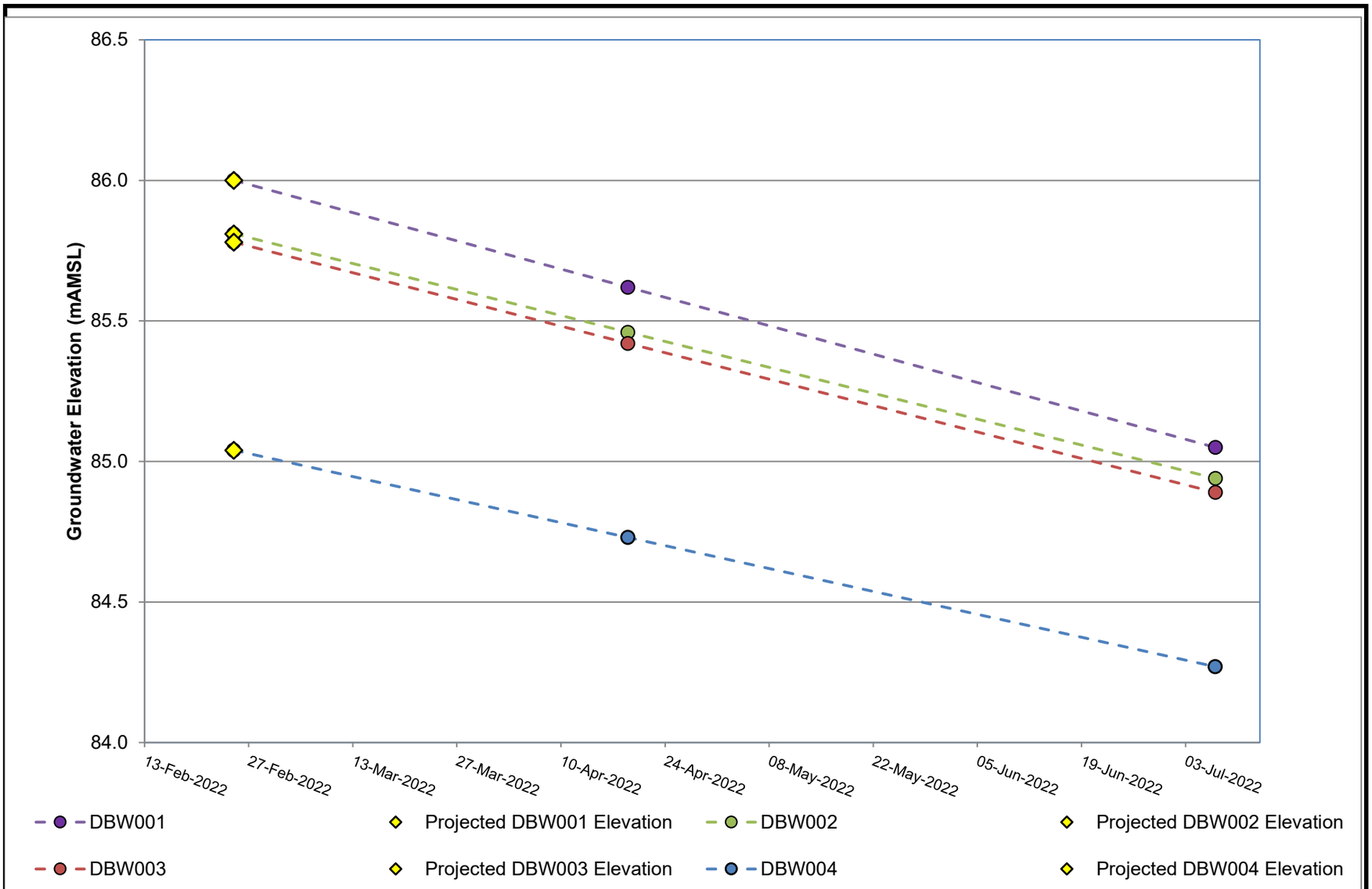


Groundwater Elevation Hydrograph

Hydrogeological Assessment
3440 Frank Kenny Road, Navan, Ontario
Hydro One Networks Inc.

Attachment A2

Projected Early Spring Freshet Groundwater Elevations



Projected Early Spring Freshet Groundwater Elevations

Hydrogeological Assessment
3440 Frank Kenny Road, Navan, Ontario
Hydro One Networks Inc.

Appendix E

Storm Management Facility

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         CURVE_NUMBER
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:00:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:00:00
END_DATE             01/02/2000
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         1
RULE_STEP            00:00:00

INERTIAL_DAMPING     NONE
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              2

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
Rainfall         INTENSITY 0:10     1.0      TIMESERIES 3CHI100

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv
Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- --------
-------- -------- -------- ----------------
S1               Rainfall         OF1              2.1024   3
231.963  0.707    0
S2               Rainfall         OF2              0.5001   10
151.84   2.06     0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero
RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- -------
--- ---------- ----------
S1               0.013      0.25       1.57       4.67       0
OUTLET
S2               0.013      0.25       1.57       4.67       0
PERVIOUS   80

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- -------
---
S1               86         12.7       7          0          0
S2               86         12.7       7          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated
Route To
;;-------------- ---------- ---------- ---------------- -------- ---
-------------
OF1              84.3       NORMAL                      NO
OF2              85.41      NORMAL                      NO

[TRANSECTS]
;;Transect Data in HEC-2 format
;
NC 0.025    0.035    0.035
X1 Ditch-1           24       8        16       0.0      0.0
0.0      0.0      0.0
GR 86.917   0        86.882   1        86.858   2        86.805   3
86.716   4
GR 86.682   5        86.569   6        86.361   7        86.102   8
85.757   9
GR 85.502   10       85.449   11       85.551   12       85.706   13
85.759   14
GR 85.792   15       85.902   16       86.026   17       86.115   18
86.179   19
GR 86.235   20       86.253   21       86.251   22       86.24
23.52895103
;
NC 0.025    0.035    0.035
X1 Ditch-2           22       9        13       0.0      0.0
0.0      0.0      0.0
GR 86.731   0        86.719   1        86.68    2        86.594   3
86.588   4
GR 86.552   5        86.475   6        86.273   7        85.934   8
85.596   9
GR 85.29    10       85.183   11       85.307   12       85.423   13
85.433   14
GR 85.454   15       85.502   16       85.535   17       85.548   18
85.552   19
GR 85.544   20       85.536   21.97530921
;
NC 0.045    0.045    0.035
X1 Ditch-3           13       4        9        0.0      0.0
0.0      0.0      0.0
GR 84.969   0        84.961   1        84.979   2        84.985   3
84.912   4
GR 84.708   5        84.554   6        84.63    7        84.816   8
84.926   9
GR 84.953   10       84.961   11       84.976   12.4337141

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Rainfall (mm/hr)
3CHI10           01/01/2000 00:00:00   3.755
3CHI10           01/01/2000 00:10:00   4.478
3CHI10           01/01/2000 00:20:00   5.593
3CHI10           01/01/2000 00:30:00   7.551
3CHI10           01/01/2000 00:40:00   11.936
3CHI10           01/01/2000 00:50:00   30.856
3CHI10           01/01/2000 01:00:00   122.142
3CHI10           01/01/2000 01:10:00   35.237
3CHI10           01/01/2000 01:20:00   18.159
3CHI10           01/01/2000 01:30:00   12.238
3CHI10           01/01/2000 01:40:00   9.269
3CHI10           01/01/2000 01:50:00   7.492
3CHI10           01/01/2000 02:00:00   6.309
3CHI10           01/01/2000 02:10:00   5.465
3CHI10           01/01/2000 02:20:00   4.831
3CHI10           01/01/2000 02:30:00   4.338
3CHI10           01/01/2000 02:40:00   3.942
3CHI10           01/01/2000 02:50:00   3.617
3CHI10           01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI100          01/01/2000 00:00:00   5.339
3CHI100          01/01/2000 00:10:00   6.376
3CHI100          01/01/2000 00:20:00   7.977
3CHI100          01/01/2000 00:30:00   10.797
3CHI100          01/01/2000 00:40:00   17.136
3CHI100          01/01/2000 00:50:00   45.128
3CHI100          01/01/2000 01:00:00   178.107
3CHI100          01/01/2000 01:10:00   51.056
3CHI100          01/01/2000 01:20:00   26.163
3CHI100          01/01/2000 01:30:00   17.571
3CHI100          01/01/2000 01:40:00   13.277
3CHI100          01/01/2000 01:50:00   10.712
3CHI100          01/01/2000 02:00:00   9.008
3CHI100          01/01/2000 02:10:00   7.793
3CHI100          01/01/2000 02:20:00   6.883
3CHI100          01/01/2000 02:30:00   6.174
3CHI100          01/01/2000 02:40:00   5.607
3CHI100          01/01/2000 02:50:00   5.142
3CHI100          01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI120          01/01/2000 00:00:00   6.406801
3CHI120          01/01/2000 00:10:00   7.6512
3CHI120          01/01/2000 00:20:00   9.572401
3CHI120          01/01/2000 00:30:00   12.9564
3CHI120          01/01/2000 00:40:00   20.5632
3CHI120          01/01/2000 00:50:00   54.1536
3CHI120          01/01/2000 01:00:00   213.7284
3CHI120          01/01/2000 01:10:00   61.2672
3CHI120          01/01/2000 01:20:00   31.3956
3CHI120          01/01/2000 01:30:00   21.0852
3CHI120          01/01/2000 01:40:00   15.9324
3CHI120          01/01/2000 01:50:00   12.8544
3CHI120          01/01/2000 02:00:00   10.8096
3CHI120          01/01/2000 02:10:00   9.351601
3CHI120          01/01/2000 02:20:00   8.259601
3CHI120          01/01/2000 02:30:00   7.4088
3CHI120          01/01/2000 02:40:00   6.7284
3CHI120          01/01/2000 02:50:00   6.170401
3CHI120          01/01/2000 03:00:00   0

;Rainfall (mm/hr)
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3CHI2            01/01/2000 00:20:00   3.696
3CHI2            01/01/2000 00:30:00   4.976
3CHI2            01/01/2000 00:40:00   7.828
3CHI2            01/01/2000 00:50:00   19.966
3CHI2            01/01/2000 01:00:00   76.805
3CHI2            01/01/2000 01:10:00   22.777
3CHI2            01/01/2000 01:20:00   11.852
3CHI2            01/01/2000 01:30:00   8.025
3CHI2            01/01/2000 01:40:00   6.096
3CHI2            01/01/2000 01:50:00   4.938
3CHI2            01/01/2000 02:00:00   4.165
3CHI2            01/01/2000 02:10:00   3.613
3CHI2            01/01/2000 02:20:00   3.197
3CHI2            01/01/2000 02:30:00   2.873
3CHI2            01/01/2000 02:40:00   2.613
3CHI2            01/01/2000 02:50:00   2.4
3CHI2            01/01/2000 03:00:00   0

;Rainfall (mm/hr)
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3CHI25           01/01/2000 00:20:00   6.506
3CHI25           01/01/2000 00:30:00   8.801
3CHI25           01/01/2000 00:40:00   13.954
3CHI25           01/01/2000 00:50:00   36.302
3CHI25           01/01/2000 01:00:00   144.693
3CHI25           01/01/2000 01:10:00   41.479
3CHI25           01/01/2000 01:20:00   21.286
3CHI25           01/01/2000 01:30:00   14.308
3CHI25           01/01/2000 01:40:00   10.818
3CHI25           01/01/2000 01:50:00   8.732
3CHI25           01/01/2000 02:00:00   7.345
3CHI25           01/01/2000 02:10:00   6.356
3CHI25           01/01/2000 02:20:00   5.615
3CHI25           01/01/2000 02:30:00   5.038
3CHI25           01/01/2000 02:40:00   4.576
3CHI25           01/01/2000 02:50:00   4.197
3CHI25           01/01/2000 03:00:00   0

;Rainfall (mm/hr)
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3CHI5            01/01/2000 00:20:00   4.844
3CHI5            01/01/2000 00:30:00   6.532
3CHI5            01/01/2000 00:40:00   10.308
3CHI5            01/01/2000 00:50:00   26.792
3CHI5            01/01/2000 01:00:00   103.93
3CHI5            01/01/2000 01:10:00   30.286
3CHI5            01/01/2000 01:20:00   15.655
3CHI5            01/01/2000 01:30:00   10.568
3CHI5            01/01/2000 01:40:00   8.013
3CHI5            01/01/2000 01:50:00   6.482
3CHI5            01/01/2000 02:00:00   5.462
```

```
3CHI5            01/01/2000 02:10:00   4.733
3CHI5            01/01/2000 02:20:00   4.186
3CHI5            01/01/2000 02:30:00   3.76
3CHI5            01/01/2000 02:40:00   3.418
3CHI5            01/01/2000 02:50:00   3.137
3CHI5            01/01/2000 03:00:00   0

;Rainfall (mm/hr)
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3CHI50           01/01/2000 00:10:00   5.766
3CHI50           01/01/2000 00:20:00   7.214
3CHI50           01/01/2000 00:30:00   9.763
3CHI50           01/01/2000 00:40:00   15.496
3CHI50           01/01/2000 00:50:00   40.401
3CHI50           01/01/2000 01:00:00   161.471
3CHI50           01/01/2000 01:10:00   46.17
3CHI50           01/01/2000 01:20:00   23.66
3CHI50           01/01/2000 01:30:00   15.89
3CHI50           01/01/2000 01:40:00   12.006
3CHI50           01/01/2000 01:50:00   9.687
3CHI50           01/01/2000 02:00:00   8.146
3CHI50           01/01/2000 02:10:00   7.047
3CHI50           01/01/2000 02:20:00   6.224
3CHI50           01/01/2000 02:30:00   5.583
3CHI50           01/01/2000 02:40:00   5.07
3CHI50           01/01/2000 02:50:00   4.649
3CHI50           01/01/2000 03:00:00   0

;Rainfall (mm/hr)
4hr-25mm         01/01/2000 00:00:00   1.777
4hr-25mm         01/01/2000 00:15:00   2.357
4hr-25mm         01/01/2000 00:30:00   3.618
4hr-25mm         01/01/2000 00:45:00   8.975
4hr-25mm         01/01/2000 01:00:00   45.631
4hr-25mm         01/01/2000 01:15:00   11.911
4hr-25mm         01/01/2000 01:30:00   6.051
4hr-25mm         01/01/2000 01:45:00   4.108
4hr-25mm         01/01/2000 02:00:00   3.138
4hr-25mm         01/01/2000 02:15:00   2.555
4hr-25mm         01/01/2000 02:30:00   2.165
4hr-25mm         01/01/2000 02:45:00   1.885
4hr-25mm         01/01/2000 03:00:00   1.675
4hr-25mm         01/01/2000 03:15:00   1.509
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4hr-25mm         01/01/2000 03:45:00   1.266

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INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       467682.18195     5030267.4602     467900.55505
5030526.6598
UNITS            Meters

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OF1              467770.833         5030279.242
OF2              467862.637         5030430.33

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[POLYGONS]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
S1               467880.085         5030372.188
S1               467890.629         5030345.018
S1               467756.648         5030294.329
S1               467717.761         5030397.105
S1               467692.108         5030464.905
S1               467800.598         5030506.231
S1               467805.604         5030490.787
S1               467809.594         5030467.675
S1               467819.441         5030443.138
S1               467823.556         5030439.654
S1               467825.307         5030437.242
S1               467817.071         5030434.168
S1               467820.274         5030426.487
S1               467827.355         5030428.933
S1               467827.837         5030427.572
S1               467835.566         5030406.949
S1               467833.049         5030402.369
S1               467816.278         5030386.339
S1               467825.652         5030371.224
S1               467880.085         5030372.188
S2               467827.355         5030428.933
S2               467820.274         5030426.487
S2               467817.071         5030434.169
S2               467825.307         5030437.242
S2               467823.556         5030439.654
S2               467819.441         5030443.138
S2               467809.594         5030467.675
S2               467805.604         5030490.787
S2               467800.598         5030506.231
S2               467824.746         5030514.878
S2               467856.724         5030432.479
S2               467880.085         5030372.188
S2               467825.652         5030371.224
S2               467816.278         5030386.339
S2               467833.049         5030402.369
S2               467835.566         5030406.949
S2               467827.837         5030427.572
S2               467827.355         5030428.933

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
  --------------------------------------------------------------


  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 2
  Number of nodes ........... 2
  Number of links ........... 0
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ***************
  Raingage Summary
  ***************
                                                  Data
Recording
  Name                Data Source                 Type
Interval
  ----------------------------------------------------------------
------
  Rainfall            3CHI100                     INTENSITY   10
min.


  ********************
  Subcatchment Summary
  ********************
  Name                      Area     Width   %Imperv    %Slope Rain
Gage            Outlet
  ----------------------------------------------------------------
----------------------------------------
  S1                        2.10    231.96      3.00    0.7070
Rainfall        OF1
  S2                        0.50    151.84     10.00    2.0600
Rainfall        OF2


  ************
  Node Summary
  ************
                                              Invert      Max.
Ponded    External
  Name                Type                    Elev.     Depth
Area    Inflow
  ----------------------------------------------------------------
-------------
  OF1                 OUTFALL                 84.30      0.00
0.0
  OF2                 OUTFALL                 85.41      0.00
0.0


  ***************
  Transect Summary
  ***************

  Transect Ditch-1
  Area:
              0.0007    0.0028    0.0059    0.0095    0.0138
              0.0185    0.0238    0.0295    0.0358    0.0431
              0.0515    0.0614    0.0722    0.0836    0.0955
              0.1081    0.1211    0.1348    0.1490    0.1637
              0.1791    0.1952    0.2120    0.2297    0.2484
              0.2681    0.2890    0.3151    0.3424    0.3700
              0.3978    0.4257    0.4539    0.4824    0.5111
              0.5400    0.5691    0.5985    0.6282    0.6584
              0.6890    0.7200    0.7520    0.7851    0.8187
              0.8530    0.8879    0.9237    0.9610    1.0000
  Hrad:
              0.0160    0.0336    0.0555    0.0769    0.0980
              0.1181    0.1373    0.1559    0.1703    0.1753
              0.1788    0.1867    0.2076    0.2279    0.2478
              0.2679    0.2881    0.3079    0.3274    0.3454
              0.3610    0.3767    0.3933    0.4070    0.4204
              0.4318    0.4346    0.3771    0.4082    0.4393
              0.4703    0.5011    0.5318    0.5624    0.5930
              0.6235    0.6540    0.6844    0.7138    0.7429
              0.7719    0.8008    0.8243    0.8515    0.8792
              0.9069    0.9327    0.9578    0.9777    1.0000
  Width:
              0.0358    0.0679    0.0850    0.1000    0.1129
              0.1259    0.1388    0.1518    0.1685    0.1970
              0.2310    0.2641    0.2790    0.2940    0.3089
              0.3232    0.3369    0.3505    0.3642    0.3793
              0.3969    0.4145    0.4348    0.4591    0.4838
              0.5109    0.5590    0.6877    0.6926    0.6974
              0.7022    0.7081    0.7141    0.7201    0.7261
              0.7321    0.7381    0.7441    0.7544    0.7655
              0.7765    0.7876    0.8243    0.8419    0.8559
              0.8699    0.8917    0.9155    0.9643    1.0000

  Transect Ditch-2
  Area:
              0.0004    0.0017    0.0039    0.0069    0.0105
              0.0147    0.0195    0.0250    0.0333    0.0431
              0.0543    0.0695    0.0903    0.1112    0.1323
              0.1536    0.1750    0.1965    0.2182    0.2400
              0.2620    0.2842    0.3064    0.3289    0.3514
              0.3742    0.3970    0.4200    0.4432    0.4665
              0.4900    0.5136    0.5373    0.5612    0.5853
              0.6095    0.6340    0.6587    0.6837    0.7089
              0.7343    0.7601    0.7863    0.8132    0.8410
              0.8708    0.9019    0.9337    0.9661    1.0000
  Hrad:
              0.0134    0.0268    0.0401    0.0558    0.0719
              0.0872    0.1021    0.0980    0.0964    0.1105
              0.1213    0.0900    0.1159    0.1424    0.1690
              0.1954    0.2218    0.2482    0.2745    0.3007
              0.3269    0.3531    0.3792    0.4052    0.4312
              0.4572    0.4832    0.5091    0.5350    0.5608
              0.5867    0.6124    0.6382    0.6639    0.6896
              0.7145    0.7392    0.7639    0.7886    0.8131
              0.8377    0.8611    0.8818    0.9026    0.9191
              0.9294    0.9504    0.9714    0.9896    1.0000
  Width:
              0.0245    0.0491    0.0736    0.0935    0.1102
              0.1270    0.1437    0.1924    0.2603    0.2943
              0.3375    0.5843    0.5889    0.5932    0.5974
              0.6015    0.6057    0.6099    0.6140    0.6182
              0.6224    0.6265    0.6307    0.6349    0.6390
              0.6432    0.6474    0.6515    0.6557    0.6598
              0.6640    0.6681    0.6723    0.6764    0.6806
              0.6870    0.6940    0.7009    0.7079    0.7149
              0.7219    0.7319    0.7502    0.7685    0.8031
              0.8704    0.8868    0.9032    0.9324    1.0000
```

```
  Transect Ditch-3
  Area:
              0.0005     0.0020     0.0045     0.0079     0.0124
              0.0179     0.0243     0.0318     0.0402     0.0494
              0.0592     0.0695     0.0805     0.0921     0.1043
              0.1170     0.1304     0.1444     0.1589     0.1739
              0.1895     0.2056     0.2222     0.2393     0.2569
              0.2751     0.2938     0.3130     0.3327     0.3529
              0.3737     0.3952     0.4174     0.4403     0.4639
              0.4882     0.5132     0.5389     0.5654     0.5925
              0.6204     0.6490     0.6787     0.7100     0.7439
              0.7804     0.8205     0.8699     0.9314     1.0000
  Hrad:
              0.0195     0.0389     0.0584     0.0778     0.0973
              0.1168     0.1362     0.1557     0.1765     0.2029
              0.2285     0.2533     0.2775     0.3013     0.3246
              0.3475     0.3702     0.3928     0.4169     0.4408
              0.4643     0.4875     0.5105     0.5333     0.5558
              0.5782     0.6004     0.6224     0.6443     0.6661
              0.6841     0.7001     0.7162     0.7325     0.7490
              0.7657     0.7825     0.7995     0.8165     0.8337
              0.8511     0.8718     0.8954     0.9283     0.9592
              0.9863     1.0076     1.0157     1.0092     1.0000
  Width:
              0.0136     0.0272     0.0409     0.0545     0.0681
              0.0817     0.0954     0.1090     0.1216     0.1299
              0.1381     0.1463     0.1545     0.1628     0.1710
              0.1792     0.1875     0.1955     0.2027     0.2098
              0.2169     0.2240     0.2312     0.2383     0.2454
              0.2525     0.2597     0.2668     0.2739     0.2810
              0.2897     0.2994     0.3091     0.3188     0.3285
              0.3382     0.3479     0.3576     0.3673     0.3770
              0.3867     0.3993     0.4151     0.4473     0.4824
              0.5176     0.5962     0.7745     0.8984     1.0000


  ************************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ************************************************************

  ***************
  Analysis Options
  ***************
  Flow Units ............... CMS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... NO
    Water Quality .......... NO
  Infiltration Method ...... CURVE_NUMBER
  Surcharge Method ......... EXTRAN
  Starting Date ............ 01/01/2000 00:00:00
  Ending Date .............. 01/02/2000 00:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:05:00
  Dry Time Step ............ 00:05:00


  *************************        Volume         Depth
  Runoff Quantity Continuity     hectare-m            mm
  *************************     ---------       -------
  Total Precipitation ......         0.187        71.708
  Evaporation Loss .........         0.000         0.000
  Infiltration Loss ........         0.082        31.548
  Surface Runoff ...........         0.102        39.050
  Final Storage ............         0.003         1.270
  Continuity Error (%) .....        -0.224


  *************************        Volume        Volume
  Flow Routing Continuity        hectare-m      10^6 ltr
  *************************     ---------      ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......         0.102         1.016
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........         0.000         0.000
  External Outflow .........         0.102         1.016
  Flooding Loss ............         0.000         0.000
  Evaporation Loss .........         0.000         0.000
  Exfiltration Loss ........         0.000         0.000
  Initial Stored Volume ....         0.000         0.000
  Final Stored Volume ......         0.000         0.000
  Continuity Error (%) .....         0.000


  **************************m
  Subcatchment Runoff Summary
  **************************

  ------------------------------------------------------------------------
------------------------------------------------------------
                          Total      Total      Total      Total
Imperv       Perv      Total       Total     Peak  Runoff
                        Precip       Runon       Evap      Infil
Runoff     Runoff     Runoff      Runoff    Runoff   Coeff
  Subcatchment                mm         mm         mm         mm
mm           mm           mm    10^6 ltr      CMS
  ------------------------------------------------------------------------
------------------------------------------------------------
  S1                      71.71       0.00       0.00      32.42
2.11      36.02      38.13        0.80       0.14   0.532
  S2                      71.71       0.00       0.00      27.90
7.03      41.50      42.90        0.21       0.10   0.598


  Analysis begun on:  Fri Aug 12 15:49:19 2022
  Analysis ended on:  Fri Aug 12 15:49:19 2022
  Total elapsed time: < 1 sec
```

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         CURVE_NUMBER
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:00:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:00:00
END_DATE             01/02/2000
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         1
RULE_STEP            00:00:00

INERTIAL_DAMPING     NONE
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              2

[EVAPORATION]
;;Data Source    Parameters
;;--------------- ----------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
Rainfall         INTENSITY 0:10     1.0      TIMESERIES 3CHI100

[SUBCATCHMENTS]
;;Name           Rain Gage         Outlet           Area     %Imperv  Width
%Slope   CurbLen  SnowPack
;;-------------- ----------------- ---------------- -------- -------- --------- ---
----- -------- ----------------
S1               Rainfall          J3               1.1497   0        107.73
0.732    0
S2               Rainfall          OF2              0.2444   0        63.342   2
0
S3               Rainfall          OF2              0.06     0        81.941   2
0
S4               Rainfall          Pond             1.02     61       63.75    1
0
S5               Rainfall          Pond             0.1518   50       125.44
33.33    0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------
- ----------
S1               0.013      0.25       1.57       4.67       0          OUTLET
S2               0.013      0.25       1.57       4.67       0          OUTLET
S3               0.013      0.25       1.57       4.67       0          OUTLET
S4               0.013      0.25       1.57       4.67       0          OUTLET
S5               0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
S1               85.973     12.7       7          0          0
S2               86.245     12.7       7          0          0
S3               85.534     12.7       7          0          0
S4               80         12.7       7          0          0
S5               80         12.7       7          0          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
J1               85.5       0.7        0          0          0
J2               85.3       0.9        0          0          0
J3               84.74      1.26       0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OF1              84.3       NORMAL                      NO
OF2              85.41      FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ----------------------
------ -------- -------- -------- --------
Pond             85.5     0.7        0          TABULAR    EX_Pond
0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- --------
-- ---------- ----------
C1               J1               J2               4.651      0.013      85.5
85.3       0          0
CULV-1           J3               OF1              16         0.024      84.74
84.68      0          0
Interim_Ditch    J2               J3               57.531     0.013      85.3
84.74      0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ------
---- -------- ----------
OR1              Pond             J1               SIDE         85.5       0.65
NO       0
OR2              Pond             J1               SIDE         85.75      0.65
NO       0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff
Gated    EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- -------
----- -------- -------- ---------- ---------- ---------- ---------- ----------
--
1                Pond             J1               TRAPEZOIDAL  85.9       1.87
NO       0        0          NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- -
--------- ----------
C1               CIRCULAR     0.525            0          0          0          1
CULV-1           ARCH         0.5              0.68       0          0          1
47
Interim_Ditch    IRREGULAR    Interim_Ditch    0          0          0          1
OR1              CIRCULAR     0.15             0          0          0
OR2              CIRCULAR     0.15             0          0          0
1                TRAPEZOIDAL  0.3              0.75       3          3

[TRANSECTS]
;;Transect Data in HEC-2 format
;
NC 0.025    0.035    0.035
X1 Ditch-1           24       8          16       0.0        0.0        0.0
0.0
GR 86.917   0        86.882   1          86.858   2          86.805     3
86.716
4
GR 86.682   5        86.569   6          86.361   7          86.102     8
85.757
9
GR 85.502   10       85.449   11         85.551   12         85.706     13
85.759
14
GR 85.792   15       85.902   16         86.026   17         86.115     18
86.179
19
GR 86.235   20       86.253   21         86.251   22         86.24      23.52895103
;
NC 0.025    0.035    0.035
X1 Ditch-2           22       9          13       0.0        0.0        0.0
0.0
GR 86.731   0        86.719   1          86.68    2          86.594     3
86.588
4
GR 86.552   5        86.475   6          86.273   7          85.934     8
85.596
9
GR 85.29    10       85.183   11         85.307   12         85.423     13
85.433
14
GR 85.454   15       85.502   16         85.535   17         85.548     18
85.552
19
GR 85.544   20       85.536   21.97530921
;
NC 0.045    0.045    0.035
X1 Ditch-3           13       4          9        0.0        0.0        0.0
0.0
GR 84.969   0        84.961   1          84.979   2          84.985     3
84.912
4
GR 84.708   5        84.554   6          84.63    7          84.816     8
84.926
9
GR 84.953   10       84.961   11         84.976   12.4337141
;
NC 0.045    0.045    0.035
X1 Interim_Ditch     8        3.6        6.5      0.0        0.0        0.0
0.0
GR 0.5      0        0.3      0.6        0.2      3.6        0          4.2
0
5.9
GR 0.2      6.5      0.3      9.5        0.5      10.1

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------
C1               0          0.045      0          NO         0
CULV-1           0.9        0          0          NO         0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
;From Phase 1 Report - SWMHYMO model Curve
EX_Pond          Storage    0          0
EX_Pond                     0.15       575
EX_Pond                     0.2        983
EX_Pond                     0.25       1013
EX_Pond                     0.3        1043
EX_Pond                     0.35       1073
EX_Pond                     0.4        1103
EX_Pond                     0.41       1109
EX_Pond                     0.42       1115
EX_Pond                     0.43       1121
EX_Pond                     0.44       1127
EX_Pond                     0.442      1129
EX_Pond                     0.444      1130
EX_Pond                     0.45       1134
EX_Pond                     0.5        1164
EX_Pond                     0.55       1194
EX_Pond                     0.6        1224
EX_Pond                     0.65       1254
EX_Pond                     0.7        1284

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Rainfall (mm/hr)
3CHI10           01/01/2000 00:00:00   3.755
3CHI10           01/01/2000 00:10:00   4.478
3CHI10           01/01/2000 00:20:00   5.593
3CHI10           01/01/2000 00:30:00   7.551
3CHI10           01/01/2000 00:40:00   11.936
3CHI10           01/01/2000 00:50:00   30.856
3CHI10           01/01/2000 01:00:00   122.142
3CHI10           01/01/2000 01:10:00   35.237
3CHI10           01/01/2000 01:20:00   18.159
3CHI10           01/01/2000 01:30:00   12.238
3CHI10           01/01/2000 01:40:00   9.269
3CHI10           01/01/2000 01:50:00   7.492
3CHI10           01/01/2000 02:00:00   6.309
3CHI10           01/01/2000 02:10:00   5.465
3CHI10           01/01/2000 02:20:00   4.831
3CHI10           01/01/2000 02:30:00   4.338
3CHI10           01/01/2000 02:40:00   3.942
3CHI10           01/01/2000 02:50:00   3.617
3CHI10           01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI100          01/01/2000 00:00:00   5.339
3CHI100          01/01/2000 00:10:00   6.376
3CHI100          01/01/2000 00:20:00   7.977
3CHI100          01/01/2000 00:30:00   10.797
3CHI100          01/01/2000 00:40:00   17.136
3CHI100          01/01/2000 00:50:00   45.128
3CHI100          01/01/2000 01:00:00   178.107
3CHI100          01/01/2000 01:10:00   51.056
3CHI100          01/01/2000 01:20:00   26.163
3CHI100          01/01/2000 01:30:00   17.571
3CHI100          01/01/2000 01:40:00   13.277
3CHI100          01/01/2000 01:50:00   10.712
3CHI100          01/01/2000 02:00:00   9.008
3CHI100          01/01/2000 02:10:00   7.793
3CHI100          01/01/2000 02:20:00   6.883
3CHI100          01/01/2000 02:30:00   6.174
3CHI100          01/01/2000 02:40:00   5.607
3CHI100          01/01/2000 02:50:00   5.142
3CHI100          01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI120          01/01/2000 00:00:00   6.406801
3CHI120          01/01/2000 00:10:00   7.6512
3CHI120          01/01/2000 00:20:00   9.572401
3CHI120          01/01/2000 00:30:00   12.9564
3CHI120          01/01/2000 00:40:00   20.5632
3CHI120          01/01/2000 00:50:00   54.1536
3CHI120          01/01/2000 01:00:00   213.7284
3CHI120          01/01/2000 01:10:00   61.2672
3CHI120          01/01/2000 01:20:00   31.3956
3CHI120          01/01/2000 01:30:00   21.0852
3CHI120          01/01/2000 01:40:00   15.9324
3CHI120          01/01/2000 01:50:00   12.8544
3CHI120          01/01/2000 02:00:00   10.8096
3CHI120          01/01/2000 02:10:00   9.351601
3CHI120          01/01/2000 02:20:00   8.259601
3CHI120          01/01/2000 02:30:00   7.4088
3CHI120          01/01/2000 02:40:00   6.7284
3CHI120          01/01/2000 02:50:00   6.170401
3CHI120          01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI2            01/01/2000 00:00:00   2.491
3CHI2            01/01/2000 00:10:00   2.966
3CHI2            01/01/2000 00:20:00   3.696
```

```
3CHI2            01/01/2000 00:30:00   4.976
3CHI2            01/01/2000 00:40:00   7.828
3CHI2            01/01/2000 00:50:00   19.966
3CHI2            01/01/2000 01:00:00   76.805
3CHI2            01/01/2000 01:10:00   22.777
3CHI2            01/01/2000 01:20:00   11.852
3CHI2            01/01/2000 01:30:00   8.025
3CHI2            01/01/2000 01:40:00   6.096
3CHI2            01/01/2000 01:50:00   4.938
3CHI2            01/01/2000 02:00:00   4.165
3CHI2            01/01/2000 02:10:00   3.613
3CHI2            01/01/2000 02:20:00   3.197
3CHI2            01/01/2000 02:30:00   2.873
3CHI2            01/01/2000 02:40:00   2.613
3CHI2            01/01/2000 02:50:00   2.4
3CHI2            01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI25           01/01/2000 00:00:00   4.358
3CHI25           01/01/2000 00:10:00   5.202
3CHI25           01/01/2000 00:20:00   6.506
3CHI25           01/01/2000 00:30:00   8.801
3CHI25           01/01/2000 00:40:00   13.954
3CHI25           01/01/2000 00:50:00   36.302
3CHI25           01/01/2000 01:00:00   144.693
3CHI25           01/01/2000 01:10:00   41.479
3CHI25           01/01/2000 01:20:00   21.286
3CHI25           01/01/2000 01:30:00   14.308
3CHI25           01/01/2000 01:40:00   10.818
3CHI25           01/01/2000 01:50:00   8.732
3CHI25           01/01/2000 02:00:00   7.345
3CHI25           01/01/2000 02:10:00   6.356
3CHI25           01/01/2000 02:20:00   5.615
3CHI25           01/01/2000 02:30:00   5.038
3CHI25           01/01/2000 02:40:00   4.576
3CHI25           01/01/2000 02:50:00   4.197
3CHI25           01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI5            01/01/2000 00:00:00   3.256
3CHI5            01/01/2000 00:10:00   3.881
3CHI5            01/01/2000 00:20:00   4.844
3CHI5            01/01/2000 00:30:00   6.532
3CHI5            01/01/2000 00:40:00   10.308
3CHI5            01/01/2000 00:50:00   26.792
3CHI5            01/01/2000 01:00:00   103.93
3CHI5            01/01/2000 01:10:00   30.286
3CHI5            01/01/2000 01:20:00   15.655
3CHI5            01/01/2000 01:30:00   10.568
3CHI5            01/01/2000 01:40:00   8.013
3CHI5            01/01/2000 01:50:00   6.482
3CHI5            01/01/2000 02:00:00   5.462
3CHI5            01/01/2000 02:10:00   4.733
3CHI5            01/01/2000 02:20:00   4.186
3CHI5            01/01/2000 02:30:00   3.76
3CHI5            01/01/2000 02:40:00   3.418
3CHI5            01/01/2000 02:50:00   3.137
3CHI5            01/01/2000 03:00:00   0

;Rainfall (mm/hr)
3CHI50           01/01/2000 00:00:00   4.828
3CHI50           01/01/2000 00:10:00   5.766
3CHI50           01/01/2000 00:20:00   7.214
3CHI50           01/01/2000 00:30:00   9.763
3CHI50           01/01/2000 00:40:00   15.496
3CHI50           01/01/2000 00:50:00   40.401
3CHI50           01/01/2000 01:00:00   161.471
3CHI50           01/01/2000 01:10:00   46.17
3CHI50           01/01/2000 01:20:00   23.66
3CHI50           01/01/2000 01:30:00   15.89
3CHI50           01/01/2000 01:40:00   12.006
3CHI50           01/01/2000 01:50:00   9.687
3CHI50           01/01/2000 02:00:00   8.146
3CHI50           01/01/2000 02:10:00   7.047
3CHI50           01/01/2000 02:20:00   6.224
3CHI50           01/01/2000 02:30:00   5.583
3CHI50           01/01/2000 02:40:00   5.07
3CHI50           01/01/2000 02:50:00   4.649
3CHI50           01/01/2000 03:00:00   0

;Rainfall (mm/hr)
4hr-25mm         01/01/2000 00:00:00   1.777
4hr-25mm         01/01/2000 00:15:00   2.357
4hr-25mm         01/01/2000 00:30:00   3.618
4hr-25mm         01/01/2000 00:45:00   8.975
4hr-25mm         01/01/2000 01:00:00   45.631
4hr-25mm         01/01/2000 01:15:00   11.911
4hr-25mm         01/01/2000 01:30:00   6.051
4hr-25mm         01/01/2000 01:45:00   4.108
4hr-25mm         01/01/2000 02:00:00   3.138
4hr-25mm         01/01/2000 02:15:00   2.555
4hr-25mm         01/01/2000 02:30:00   2.165
4hr-25mm         01/01/2000 02:45:00   1.885
4hr-25mm         01/01/2000 03:00:00   1.675
4hr-25mm         01/01/2000 03:15:00   1.509
4hr-25mm         01/01/2000 03:30:00   1.376
4hr-25mm         01/01/2000 03:45:00   1.266

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]
Subcatch   S5              Dry_Pond
Node       Pond            Pond
Link       CULV-1          Culvert
Link       Interim_Ditch   Ditch

[MAP]
DIMENSIONS       467682.18195     5030267.4602     467900.55505     5030526.6598
UNITS            Meters

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
J1               467743.528         5030355.828
J2               467745.142         5030351.468
J3               467763.915         5030297.109
OF1              467770.833         5030279.242
OF2              467862.637         5030430.33
Pond             467742.802         5030357.725

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OR2              467744.066         5030358.304
OR2              467744.981         5030356.151
1                467741.829         5030357.421
1                467742.695         5030355.393

[POLYGONS]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
S1               467880.085         5030372.188
S1               467890.629         5030345.018
S1               467756.648         5030294.329
S1               467736.205         5030348.359
S1               467758.885         5030357.883
S1               467741.424         5030405.936
S1               467817.071         5030434.169
S1               467820.274         5030426.487
S1               467827.355         5030428.933
S1               467827.837         5030427.572
S1               467835.566         5030406.949
S1               467833.049         5030402.369
S1               467816.278         5030386.339
S1               467825.652         5030371.224
S1               467880.085         5030372.188
S2               467827.355         5030428.933
S2               467834.436         5030431.38
S2               467834.513         5030431.203
S2               467834.596         5030431.029
S2               467834.685         5030430.857
S2               467834.78          5030430.69
S2               467834.88          5030430.525
S2               467834.987         5030430.364
S2               467835.098         5030430.206
S2               467835.215         5030430.053
S2               467835.337         5030429.904
S2               467835.464         5030429.759
S2               467835.597         5030429.618
S2               467835.734         5030429.482
S2               467835.875         5030429.351
S2               467836.021         5030429.225
S2               467836.171         5030429.104
S2               467836.325         5030428.988
S2               467836.483         5030428.878
S2               467836.645         5030428.773
S2               467836.811         5030428.674
S2               467836.979         5030428.58
S2               467837.151         5030428.492
S2               467837.326         5030428.41
S2               467837.503         5030428.335
S2               467837.683         5030428.265
S2               467837.865         5030428.202
S2               467838.05          5030428.145
S2               467838.236         5030428.094
S2               467838.424         5030428.05
S2               467838.613         5030428.012
S2               467838.803         5030427.981
S2               467838.994         5030427.957
S2               467839.186         5030427.939
S2               467839.379         5030427.927
S2               467839.572         5030427.922
S2               467839.765         5030427.924
S2               467839.957         5030427.933
S2               467840.15          5030427.948
S2               467840.341         5030427.97
S2               467840.532         5030427.998
S2               467856.724         5030432.479
S2               467880.085         5030372.188
S2               467825.652         5030372.224
S2               467816.278         5030386.339
S2               467833.049         5030402.369
S2               467835.566         5030406.949
S2               467827.837         5030427.572
S2               467827.355         5030428.933
S3               467817.071         5030434.169
S3               467825.307         5030437.242
S3               467823.556         5030439.654
S3               467819.441         5030443.138
S3               467809.594         5030467.675
S3               467805.604         5030490.787
S3               467800.598         5030506.231
S3               467824.746         5030514.878
S3               467856.724         5030432.479
S3               467840.532         5030427.998
S3               467840.341         5030427.97
S3               467840.15          5030427.948
S3               467839.957         5030427.933
S3               467839.765         5030427.924
S3               467839.572         5030427.922
S3               467839.379         5030427.927
S3               467839.186         5030427.939
S3               467838.994         5030427.957
S3               467838.803         5030427.981
S3               467838.613         5030428.012
S3               467838.424         5030428.05
S3               467838.236         5030428.094
S3               467838.05          5030428.145
S3               467837.865         5030428.202
S3               467837.683         5030428.265
S3               467837.503         5030428.335
S3               467837.326         5030428.41
S3               467837.151         5030428.492
S3               467836.979         5030428.58
S3               467836.811         5030428.674
S3               467836.645         5030428.773
S3               467836.483         5030428.878
S3               467836.325         5030428.988
S3               467836.171         5030429.104
S3               467836.021         5030429.225
S3               467835.875         5030429.351
S3               467835.734         5030429.482
S3               467835.597         5030429.618
S3               467835.464         5030429.759
S3               467835.337         5030429.904
S3               467835.215         5030430.053
S3               467835.098         5030430.206
S3               467834.987         5030430.364
S3               467834.88          5030430.525
S3               467834.78          5030430.69
S3               467834.685         5030430.857
S3               467834.596         5030431.029
S3               467834.513         5030431.203
S3               467834.436         5030431.38
S3               467820.274         5030426.487
S3               467817.071         5030434.169
S4               467741.401         5030405.927
S4               467738.253         5030414.576
S4               467714.56          5030405.565
S4               467692.108         5030464.905
S4               467800.598         5030506.231
S4               467805.604         5030490.787
S4               467809.594         5030467.675
S4               467819.441         5030443.138
S4               467823.556         5030439.654
S4               467825.307         5030437.242
S4               467741.424         5030405.936
S4               467741.401         5030405.927
S5               467714.56          5030405.565
S5               467738.253         5030414.576
S5               467741.401         5030405.927
S5               467758.885         5030357.883
S5               467736.205         5030348.359
S5               467714.56          5030405.565

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
  ---------------------------------------------------------------


  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 5
  Number of nodes ........... 6
  Number of links ........... 6
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************

                                                    Data       Recording
  Name                 Data Source                  Type       Interval
  -----------------------------------------------------------------------
  Rainfall             3CHI100                      INTENSITY  10 min.


  *********************
  Subcatchment Summary
  *********************
  Name                        Area     Width   %Imperv    %Slope Rain Gage
Outlet
  ------------------------------------------------------------------------
------------------------
  S1                          1.15    107.73      0.00    0.7320 Rainfall
J3
  S2                          0.24     63.34      0.00    2.0000 Rainfall
OF2
  S3                          0.06     81.94      0.00    2.0000 Rainfall
OF2
  S4                          1.02     63.75     61.00    1.0000 Rainfall
Pond
  S5                          0.15    125.44     50.00   33.3300 Rainfall
Pond


  ************
  Node Summary
  ************

                                          Invert      Max.    Ponded    External
  Name                 Type                Elev.     Depth      Area    Inflow
  -----------------------------------------------------------------------------
  J1                   JUNCTION           85.50      0.70       0.0
  J2                   JUNCTION           85.30      0.90       0.0
  J3                   JUNCTION           84.74      1.26       0.0
  OF1                  OUTFALL            84.30      0.88       0.0
  OF2                  OUTFALL            85.41      0.00       0.0
  Pond                 STORAGE            85.50      0.70       0.0


  ************
  Link Summary
  ************
  Name                 From Node        To Node          Type           Length
%Slope Roughness
  ------------------------------------------------------------------------------
--------------
  C1                   J1               J2               CONDUIT            4.7
4.3041    0.0130
  CULV-1               J3               OF1              CONDUIT           16.0
0.3750    0.0240
  Interim_Ditch        J2               J3               CONDUIT           57.5
0.9734    0.0350
  OR1                  Pond             J1               ORIFICE
  OR2                  Pond             J1               ORIFICE
  1                    Pond             J1               WEIR


  *********************
  Cross Section Summary
  *********************
                                        Full     Full     Hyd.     Max.   No. of
Full
  Conduit              Shape             Depth     Area     Rad.    Width  Barrels
Flow
  ------------------------------------------------------------------------------
--------
  C1                   CIRCULAR           0.53     0.22     0.13     0.53        1
0.89
  CULV-1               ARCH               0.50     0.27     0.15     0.68        1
0.19
  Interim_Ditch        Interim_Ditch      0.50     2.95     0.27    10.10        1
3.49


  ****************
  Transect Summary
  ****************

  Transect Ditch-1
  Area:
             0.0007    0.0028    0.0059    0.0095    0.0138
             0.0185    0.0238    0.0295    0.0358    0.0431
             0.0515    0.0614    0.0722    0.0836    0.0955
             0.1081    0.1211    0.1348    0.1490    0.1637
             0.1791    0.1952    0.2120    0.2297    0.2484
             0.2681    0.2890    0.3151    0.3424    0.3700
             0.3978    0.4257    0.4539    0.4824    0.5111
             0.5400    0.5691    0.5985    0.6282    0.6584
             0.6890    0.7200    0.7520    0.7851    0.8187
             0.8530    0.8879    0.9237    0.9610    1.0000
  Hrad:
             0.0160    0.0336    0.0555    0.0769    0.0980
             0.1181    0.1373    0.1559    0.1703    0.1753
             0.1788    0.1867    0.2076    0.2279    0.2478
             0.2679    0.2881    0.3079    0.3274    0.3454
             0.3610    0.3767    0.3933    0.4070    0.4204
             0.4318    0.4346    0.3771    0.4082    0.4393
             0.4703    0.5011    0.5318    0.5624    0.5930
             0.6235    0.6540    0.6844    0.7138    0.7429
             0.7719    0.8008    0.8243    0.8515    0.8792
             0.9069    0.9327    0.9578    0.9777    1.0000
  Width:
             0.0358    0.0679    0.0850    0.1000    0.1129
             0.1259    0.1388    0.1518    0.1685    0.1970
             0.2310    0.2641    0.2790    0.2940    0.3089
             0.3232    0.3369    0.3505    0.3642    0.3793
             0.3969    0.4145    0.4348    0.4591    0.4838
             0.5109    0.5590    0.6877    0.6926    0.6974
             0.7022    0.7081    0.7141    0.7201    0.7261
             0.7321    0.7381    0.7441    0.7544    0.7655
             0.7765    0.7876    0.8243    0.8419    0.8559
             0.8699    0.8917    0.9155    0.9643    1.0000

  Transect Ditch-2
  Area:
             0.0004    0.0017    0.0039    0.0069    0.0105
             0.0147    0.0195    0.0250    0.0333    0.0431
             0.0543    0.0695    0.0903    0.1112    0.1323
             0.1536    0.1750    0.1965    0.2182    0.2400
             0.2620    0.2842    0.3064    0.3289    0.3514
             0.3742    0.3970    0.4200    0.4432    0.4665
             0.4900    0.5136    0.5373    0.5612    0.5853
             0.6095    0.6340    0.6587    0.6837    0.7089
             0.7343    0.7601    0.7863    0.8132    0.8410
             0.8708    0.9019    0.9337    0.9661    1.0000
  Hrad:
             0.0134    0.0268    0.0401    0.0558    0.0719
             0.0872    0.1021    0.0980    0.0964    0.1105
             0.1213    0.0900    0.1159    0.1424    0.1690
             0.1954    0.2218    0.2482    0.2745    0.3007
             0.3269    0.3531    0.3792    0.4052    0.4312
             0.4572    0.4832    0.5091    0.5350    0.5608
             0.5867    0.6124    0.6382    0.6639    0.6896
             0.7145    0.7392    0.7639    0.7886    0.8131
             0.8377    0.8611    0.8818    0.9026    0.9191
             0.9294    0.9504    0.9714    0.9896    1.0000
  Width:
             0.0245    0.0491    0.0736    0.0935    0.1102
             0.1270    0.1437    0.1924    0.2603    0.2943
             0.3375    0.5843    0.5889    0.5932    0.5974
             0.6015    0.6057    0.6099    0.6140    0.6182
             0.6224    0.6265    0.6307    0.6349    0.6390
             0.6432    0.6474    0.6515    0.6557    0.6598
             0.6640    0.6681    0.6723    0.6764    0.6806
             0.6870    0.6940    0.7009    0.7079    0.7149
             0.7219    0.7319    0.7502    0.7685    0.8031
             0.8704    0.8868    0.9032    0.9324    1.0000

  Transect Ditch-3
  Area:
             0.0005    0.0020    0.0045    0.0079    0.0124
             0.0179    0.0243    0.0318    0.0402    0.0494
             0.0592    0.0695    0.0805    0.0921    0.1043
             0.1170    0.1304    0.1444    0.1589    0.1739
             0.1895    0.2056    0.2222    0.2393    0.2569
             0.2751    0.2938    0.3130    0.3327    0.3529
             0.3737    0.3952    0.4174    0.4403    0.4639
             0.4882    0.5132    0.5389    0.5654    0.5925
             0.6204    0.6490    0.6787    0.7100    0.7439
             0.7804    0.8205    0.8699    0.9314    1.0000
  Hrad:
             0.0195    0.0389    0.0584    0.0778    0.0973
             0.1168    0.1362    0.1557    0.1765    0.2029
             0.2285    0.2533    0.2775    0.3013    0.3246
             0.3475    0.3702    0.3928    0.4169    0.4408
             0.4643    0.4875    0.5105    0.5333    0.5558
             0.5782    0.6004    0.6224    0.6443    0.6661
             0.6841    0.7011    0.7162    0.7325    0.7490
             0.7657    0.7825    0.7995    0.8165    0.8337
             0.8511    0.8718    0.8954    0.9283    0.9592
             0.9863    1.0076    1.0157    1.0092    1.0000
  Width:
             0.0136    0.0272    0.0409    0.0545    0.0681
             0.0817    0.0954    0.1090    0.1216    0.1299
             0.1381    0.1463    0.1545    0.1628    0.1710
             0.1792    0.1875    0.1955    0.2027    0.2098
             0.2169    0.2240    0.2312    0.2383    0.2454
             0.2525    0.2597    0.2668    0.2739    0.2810
             0.2897    0.2994    0.3091    0.3188    0.3285
             0.3382    0.3479    0.3576    0.3673    0.3770
             0.3867    0.3993    0.4151    0.4473    0.4824
             0.5176    0.5962    0.7745    0.8984    1.0000

  Transect Interim_Ditch
  Area:
             0.0059    0.0119    0.0182    0.0247    0.0314
             0.0382    0.0453    0.0526    0.0601    0.0678
             0.0757    0.0838    0.0921    0.1006    0.1093
             0.1182    0.1274    0.1367    0.1462    0.1559
             0.1668    0.1797    0.1946    0.2115    0.2305
             0.2515    0.2746    0.2997    0.3268    0.3559
             0.3862    0.4167    0.4474    0.4782    0.5093
             0.5406    0.5721    0.6038    0.6357    0.6678
             0.7001    0.7326    0.7653    0.7982    0.8314
             0.8647    0.8982    0.9319    0.9659    1.0000
  Hrad:
             0.0359    0.0705    0.1040    0.1364    0.1678
             0.1984    0.2283    0.2574    0.2858    0.3137
             0.3410    0.3678    0.3941    0.4199    0.4454
             0.4705    0.4952    0.5196    0.5437    0.5675
             0.5982    0.6200    0.6346    0.6438    0.6489
             0.6513    0.6518    0.6513    0.6504    0.6493
             0.6558    0.6653    0.6773    0.6910    0.7062
             0.7226    0.7399    0.7579    0.7765    0.7956
             0.8150    0.8349    0.8550    0.8753    0.8958
             0.9164    0.9372    0.9581    0.9790    1.0000
  Width:
             0.1743    0.1802    0.1861    0.1921    0.1980
             0.2040    0.2099    0.2158    0.2218    0.2277
             0.2337    0.2396    0.2455    0.2515    0.2574
             0.2634    0.2693    0.2752    0.2812    0.2871
             0.3465    0.4059    0.4653    0.5248    0.5842
             0.6436    0.7030    0.7624    0.8218    0.8812
             0.8871    0.8931    0.8990    0.9050    0.9109
             0.9168    0.9228    0.9287    0.9347    0.9406
             0.9465    0.9525    0.9584    0.9644    0.9703
             0.9762    0.9822    0.9881    0.9941    1.0000

  ********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ..... CMS
  Process Models:
    Rainfall/Runoff ..... YES
    RDII ................ NO
    Snowmelt ............ NO
    Groundwater ......... NO
    Flow Routing ........ YES
    Ponding Allowed ..... NO
    Water Quality ....... NO
  Infiltration Method ..... CURVE_NUMBER
  Flow Routing Method ..... DYNWAVE
  Surcharge Method ........ EXTRAN
  Starting Date ........... 01/01/2000 00:00:00
  Ending Date ............. 01/02/2000 00:00:00
  Antecedent Dry Days ..... 0.0
  Report Time Step ........ 00:01:00
  Wet Time Step ........... 00:05:00
  Dry Time Step ........... 00:05:00
  Routing Time Step ....... 1.00 sec
  Variable Time Step ...... YES
  Maximum Trials .......... 8
  Number of Threads ....... 1
  Head Tolerance .......... 0.001500 m


  **************************        Volume          Depth
  Runoff Quantity Continuity     hectare-m            mm
  **************************     ---------       -------
  Total Precipitation .....          0.188        71.708
  Evaporation Loss .......           0.000         0.000
  Infiltration Loss ......           0.067        25.639
  Surface Runoff .........           0.118        45.058
  Final Storage ..........           0.003         1.322
  Continuity Error (%) ...          -0.434


  **************************        Volume          Volume
  Flow Routing Continuity        hectare-m       10^6 ltr
  **************************     ---------       ---------
  Dry Weather Inflow .....           0.000         0.000
  Wet Weather Inflow .....           0.118         1.183
  Groundwater Inflow .....           0.000         0.000
  RDII Inflow ............           0.000         0.000
  External Inflow ........           0.000         0.000
  External Outflow .......           0.118         1.183
  Flooding Loss ..........           0.000         0.000
  Evaporation Loss .......           0.000         0.000
  Exfiltration Loss ......           0.000         0.000
  Initial Stored Volume ....         0.000         0.000
  Final Stored Volume ......         0.000         0.000
```

Continuity Error (%) 0.014

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
Link CULV-1 (1)

****
Routing Time Step Summary
****

Minimum Time Step	:	0.50 sec
Average Time Step	:	1.00 sec
Maximum Time Step	:	1.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.00
Time Step Frequencies	:	
1.000 - 0.871 sec	:	100.00 %
0.871 - 0.758 sec	:	0.00 %
0.758 - 0.660 sec	:	0.00 %
0.660 - 0.574 sec	:	0.00 %
0.574 - 0.500 sec	:	0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S1	71.71	0.00	0.00	33.94	0.00	36.64	36.64	0.42	0.06	0.511
S2	71.71	0.00	0.00	30.87	0.00	39.90	39.90	0.10	0.04	0.556
S3	71.71	0.00	0.00	30.85	0.00	40.54	40.54	0.02	0.02	0.565
S4	71.71	0.00	0.00	15.76	43.16	11.77	54.93	0.56	0.32	0.766
S5	71.71	0.00	0.00	18.69	35.15	17.42	52.57	0.08	0.06	0.733

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
J1	JUNCTION	0.03	0.15	85.65	0 01:39	0.15
J2	JUNCTION	0.01	0.07	85.37	0 01:40	0.07
J3	JUNCTION	0.05	0.27	85.01	0 01:38	0.27
OF1	OUTFALL	0.00	0.00	84.30	0 00:00	0.00
OF2	OUTFALL	0.00	0.00	85.41	0 00:00	0.00
Pond	STORAGE	0.08	0.45	85.95	0 01:39	0.45

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J1	JUNCTION	0.000	0.061	0 01:39	0	0.64	0.001
J2	JUNCTION	0.000	0.061	0 01:39	0	0.64	-0.000
J3	JUNCTION	0.065	0.123	0 01:33	0.421	1.06	0.022
OF1	OUTFALL	0.000	0.123	0 01:38	0	1.06	0.000
OF2	OUTFALL	0.054	0.054	0 01:10	0.122	0.122	0.000
Pond	STORAGE	0.381	0.381	0 01:10	0.64	0.64	0.000

****
Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
Pond	0.044	7	0	0	0.347	53	0 01:39	0.061

****

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	48.78	0.025	0.123	1.061
OF2	16.81	0.008	0.054	0.122
System	32.79	0.034	0.145	1.183

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.061	0 01:39	1.84	0.07	0.21
CULV-1	CONDUIT	0.123	0 01:38	0.92	0.64	0.45
Interim_Ditch	CHANNEL	0.061	0 01:40	0.16	0.02	0.34
OR1	ORIFICE	0.028	0 01:41			1.00
OR2	ORIFICE	0.018	0 01:39			1.00
1	WEIR	0.016	0 01:39			0.17

****
Flow Classification Summary
****

		---------- Fraction of Time in Flow Class ----------								
Conduit	Adjusted /Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.01	0.00	0.00	0.29	0.70	0.00	0.00	0.17	0.00
CULV-1	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.29
Interim_Ditch	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.98	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Fri Aug 12 15:49:07 2022
Analysis ended on: Fri Aug 12 15:49:08 2022
Total elapsed time: 00:00:01

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         CURVE_NUMBER
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           01/01/2000
START_TIME           00:00:00
REPORT_START_DATE    01/01/2000
REPORT_START_TIME    00:00:00
END_DATE             01/05/2000
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:05:00
DRY_STEP             00:05:00
ROUTING_STEP         1
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         1.167
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              2

[EVAPORATION]
;;Data Source    Parameters
;;--------------- ----------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
Rainfall         INTENSITY 0:10     1.0      TIMESERIES 3CHI100

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width
%Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- ---
----- -------- ----------------
B1               Rainfall         OF2              0.3711   14.55    165.753  2
0
B2               Rainfall         POND             1.8915   62.21    180.23   2
0
SWM_BLOCK        Rainfall         POND             0.2578   50       211.33   3
0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------
- ----------
B1               0.013      0.25       1.57       4.67       0          PERVIOUS
100
B2               0.013      0.25       1.57       4.67       0          PERVIOUS
100
SWM_BLOCK        0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
B1               80         12.7       7          0          0
B2               71.23      12.7       7          0          0
SWM_BLOCK        80         12.7       7          0          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
Ditch            84.3       1          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OF1              84.28      NORMAL                      NO
OF2              85.41      FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ----------------------
----- -------- --------  -------- --------
J3               84.74    1.19       0          FUNCTIONAL 0.5       0.5       2
0        0
OGS              84.61    1.32       0.09       FUNCTIONAL 0         0
1.13     0         0
POND             85       0.94       0          TABULAR    Pond
0        0
SU1              84.61    1.32       0.09       FUNCTIONAL 0         0
0.72     0         0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- --------
--- ---------- ---------- ----------
C1               SU1              OGS              2.1        0.013      84.9
84.85      0          0
C1_2             OGS              J3               4.5        0.013      84.85
84.76      0          0
C3               Ditch            OF1              6.69       0.013      84.3
84.28      0          0
CULV-1           J3               Ditch            16         0.024      84.74
84.68      0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff
Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ------
---- -------- ----------
OR1              POND             SU1              SIDE         85         0.61
NO       0

[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff
Gated    EndCon   EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- ------
---- -------- -------- ---------- ---------- ---------- ---------- --------------
--
W1               POND             SU1              TRANSVERSE   85.41      1.84
NO       0        0          NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- -
---------- ----------
C1               CIRCULAR     0.45             0          0          0          1
C1_2             CIRCULAR     0.45             0          0          0          1
C3               IRREGULAR    Ditch            0          0          0          1
CULV-1           ARCH         0.5              0.68       0          0          1
47
OR1              CIRCULAR     0.1              0          0          0
W1               RECT_OPEN    0.53             0.65       0          0

[TRANSECTS]
;;Transect Data in HEC-2 format
;
NC 0.035    0.035    0.025
X1 Ditch             8        0.0      6        0.0      0.0      0.0      0.0
0.0
GR 84.64    0        84.582   1        84.43    2        84.317   3        84.331
4
GR 84.521   5        84.719   6        84.801   7.55792774357109

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------
C1               3          0.045      0          NO         0
C1_2             3          0.045      0          NO         0
CULV-1           0.9        0.5        0          NO         0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
INFIL-1          Rating     0          0
INFIL-1                     0.01       0.0226
INFIL-1                     0.5        0.0226
INFIL-1                     0.91       0.0226

Pond             Storage    0          0.81
Pond                        0.01       7.08
Pond                        0.02       20.75
Pond                        0.03       41.85
Pond                        0.04       70.37
Pond                        0.05       106.29
Pond                        0.06       149.16
Pond                        0.07       199.37
Pond                        0.08       259.55
Pond                        0.09       310.38
Pond                        0.1        355.12
Pond                        0.11       396.59
Pond                        0.12       439.99
Pond                        0.13       485.56
Pond                        0.14       532.37
Pond                        0.15       583.02
Pond                        0.16       631.36
Pond                        0.17       684.09
Pond                        0.18       741.29
Pond                        0.19       803.33
Pond                        0.2        871.43
Pond                        0.21       950.28
Pond                        0.22       1003.84
Pond                        0.23       1060.36
Pond                        0.24       1119.6
Pond                        0.25       1179.81
Pond                        0.26       1236.68
Pond                        0.27       1287.1
Pond                        0.28       1334.42
Pond                        0.29       1377.32
Pond                        0.3        1421.17
Pond                        0.31       1467.71
Pond                        0.32       1514.1
Pond                        0.33       1557.26
Pond                        0.34       1600.29
Pond                        0.35       1640.2
Pond                        0.36       1675.98
Pond                        0.37       1703.66
Pond                        0.38       1728.02
Pond                        0.39       1750.82
Pond                        0.4        1773.58
Pond                        0.41       1797.09
Pond                        0.42       1818.61
Pond                        0.43       1832.1
Pond                        0.44       1845.76
Pond                        0.45       1859.61
Pond                        0.46       1873.65
Pond                        0.47       1887.86
Pond                        0.48       1902.27
Pond                        0.49       1916.85
Pond                        0.5        1931.62
Pond                        0.51       1959.27
Pond                        0.52       1977.72
Pond                        0.53       1992.32
Pond                        0.54       2006.38
Pond                        0.55       2020.07
Pond                        0.56       2033.68
Pond                        0.57       2047.63
Pond                        0.58       2061.53
Pond                        0.59       2075.24
Pond                        0.6        2088.96
Pond                        0.61       2127.93
Pond                        0.62       2138.2
Pond                        0.63       2148.52
Pond                        0.64       2158.88
Pond                        0.65       2169.3
Pond                        0.66       2179.78
Pond                        0.67       2190.3
Pond                        0.68       2200.87
Pond                        0.69       2211.49
Pond                        0.7        2222.16
Pond                        0.71       2266.98
Pond                        0.72       2278.46
Pond                        0.73       2290
Pond                        0.74       2301.61
Pond                        0.75       2313.28
Pond                        0.76       2325.02
Pond                        0.77       2336.82
Pond                        0.78       2348.69
Pond                        0.79       2360.62
Pond                        0.8        2372.61
Pond                        0.81       2384.67
Pond                        0.82       2439.92
Pond                        0.83       2452.74
Pond                        0.84       2465.66
Pond                        0.85       2478.68
Pond                        0.86       2491.8
Pond                        0.87       2505.01
Pond                        0.88       2518.32
Pond                        0.89       2531.73
Pond                        0.9        2545.24
Pond                        0.91       2558.84
Pond                        0.92       2655.61
Pond                        0.93       2704.13

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;Rainfall (mm/hr)
12SCS10          01/01/2000 00:00:00   2.016
12SCS10          01/01/2000 00:15:00   2.016
12SCS10          01/01/2000 00:30:00   0.9408
12SCS10          01/01/2000 00:45:00   0.9408
12SCS10          01/01/2000 01:00:00   1.7472
12SCS10          01/01/2000 01:15:00   1.7472
12SCS10          01/01/2000 01:30:00   1.7472
12SCS10          01/01/2000 01:45:00   1.7472
12SCS10          01/01/2000 02:00:00   2.2848
12SCS10          01/01/2000 02:15:00   2.2848
12SCS10          01/01/2000 02:30:00   2.016
12SCS10          01/01/2000 02:45:00   2.016
12SCS10          01/01/2000 03:00:00   2.688
12SCS10          01/01/2000 03:15:00   2.688
12SCS10          01/01/2000 03:30:00   2.688
12SCS10          01/01/2000 03:45:00   2.688
12SCS10          01/01/2000 04:00:00   3.6288
12SCS10          01/01/2000 04:15:00   3.6288
12SCS10          01/01/2000 04:30:00   4.5696
12SCS10          01/01/2000 04:45:00   4.5696
12SCS10          01/01/2000 05:00:00   7.2576
12SCS10          01/01/2000 05:15:00   7.2576
12SCS10          01/01/2000 05:30:00   36.288
```

```
12SCS10          01/01/2000 05:45:00   78.7584
12SCS10          01/01/2000 06:00:00   14.6496
12SCS10          01/01/2000 06:15:00   14.6496
12SCS10          01/01/2000 06:30:00   6.4512
12SCS10          01/01/2000 06:45:00   6.4512
12SCS10          01/01/2000 07:00:00   4.3008
12SCS10          01/01/2000 07:15:00   4.3008
12SCS10          01/01/2000 07:30:00   3.7632
12SCS10          01/01/2000 07:45:00   3.7632
12SCS10          01/01/2000 08:00:00   2.9568
12SCS10          01/01/2000 08:15:00   2.9568
12SCS10          01/01/2000 08:30:00   3.0912
12SCS10          01/01/2000 08:45:00   3.0912
12SCS10          01/01/2000 09:00:00   2.016
12SCS10          01/01/2000 09:15:00   2.016
12SCS10          01/01/2000 09:30:00   1.6128
12SCS10          01/01/2000 09:45:00   1.6128
12SCS10          01/01/2000 10:00:00   2.2848
12SCS10          01/01/2000 10:15:00   2.2848
12SCS10          01/01/2000 10:30:00   1.4784
12SCS10          01/01/2000 10:45:00   1.4784
12SCS10          01/01/2000 11:00:00   1.344
12SCS10          01/01/2000 11:15:00   1.344
12SCS10          01/01/2000 11:30:00   1.344
12SCS10          01/01/2000 11:45:00   1.344
12SCS10          01/01/2000 12:00:00   0

;Rainfall (mm/hr)
12SCS100         01/01/2000 00:00:00   2.88
12SCS100         01/01/2000 00:15:00   2.88
12SCS100         01/01/2000 00:30:00   1.344
12SCS100         01/01/2000 00:45:00   1.344
12SCS100         01/01/2000 01:00:00   2.496
12SCS100         01/01/2000 01:15:00   2.496
12SCS100         01/01/2000 01:30:00   2.496
12SCS100         01/01/2000 01:45:00   2.496
12SCS100         01/01/2000 02:00:00   3.264
12SCS100         01/01/2000 02:15:00   3.264
12SCS100         01/01/2000 02:30:00   2.88
12SCS100         01/01/2000 02:45:00   2.88
12SCS100         01/01/2000 03:00:00   3.84
12SCS100         01/01/2000 03:15:00   3.84
12SCS100         01/01/2000 03:30:00   3.84
12SCS100         01/01/2000 03:45:00   3.84
12SCS100         01/01/2000 04:00:00   5.184
12SCS100         01/01/2000 04:15:00   5.184
12SCS100         01/01/2000 04:30:00   6.528
12SCS100         01/01/2000 04:45:00   6.528
12SCS100         01/01/2000 05:00:00   10.368
12SCS100         01/01/2000 05:15:00   10.368
12SCS100         01/01/2000 05:30:00   51.84
12SCS100         01/01/2000 05:45:00   112.512
12SCS100         01/01/2000 06:00:00   20.928
12SCS100         01/01/2000 06:15:00   20.928
12SCS100         01/01/2000 06:30:00   9.216
12SCS100         01/01/2000 06:45:00   9.216
12SCS100         01/01/2000 07:00:00   6.144
12SCS100         01/01/2000 07:15:00   6.144
12SCS100         01/01/2000 07:30:00   5.376
12SCS100         01/01/2000 07:45:00   5.376
12SCS100         01/01/2000 08:00:00   4.224
12SCS100         01/01/2000 08:15:00   4.224
12SCS100         01/01/2000 08:30:00   4.416
12SCS100         01/01/2000 08:45:00   4.416
12SCS100         01/01/2000 09:00:00   2.88
12SCS100         01/01/2000 09:15:00   2.88
12SCS100         01/01/2000 09:30:00   2.304
12SCS100         01/01/2000 09:45:00   2.304
12SCS100         01/01/2000 10:00:00   3.264
12SCS100         01/01/2000 10:15:00   3.264
12SCS100         01/01/2000 10:30:00   2.112
12SCS100         01/01/2000 10:45:00   2.112
12SCS100         01/01/2000 11:00:00   1.92
12SCS100         01/01/2000 11:15:00   1.92
12SCS100         01/01/2000 11:30:00   1.92
12SCS100         01/01/2000 11:45:00   1.92
12SCS100         01/01/2000 12:00:00   0

;Rainfall (mm/hr)
12SCS120         01/01/2000 00:00:00   3.456
12SCS120         01/01/2000 00:15:00   3.456
12SCS120         01/01/2000 00:30:00   1.6128
12SCS120         01/01/2000 00:45:00   1.6128
12SCS120         01/01/2000 01:00:00   2.9952
12SCS120         01/01/2000 01:15:00   2.9952
12SCS120         01/01/2000 01:30:00   2.9952
12SCS120         01/01/2000 01:45:00   2.9952
12SCS120         01/01/2000 02:00:00   3.9168
12SCS120         01/01/2000 02:15:00   3.9168
12SCS120         01/01/2000 02:30:00   3.456
12SCS120         01/01/2000 02:45:00   3.456
12SCS120         01/01/2000 03:00:00   4.608
12SCS120         01/01/2000 03:15:00   4.608
12SCS120         01/01/2000 03:30:00   4.608
12SCS120         01/01/2000 03:45:00   4.608
12SCS120         01/01/2000 04:00:00   6.2208
12SCS120         01/01/2000 04:15:00   6.2208
12SCS120         01/01/2000 04:30:00   7.8336
12SCS120         01/01/2000 04:45:00   7.8336
12SCS120         01/01/2000 05:00:00   12.4416
12SCS120         01/01/2000 05:15:00   12.4416
12SCS120         01/01/2000 05:30:00   62.208
12SCS120         01/01/2000 05:45:00   135.0144
12SCS120         01/01/2000 06:00:00   25.1136
12SCS120         01/01/2000 06:15:00   25.1136
12SCS120         01/01/2000 06:30:00   11.0592
12SCS120         01/01/2000 06:45:00   11.0592
12SCS120         01/01/2000 07:00:00   7.3728
12SCS120         01/01/2000 07:15:00   7.3728
12SCS120         01/01/2000 07:30:00   6.4512
12SCS120         01/01/2000 07:45:00   6.4512
12SCS120         01/01/2000 08:00:00   5.0688
12SCS120         01/01/2000 08:15:00   5.0688
12SCS120         01/01/2000 08:30:00   5.2992
12SCS120         01/01/2000 08:45:00   5.2992
12SCS120         01/01/2000 09:00:00   3.456
12SCS120         01/01/2000 09:15:00   3.456
12SCS120         01/01/2000 09:30:00   2.7648
12SCS120         01/01/2000 09:45:00   2.7648
12SCS120         01/01/2000 10:00:00   3.9168
12SCS120         01/01/2000 10:15:00   3.9168
12SCS120         01/01/2000 10:30:00   2.5344
12SCS120         01/01/2000 10:45:00   2.5344
12SCS120         01/01/2000 11:00:00   2.304
12SCS120         01/01/2000 11:15:00   2.304
12SCS120         01/01/2000 11:30:00   2.304
12SCS120         01/01/2000 11:45:00   2.304
12SCS120         01/01/2000 12:00:00   0

;Rainfall (mm/hr)
12SCS2           01/01/2000 00:00:00   1.296
12SCS2           01/01/2000 00:15:00   1.296
12SCS2           01/01/2000 00:30:00   0.6048
12SCS2           01/01/2000 00:45:00   0.6048
12SCS2           01/01/2000 01:00:00   1.1232
12SCS2           01/01/2000 01:15:00   1.1232
12SCS2           01/01/2000 01:30:00   1.1232
12SCS2           01/01/2000 01:45:00   1.1232
12SCS2           01/01/2000 02:00:00   1.4688
12SCS2           01/01/2000 02:15:00   1.4688
12SCS2           01/01/2000 02:30:00   1.296
12SCS2           01/01/2000 02:45:00   1.296
12SCS2           01/01/2000 03:00:00   1.728
12SCS2           01/01/2000 03:15:00   1.728
12SCS2           01/01/2000 03:30:00   1.728
12SCS2           01/01/2000 03:45:00   1.728
12SCS2           01/01/2000 04:00:00   2.3328
12SCS2           01/01/2000 04:15:00   2.3328
12SCS2           01/01/2000 04:30:00   2.9376
12SCS2           01/01/2000 04:45:00   2.9376
12SCS2           01/01/2000 05:00:00   4.6656
12SCS2           01/01/2000 05:15:00   4.6656
12SCS2           01/01/2000 05:30:00   23.328
12SCS2           01/01/2000 05:45:00   50.6304
12SCS2           01/01/2000 06:00:00   9.4176
12SCS2           01/01/2000 06:15:00   9.4176
12SCS2           01/01/2000 06:30:00   4.1472
12SCS2           01/01/2000 06:45:00   4.1472
12SCS2           01/01/2000 07:00:00   2.7648
12SCS2           01/01/2000 07:15:00   2.7648
12SCS2           01/01/2000 07:30:00   2.4192
12SCS2           01/01/2000 07:45:00   2.4192
12SCS2           01/01/2000 08:00:00   1.9008
12SCS2           01/01/2000 08:15:00   1.9008
12SCS2           01/01/2000 08:30:00   1.9872
12SCS2           01/01/2000 08:45:00   1.9872
12SCS2           01/01/2000 09:00:00   1.296
12SCS2           01/01/2000 09:15:00   1.296
12SCS2           01/01/2000 09:30:00   1.0368
12SCS2           01/01/2000 09:45:00   1.0368
12SCS2           01/01/2000 10:00:00   1.4688
12SCS2           01/01/2000 10:15:00   1.4688
12SCS2           01/01/2000 10:30:00   0.9504
12SCS2           01/01/2000 10:45:00   0.9504
12SCS2           01/01/2000 11:00:00   0.864
12SCS2           01/01/2000 11:15:00   0.864
12SCS2           01/01/2000 11:30:00   0.864
12SCS2           01/01/2000 11:45:00   0.864
12SCS2           01/01/2000 12:00:00   0

;Rainfall (mm/hr)
12SCS25          01/01/2000 00:00:00   2.376
12SCS25          01/01/2000 00:15:00   2.376
12SCS25          01/01/2000 00:30:00   1.1088
12SCS25          01/01/2000 00:45:00   1.1088
12SCS25          01/01/2000 01:00:00   2.0592
12SCS25          01/01/2000 01:15:00   2.0592
12SCS25          01/01/2000 01:30:00   2.0592
12SCS25          01/01/2000 01:45:00   2.0592
12SCS25          01/01/2000 02:00:00   2.6928
12SCS25          01/01/2000 02:15:00   2.6928
12SCS25          01/01/2000 02:30:00   2.376
12SCS25          01/01/2000 02:45:00   2.376
12SCS25          01/01/2000 03:00:00   3.168
12SCS25          01/01/2000 03:15:00   3.168
12SCS25          01/01/2000 03:30:00   3.168
12SCS25          01/01/2000 03:45:00   3.168
12SCS25          01/01/2000 04:00:00   4.2768
12SCS25          01/01/2000 04:15:00   4.2768
12SCS25          01/01/2000 04:30:00   5.3856
12SCS25          01/01/2000 04:45:00   5.3856
12SCS25          01/01/2000 05:00:00   8.5536
12SCS25          01/01/2000 05:15:00   8.5536
12SCS25          01/01/2000 05:30:00   42.768
12SCS25          01/01/2000 05:45:00   92.8224
12SCS25          01/01/2000 06:00:00   17.2656
12SCS25          01/01/2000 06:15:00   17.2656
12SCS25          01/01/2000 06:30:00   7.6032
12SCS25          01/01/2000 06:45:00   7.6032
12SCS25          01/01/2000 07:00:00   5.0688
12SCS25          01/01/2000 07:15:00   5.0688
12SCS25          01/01/2000 07:30:00   4.4352
12SCS25          01/01/2000 07:45:00   4.4352
12SCS25          01/01/2000 08:00:00   3.4848
12SCS25          01/01/2000 08:15:00   3.4848
12SCS25          01/01/2000 08:30:00   3.6432
12SCS25          01/01/2000 08:45:00   3.6432
12SCS25          01/01/2000 09:00:00   2.376
12SCS25          01/01/2000 09:15:00   2.376
12SCS25          01/01/2000 09:30:00   1.9008
12SCS25          01/01/2000 09:45:00   1.9008
12SCS25          01/01/2000 10:00:00   2.6928
12SCS25          01/01/2000 10:15:00   2.6928
12SCS25          01/01/2000 10:30:00   1.7424
12SCS25          01/01/2000 10:45:00   1.7424
12SCS25          01/01/2000 11:00:00   1.584
12SCS25          01/01/2000 11:15:00   1.584
12SCS25          01/01/2000 11:30:00   1.584
12SCS25          01/01/2000 11:45:00   1.584
12SCS25          01/01/2000 12:00:00   0

;Rainfall (mm/hr)
12SCS5           01/01/2000 00:00:00   1.728
12SCS5           01/01/2000 00:15:00   1.728
12SCS5           01/01/2000 00:30:00   0.8064
12SCS5           01/01/2000 00:45:00   0.8064
12SCS5           01/01/2000 01:00:00   1.4976
12SCS5           01/01/2000 01:15:00   1.4976
12SCS5           01/01/2000 01:30:00   1.4976
12SCS5           01/01/2000 01:45:00   1.4976
12SCS5           01/01/2000 02:00:00   1.9584
12SCS5           01/01/2000 02:15:00   1.9584
12SCS5           01/01/2000 02:30:00   1.728
12SCS5           01/01/2000 02:45:00   1.728
12SCS5           01/01/2000 03:00:00   2.304
12SCS5           01/01/2000 03:15:00   2.304
12SCS5           01/01/2000 03:30:00   2.304
12SCS5           01/01/2000 03:45:00   2.304
12SCS5           01/01/2000 04:00:00   3.1104
12SCS5           01/01/2000 04:15:00   3.1104
12SCS5           01/01/2000 04:30:00   3.9168
12SCS5           01/01/2000 04:45:00   3.9168
12SCS5           01/01/2000 05:00:00   6.2208
12SCS5           01/01/2000 05:15:00   6.2208
12SCS5           01/01/2000 05:30:00   31.104
12SCS5           01/01/2000 05:45:00   67.5072
12SCS5           01/01/2000 06:00:00   12.5568
12SCS5           01/01/2000 06:15:00   12.5568
12SCS5           01/01/2000 06:30:00   5.5296
12SCS5           01/01/2000 06:45:00   5.5296
12SCS5           01/01/2000 07:00:00   3.6864
12SCS5           01/01/2000 07:15:00   3.6864
12SCS5           01/01/2000 07:30:00   3.2256
12SCS5           01/01/2000 07:45:00   3.2256
12SCS5           01/01/2000 08:00:00   2.5344
12SCS5           01/01/2000 08:15:00   2.5344
12SCS5           01/01/2000 08:30:00   2.6496
12SCS5           01/01/2000 08:45:00   2.6496
12SCS5           01/01/2000 09:00:00   1.728
12SCS5           01/01/2000 09:15:00   1.728
12SCS5           01/01/2000 09:30:00   1.3824
12SCS5           01/01/2000 09:45:00   1.3824
12SCS5           01/01/2000 10:00:00   1.9584
12SCS5           01/01/2000 10:15:00   1.9584
12SCS5           01/01/2000 10:30:00   1.2672
12SCS5           01/01/2000 10:45:00   1.2672
12SCS5           01/01/2000 11:00:00   1.152
12SCS5           01/01/2000 11:15:00   1.152
12SCS5           01/01/2000 11:30:00   1.152
12SCS5           01/01/2000 11:45:00   1.152
12SCS5           01/01/2000 12:00:00   0

;Rainfall (mm/hr)
12SCS50          01/01/2000 00:00:00   2.628
12SCS50          01/01/2000 00:15:00   2.628
12SCS50          01/01/2000 00:30:00   1.2264
12SCS50          01/01/2000 00:45:00   1.2264
12SCS50          01/01/2000 01:00:00   2.2776
12SCS50          01/01/2000 01:15:00   2.2776
12SCS50          01/01/2000 01:30:00   2.2776
12SCS50          01/01/2000 01:45:00   2.2776
12SCS50          01/01/2000 02:00:00   2.9784
12SCS50          01/01/2000 02:15:00   2.9784
12SCS50          01/01/2000 02:30:00   2.628
12SCS50          01/01/2000 02:45:00   2.628
12SCS50          01/01/2000 03:00:00   3.504
12SCS50          01/01/2000 03:15:00   3.504
12SCS50          01/01/2000 03:30:00   3.504
```

12SCS50	01/01/2000 03:45:00	3.504
12SCS50	01/01/2000 04:00:00	4.7304
12SCS50	01/01/2000 04:15:00	4.7304
12SCS50	01/01/2000 04:30:00	5.9568
12SCS50	01/01/2000 04:45:00	5.9568
12SCS50	01/01/2000 05:00:00	9.4608
12SCS50	01/01/2000 05:15:00	9.4608
12SCS50	01/01/2000 05:30:00	47.304
12SCS50	01/01/2000 05:45:00	102.6672
12SCS50	01/01/2000 06:00:00	19.0968
12SCS50	01/01/2000 06:15:00	19.0968
12SCS50	01/01/2000 06:30:00	8.4096
12SCS50	01/01/2000 06:45:00	8.4096
12SCS50	01/01/2000 07:00:00	5.6064
12SCS50	01/01/2000 07:15:00	5.6064
12SCS50	01/01/2000 07:30:00	4.9056
12SCS50	01/01/2000 07:45:00	4.9056
12SCS50	01/01/2000 08:00:00	3.8544
12SCS50	01/01/2000 08:15:00	3.8544
12SCS50	01/01/2000 08:30:00	4.0296
12SCS50	01/01/2000 08:45:00	4.0296
12SCS50	01/01/2000 09:00:00	2.628
12SCS50	01/01/2000 09:15:00	2.628
12SCS50	01/01/2000 09:30:00	2.1024
12SCS50	01/01/2000 09:45:00	2.1024
12SCS50	01/01/2000 10:00:00	2.9784
12SCS50	01/01/2000 10:15:00	2.9784
12SCS50	01/01/2000 10:30:00	1.9272
12SCS50	01/01/2000 10:45:00	1.9272
12SCS50	01/01/2000 11:00:00	1.752
12SCS50	01/01/2000 11:15:00	1.752
12SCS50	01/01/2000 11:30:00	1.752
12SCS50	01/01/2000 11:45:00	1.752
12SCS50	01/01/2000 12:00:00	0

;Rainfall (mm/hr)

24SCS10	01/01/2000 00:00:00	1.08
24SCS10	01/01/2000 00:15:00	1.08
24SCS10	01/01/2000 00:30:00	1.08
24SCS10	01/01/2000 00:45:00	1.08
24SCS10	01/01/2000 01:00:00	0.504
24SCS10	01/01/2000 01:15:00	0.504
24SCS10	01/01/2000 01:30:00	0.504
24SCS10	01/01/2000 01:45:00	0.504
24SCS10	01/01/2000 02:00:00	0.936
24SCS10	01/01/2000 02:15:00	0.936
24SCS10	01/01/2000 02:30:00	0.936
24SCS10	01/01/2000 02:45:00	0.936
24SCS10	01/01/2000 03:00:00	0.936
24SCS10	01/01/2000 03:15:00	0.936
24SCS10	01/01/2000 03:30:00	0.936
24SCS10	01/01/2000 03:45:00	0.936
24SCS10	01/01/2000 04:00:00	1.224
24SCS10	01/01/2000 04:15:00	1.224
24SCS10	01/01/2000 04:30:00	1.224
24SCS10	01/01/2000 04:45:00	1.224
24SCS10	01/01/2000 05:00:00	1.08
24SCS10	01/01/2000 05:15:00	1.08
24SCS10	01/01/2000 05:30:00	1.08
24SCS10	01/01/2000 05:45:00	1.08
24SCS10	01/01/2000 06:00:00	1.44
24SCS10	01/01/2000 06:15:00	1.44
24SCS10	01/01/2000 06:30:00	1.44
24SCS10	01/01/2000 06:45:00	1.44
24SCS10	01/01/2000 07:00:00	1.44
24SCS10	01/01/2000 07:15:00	1.44
24SCS10	01/01/2000 07:30:00	1.44
24SCS10	01/01/2000 07:45:00	1.44
24SCS10	01/01/2000 08:00:00	1.944
24SCS10	01/01/2000 08:15:00	1.944
24SCS10	01/01/2000 08:30:00	1.944
24SCS10	01/01/2000 08:45:00	1.944
24SCS10	01/01/2000 09:00:00	2.304
24SCS10	01/01/2000 09:15:00	2.304
24SCS10	01/01/2000 09:30:00	2.592
24SCS10	01/01/2000 09:45:00	2.592
24SCS10	01/01/2000 10:00:00	3.312
24SCS10	01/01/2000 10:15:00	3.312
24SCS10	01/01/2000 10:30:00	4.464
24SCS10	01/01/2000 10:45:00	4.464
24SCS10	01/01/2000 11:00:00	6.912
24SCS10	01/01/2000 11:15:00	6.912
24SCS10	01/01/2000 11:30:00	29.952
24SCS10	01/01/2000 11:45:00	79.488
24SCS10	01/01/2000 12:00:00	10.368
24SCS10	01/01/2000 12:15:00	10.368
24SCS10	01/01/2000 12:30:00	5.328
24SCS10	01/01/2000 12:45:00	5.328
24SCS10	01/01/2000 13:00:00	3.888
24SCS10	01/01/2000 13:15:00	3.888
24SCS10	01/01/2000 13:30:00	3.024
24SCS10	01/01/2000 13:45:00	3.024
24SCS10	01/01/2000 14:00:00	2.304
24SCS10	01/01/2000 14:15:00	2.304
24SCS10	01/01/2000 14:30:00	2.304
24SCS10	01/01/2000 14:45:00	2.304
24SCS10	01/01/2000 15:00:00	2.016
24SCS10	01/01/2000 15:15:00	2.016
24SCS10	01/01/2000 15:30:00	2.016
24SCS10	01/01/2000 15:45:00	2.016
24SCS10	01/01/2000 16:00:00	1.584
24SCS10	01/01/2000 16:15:00	1.584
24SCS10	01/01/2000 16:30:00	1.584
24SCS10	01/01/2000 16:45:00	1.584
24SCS10	01/01/2000 17:00:00	1.656
24SCS10	01/01/2000 17:15:00	1.656
24SCS10	01/01/2000 17:30:00	1.656
24SCS10	01/01/2000 17:45:00	1.656
24SCS10	01/01/2000 18:00:00	1.08
24SCS10	01/01/2000 18:15:00	1.08
24SCS10	01/01/2000 18:30:00	1.08
24SCS10	01/01/2000 18:45:00	1.08
24SCS10	01/01/2000 19:00:00	0.864
24SCS10	01/01/2000 19:15:00	0.864
24SCS10	01/01/2000 19:30:00	0.864
24SCS10	01/01/2000 19:45:00	0.864
24SCS10	01/01/2000 20:00:00	1.224
24SCS10	01/01/2000 20:15:00	1.224
24SCS10	01/01/2000 20:30:00	1.224
24SCS10	01/01/2000 20:45:00	1.224
24SCS10	01/01/2000 21:00:00	0.792
24SCS10	01/01/2000 21:15:00	0.792
24SCS10	01/01/2000 21:30:00	0.792
24SCS10	01/01/2000 21:45:00	0.792
24SCS10	01/01/2000 22:00:00	0.72
24SCS10	01/01/2000 22:15:00	0.72
24SCS10	01/01/2000 22:30:00	0.72
24SCS10	01/01/2000 22:45:00	0.72
24SCS10	01/01/2000 23:00:00	0.72
24SCS10	01/01/2000 23:15:00	0.72
24SCS10	01/01/2000 23:30:00	0.72
24SCS10	01/01/2000 23:45:00	0.72
24SCS10	01/02/2000 00:00:00	0

;Rainfall (mm/hr)

24SCS100	01/01/2000 00:00:00	1.548
24SCS100	01/01/2000 00:15:00	1.548
24SCS100	01/01/2000 00:30:00	1.548
24SCS100	01/01/2000 00:45:00	1.548
24SCS100	01/01/2000 01:00:00	0.7224
24SCS100	01/01/2000 01:15:00	0.7224
24SCS100	01/01/2000 01:30:00	0.7224
24SCS100	01/01/2000 01:45:00	0.7224
24SCS100	01/01/2000 02:00:00	1.3416
24SCS100	01/01/2000 02:15:00	1.3416
24SCS100	01/01/2000 02:30:00	1.3416
24SCS100	01/01/2000 02:45:00	1.3416
24SCS100	01/01/2000 03:00:00	1.3416
24SCS100	01/01/2000 03:15:00	1.3416
24SCS100	01/01/2000 03:30:00	1.3416
24SCS100	01/01/2000 03:45:00	1.3416
24SCS100	01/01/2000 04:00:00	1.7544
24SCS100	01/01/2000 04:15:00	1.7544
24SCS100	01/01/2000 04:30:00	1.7544
24SCS100	01/01/2000 04:45:00	1.7544
24SCS100	01/01/2000 05:00:00	1.548
24SCS100	01/01/2000 05:15:00	1.548
24SCS100	01/01/2000 05:30:00	1.548
24SCS100	01/01/2000 05:45:00	1.548
24SCS100	01/01/2000 06:00:00	2.064
24SCS100	01/01/2000 06:15:00	2.064
24SCS100	01/01/2000 06:30:00	2.064
24SCS100	01/01/2000 06:45:00	2.064
24SCS100	01/01/2000 07:00:00	2.064
24SCS100	01/01/2000 07:15:00	2.064
24SCS100	01/01/2000 07:30:00	2.064
24SCS100	01/01/2000 07:45:00	2.064
24SCS100	01/01/2000 08:00:00	2.7864
24SCS100	01/01/2000 08:15:00	2.7864
24SCS100	01/01/2000 08:30:00	2.7864
24SCS100	01/01/2000 08:45:00	2.7864
24SCS100	01/01/2000 09:00:00	3.3024
24SCS100	01/01/2000 09:15:00	3.3024
24SCS100	01/01/2000 09:30:00	3.7152
24SCS100	01/01/2000 09:45:00	3.7152
24SCS100	01/01/2000 10:00:00	4.7472
24SCS100	01/01/2000 10:15:00	4.7472
24SCS100	01/01/2000 10:30:00	6.3984
24SCS100	01/01/2000 10:45:00	6.3984
24SCS100	01/01/2000 11:00:00	9.9072
24SCS100	01/01/2000 11:15:00	9.9072
24SCS100	01/01/2000 11:30:00	42.9312
24SCS100	01/01/2000 11:45:00	113.9328
24SCS100	01/01/2000 12:00:00	14.8608
24SCS100	01/01/2000 12:15:00	14.8608
24SCS100	01/01/2000 12:30:00	7.6368
24SCS100	01/01/2000 12:45:00	7.6368
24SCS100	01/01/2000 13:00:00	5.5728
24SCS100	01/01/2000 13:15:00	5.5728
24SCS100	01/01/2000 13:30:00	4.3344
24SCS100	01/01/2000 13:45:00	4.3344
24SCS100	01/01/2000 14:00:00	3.3024
24SCS100	01/01/2000 14:15:00	3.3024
24SCS100	01/01/2000 14:30:00	3.3024
24SCS100	01/01/2000 14:45:00	3.3024
24SCS100	01/01/2000 15:00:00	2.8896
24SCS100	01/01/2000 15:15:00	2.8896
24SCS100	01/01/2000 15:30:00	2.8896
24SCS100	01/01/2000 15:45:00	2.8896
24SCS100	01/01/2000 16:00:00	2.2704
24SCS100	01/01/2000 16:15:00	2.2704
24SCS100	01/01/2000 16:30:00	2.2704
24SCS100	01/01/2000 16:45:00	2.2704
24SCS100	01/01/2000 17:00:00	2.3736
24SCS100	01/01/2000 17:15:00	2.3736
24SCS100	01/01/2000 17:30:00	2.3736
24SCS100	01/01/2000 17:45:00	2.3736
24SCS100	01/01/2000 18:00:00	1.548
24SCS100	01/01/2000 18:15:00	1.548
24SCS100	01/01/2000 18:30:00	1.548
24SCS100	01/01/2000 18:45:00	1.548
24SCS100	01/01/2000 19:00:00	1.2384
24SCS100	01/01/2000 19:15:00	1.2384
24SCS100	01/01/2000 19:30:00	1.2384
24SCS100	01/01/2000 19:45:00	1.2384
24SCS100	01/01/2000 20:00:00	1.7544
24SCS100	01/01/2000 20:15:00	1.7544
24SCS100	01/01/2000 20:30:00	1.7544
24SCS100	01/01/2000 20:45:00	1.7544
24SCS100	01/01/2000 21:00:00	1.1352
24SCS100	01/01/2000 21:15:00	1.1352
24SCS100	01/01/2000 21:30:00	1.1352
24SCS100	01/01/2000 21:45:00	1.1352
24SCS100	01/01/2000 22:00:00	1.032
24SCS100	01/01/2000 22:15:00	1.032
24SCS100	01/01/2000 22:30:00	1.032
24SCS100	01/01/2000 22:45:00	1.032
24SCS100	01/01/2000 23:00:00	1.032
24SCS100	01/01/2000 23:15:00	1.032
24SCS100	01/01/2000 23:30:00	1.032
24SCS100	01/01/2000 23:45:00	1.032
24SCS100	01/02/2000 00:00:00	0

;Rainfall (mm/hr)

24SCS120	01/01/2000 00:00:00	1.8576
24SCS120	01/01/2000 00:15:00	1.8576
24SCS120	01/01/2000 00:30:00	1.8576
24SCS120	01/01/2000 00:45:00	1.8576
24SCS120	01/01/2000 01:00:00	0.86688
24SCS120	01/01/2000 01:15:00	0.86688
24SCS120	01/01/2000 01:30:00	0.86688
24SCS120	01/01/2000 01:45:00	0.86688
24SCS120	01/01/2000 02:00:00	1.60992
24SCS120	01/01/2000 02:15:00	1.60992
24SCS120	01/01/2000 02:30:00	1.60992
24SCS120	01/01/2000 02:45:00	1.60992
24SCS120	01/01/2000 03:00:00	1.60992
24SCS120	01/01/2000 03:15:00	1.60992
24SCS120	01/01/2000 03:30:00	1.60992
24SCS120	01/01/2000 03:45:00	1.60992
24SCS120	01/01/2000 04:00:00	2.10528
24SCS120	01/01/2000 04:15:00	2.10528
24SCS120	01/01/2000 04:30:00	2.10528
24SCS120	01/01/2000 04:45:00	2.10528
24SCS120	01/01/2000 05:00:00	1.8576
24SCS120	01/01/2000 05:15:00	1.8576
24SCS120	01/01/2000 05:30:00	1.8576
24SCS120	01/01/2000 05:45:00	1.8576
24SCS120	01/01/2000 06:00:00	2.4768
24SCS120	01/01/2000 06:15:00	2.4768
24SCS120	01/01/2000 06:30:00	2.4768
24SCS120	01/01/2000 06:45:00	2.4768
24SCS120	01/01/2000 07:00:00	2.4768
24SCS120	01/01/2000 07:15:00	2.4768
24SCS120	01/01/2000 07:30:00	2.4768
24SCS120	01/01/2000 07:45:00	2.4768
24SCS120	01/01/2000 08:00:00	3.34368
24SCS120	01/01/2000 08:15:00	3.34368
24SCS120	01/01/2000 08:30:00	3.34368
24SCS120	01/01/2000 08:45:00	3.34368
24SCS120	01/01/2000 09:00:00	3.96288
24SCS120	01/01/2000 09:15:00	3.96288
24SCS120	01/01/2000 09:30:00	4.45824
24SCS120	01/01/2000 09:45:00	4.45824
24SCS120	01/01/2000 10:00:00	5.69664
24SCS120	01/01/2000 10:15:00	5.69664
24SCS120	01/01/2000 10:30:00	7.67808
24SCS120	01/01/2000 10:45:00	7.67808
24SCS120	01/01/2000 11:00:00	11.88864
24SCS120	01/01/2000 11:15:00	11.88864
24SCS120	01/01/2000 11:30:00	51.51744
24SCS120	01/01/2000 11:45:00	136.7193
24SCS120	01/01/2000 12:00:00	17.83296
24SCS120	01/01/2000 12:15:00	17.83296
24SCS120	01/01/2000 12:30:00	9.16416
24SCS120	01/01/2000 12:45:00	9.16416
24SCS120	01/01/2000 13:00:00	6.68736
24SCS120	01/01/2000 13:15:00	6.68736
24SCS120	01/01/2000 13:30:00	5.20128
24SCS120	01/01/2000 13:45:00	5.20128
24SCS120	01/01/2000 14:00:00	3.96288
24SCS120	01/01/2000 14:15:00	3.96288
24SCS120	01/01/2000 14:30:00	3.96288
24SCS120	01/01/2000 14:45:00	3.96288
24SCS120	01/01/2000 15:00:00	3.46752
24SCS120	01/01/2000 15:15:00	3.46752
24SCS120	01/01/2000 15:30:00	3.46752
24SCS120	01/01/2000 15:45:00	3.46752

```
24SCS120          01/01/2000 16:00:00   2.72448
24SCS120          01/01/2000 16:15:00   2.72448
24SCS120          01/01/2000 16:30:00   2.72448
24SCS120          01/01/2000 16:45:00   2.72448
24SCS120          01/01/2000 17:00:00   2.84832
24SCS120          01/01/2000 17:15:00   2.84832
24SCS120          01/01/2000 17:30:00   2.84832
24SCS120          01/01/2000 17:45:00   2.84832
24SCS120          01/01/2000 18:00:00   1.8576
24SCS120          01/01/2000 18:15:00   1.8576
24SCS120          01/01/2000 18:30:00   1.8576
24SCS120          01/01/2000 18:45:00   1.8576
24SCS120          01/01/2000 19:00:00   1.48608
24SCS120          01/01/2000 19:15:00   1.48608
24SCS120          01/01/2000 19:30:00   1.48608
24SCS120          01/01/2000 19:45:00   1.48608
24SCS120          01/01/2000 20:00:00   2.10528
24SCS120          01/01/2000 20:15:00   2.10528
24SCS120          01/01/2000 20:30:00   2.10528
24SCS120          01/01/2000 20:45:00   2.10528
24SCS120          01/01/2000 21:00:00   1.36224
24SCS120          01/01/2000 21:15:00   1.36224
24SCS120          01/01/2000 21:30:00   1.36224
24SCS120          01/01/2000 21:45:00   1.36224
24SCS120          01/01/2000 22:00:00   1.2384
24SCS120          01/01/2000 22:15:00   1.2384
24SCS120          01/01/2000 22:30:00   1.2384
24SCS120          01/01/2000 22:45:00   1.2384
24SCS120          01/01/2000 23:00:00   1.2384
24SCS120          01/01/2000 23:15:00   1.2384
24SCS120          01/01/2000 23:30:00   1.2384
24SCS120          01/01/2000 23:45:00   1.2384
24SCS120          01/02/2000 00:00:00   0

;Rainfall (mm/hr)
24SCS2            01/01/2000 00:00:00   0.72
24SCS2            01/01/2000 00:15:00   0.72
24SCS2            01/01/2000 00:30:00   0.72
24SCS2            01/01/2000 00:45:00   0.72
24SCS2            01/01/2000 01:00:00   0.336
24SCS2            01/01/2000 01:15:00   0.336
24SCS2            01/01/2000 01:30:00   0.336
24SCS2            01/01/2000 01:45:00   0.336
24SCS2            01/01/2000 02:00:00   0.624
24SCS2            01/01/2000 02:15:00   0.624
24SCS2            01/01/2000 02:30:00   0.624
24SCS2            01/01/2000 02:45:00   0.624
24SCS2            01/01/2000 03:00:00   0.624
24SCS2            01/01/2000 03:15:00   0.624
24SCS2            01/01/2000 03:30:00   0.624
24SCS2            01/01/2000 03:45:00   0.624
24SCS2            01/01/2000 04:00:00   0.816
24SCS2            01/01/2000 04:15:00   0.816
24SCS2            01/01/2000 04:30:00   0.816
24SCS2            01/01/2000 04:45:00   0.816
24SCS2            01/01/2000 05:00:00   0.72
24SCS2            01/01/2000 05:15:00   0.72
24SCS2            01/01/2000 05:30:00   0.72
24SCS2            01/01/2000 05:45:00   0.72
24SCS2            01/01/2000 06:00:00   0.96
24SCS2            01/01/2000 06:15:00   0.96
24SCS2            01/01/2000 06:30:00   0.96
24SCS2            01/01/2000 06:45:00   0.96
24SCS2            01/01/2000 07:00:00   0.96
24SCS2            01/01/2000 07:15:00   0.96
24SCS2            01/01/2000 07:30:00   0.96
24SCS2            01/01/2000 07:45:00   0.96
24SCS2            01/01/2000 08:00:00   1.296
24SCS2            01/01/2000 08:15:00   1.296
24SCS2            01/01/2000 08:30:00   1.296
24SCS2            01/01/2000 08:45:00   1.296
24SCS2            01/01/2000 09:00:00   1.536
24SCS2            01/01/2000 09:15:00   1.536
24SCS2            01/01/2000 09:30:00   1.728
24SCS2            01/01/2000 09:45:00   1.728
24SCS2            01/01/2000 10:00:00   2.208
24SCS2            01/01/2000 10:15:00   2.208
24SCS2            01/01/2000 10:30:00   2.976
24SCS2            01/01/2000 10:45:00   2.976
24SCS2            01/01/2000 11:00:00   4.608
24SCS2            01/01/2000 11:15:00   4.608
24SCS2            01/01/2000 11:30:00   19.968
24SCS2            01/01/2000 11:45:00   52.992
24SCS2            01/01/2000 12:00:00   6.912
24SCS2            01/01/2000 12:15:00   6.912
24SCS2            01/01/2000 12:30:00   3.552
24SCS2            01/01/2000 12:45:00   3.552
24SCS2            01/01/2000 13:00:00   2.592
24SCS2            01/01/2000 13:15:00   2.592
24SCS2            01/01/2000 13:30:00   2.016
24SCS2            01/01/2000 13:45:00   2.016
24SCS2            01/01/2000 14:00:00   1.536
24SCS2            01/01/2000 14:15:00   1.536
24SCS2            01/01/2000 14:30:00   1.536
24SCS2            01/01/2000 14:45:00   1.536
24SCS2            01/01/2000 15:00:00   1.344
24SCS2            01/01/2000 15:15:00   1.344
24SCS2            01/01/2000 15:30:00   1.344
24SCS2            01/01/2000 15:45:00   1.344
24SCS2            01/01/2000 16:00:00   1.056
24SCS2            01/01/2000 16:15:00   1.056
24SCS2            01/01/2000 16:30:00   1.056
24SCS2            01/01/2000 16:45:00   1.056
24SCS2            01/01/2000 17:00:00   1.104
24SCS2            01/01/2000 17:15:00   1.104
24SCS2            01/01/2000 17:30:00   1.104
24SCS2            01/01/2000 17:45:00   1.104
24SCS2            01/01/2000 18:00:00   0.72
24SCS2            01/01/2000 18:15:00   0.72
24SCS2            01/01/2000 18:30:00   0.72
24SCS2            01/01/2000 18:45:00   0.72
24SCS2            01/01/2000 19:00:00   0.576
24SCS2            01/01/2000 19:15:00   0.576
24SCS2            01/01/2000 19:30:00   0.576
24SCS2            01/01/2000 19:45:00   0.576
24SCS2            01/01/2000 20:00:00   0.816
24SCS2            01/01/2000 20:15:00   0.816
24SCS2            01/01/2000 20:30:00   0.816
24SCS2            01/01/2000 20:45:00   0.816
24SCS2            01/01/2000 21:00:00   0.528
24SCS2            01/01/2000 21:15:00   0.528
24SCS2            01/01/2000 21:30:00   0.528
24SCS2            01/01/2000 21:45:00   0.528
24SCS2            01/01/2000 22:00:00   0.48
24SCS2            01/01/2000 22:15:00   0.48
24SCS2            01/01/2000 22:30:00   0.48
24SCS2            01/01/2000 22:45:00   0.48
24SCS2            01/01/2000 23:00:00   0.48
24SCS2            01/01/2000 23:15:00   0.48
24SCS2            01/01/2000 23:30:00   0.48
24SCS2            01/01/2000 23:45:00   0.48
24SCS2            01/02/2000 00:00:00   0

;Rainfall (mm/hr)
24SCS25           01/01/2000 00:00:00   1.26
24SCS25           01/01/2000 00:15:00   1.26
24SCS25           01/01/2000 00:30:00   1.26
24SCS25           01/01/2000 00:45:00   1.26
24SCS25           01/01/2000 01:00:00   0.588
24SCS25           01/01/2000 01:15:00   0.588
24SCS25           01/01/2000 01:30:00   0.588
24SCS25           01/01/2000 01:45:00   0.588
24SCS25           01/01/2000 02:00:00   1.092
24SCS25           01/01/2000 02:15:00   1.092
24SCS25           01/01/2000 02:30:00   1.092
24SCS25           01/01/2000 02:45:00   1.092
24SCS25           01/01/2000 03:00:00   1.092
24SCS25           01/01/2000 03:15:00   1.092
24SCS25           01/01/2000 03:30:00   1.092
24SCS25           01/01/2000 03:45:00   1.092
24SCS25           01/01/2000 04:00:00   1.428
24SCS25           01/01/2000 04:15:00   1.428
24SCS25           01/01/2000 04:30:00   1.428
24SCS25           01/01/2000 04:45:00   1.428
24SCS25           01/01/2000 05:00:00   1.26
24SCS25           01/01/2000 05:15:00   1.26
24SCS25           01/01/2000 05:30:00   1.26
24SCS25           01/01/2000 05:45:00   1.26
24SCS25           01/01/2000 06:00:00   1.68
24SCS25           01/01/2000 06:15:00   1.68
24SCS25           01/01/2000 06:30:00   1.68
24SCS25           01/01/2000 06:45:00   1.68
24SCS25           01/01/2000 07:00:00   1.68
24SCS25           01/01/2000 07:15:00   1.68
24SCS25           01/01/2000 07:30:00   1.68
24SCS25           01/01/2000 07:45:00   1.68
24SCS25           01/01/2000 08:00:00   2.268
24SCS25           01/01/2000 08:15:00   2.268
24SCS25           01/01/2000 08:30:00   2.268
24SCS25           01/01/2000 08:45:00   2.268
24SCS25           01/01/2000 09:00:00   2.688
24SCS25           01/01/2000 09:15:00   2.688
24SCS25           01/01/2000 09:30:00   3.024
24SCS25           01/01/2000 09:45:00   3.024
24SCS25           01/01/2000 10:00:00   3.864
24SCS25           01/01/2000 10:15:00   3.864
24SCS25           01/01/2000 10:30:00   5.208
24SCS25           01/01/2000 10:45:00   5.208
24SCS25           01/01/2000 11:00:00   8.064
24SCS25           01/01/2000 11:15:00   8.064
24SCS25           01/01/2000 11:30:00   34.944
24SCS25           01/01/2000 11:45:00   92.736
24SCS25           01/01/2000 12:00:00   12.096
24SCS25           01/01/2000 12:15:00   12.096
24SCS25           01/01/2000 12:30:00   6.216
24SCS25           01/01/2000 12:45:00   6.216
24SCS25           01/01/2000 13:00:00   4.536
24SCS25           01/01/2000 13:15:00   4.536
24SCS25           01/01/2000 13:30:00   3.528
24SCS25           01/01/2000 13:45:00   3.528
24SCS25           01/01/2000 14:00:00   2.688
24SCS25           01/01/2000 14:15:00   2.688
24SCS25           01/01/2000 14:30:00   2.688
24SCS25           01/01/2000 14:45:00   2.688
24SCS25           01/01/2000 15:00:00   2.352
24SCS25           01/01/2000 15:15:00   2.352
24SCS25           01/01/2000 15:30:00   2.352
24SCS25           01/01/2000 15:45:00   2.352
24SCS25           01/01/2000 16:00:00   1.848
24SCS25           01/01/2000 16:15:00   1.848
24SCS25           01/01/2000 16:30:00   1.848
24SCS25           01/01/2000 16:45:00   1.848
24SCS25           01/01/2000 17:00:00   1.932
24SCS25           01/01/2000 17:15:00   1.932
24SCS25           01/01/2000 17:30:00   1.932
24SCS25           01/01/2000 17:45:00   1.932
24SCS25           01/01/2000 18:00:00   1.26
24SCS25           01/01/2000 18:15:00   1.26
24SCS25           01/01/2000 18:30:00   1.26
24SCS25           01/01/2000 18:45:00   1.26
24SCS25           01/01/2000 19:00:00   1.008
24SCS25           01/01/2000 19:15:00   1.008
24SCS25           01/01/2000 19:30:00   1.008
24SCS25           01/01/2000 19:45:00   1.008
24SCS25           01/01/2000 20:00:00   1.428
24SCS25           01/01/2000 20:15:00   1.428
24SCS25           01/01/2000 20:30:00   1.428
24SCS25           01/01/2000 20:45:00   1.428
24SCS25           01/01/2000 21:00:00   0.924
24SCS25           01/01/2000 21:15:00   0.924
24SCS25           01/01/2000 21:30:00   0.924
24SCS25           01/01/2000 21:45:00   0.924
24SCS25           01/01/2000 22:00:00   0.84
24SCS25           01/01/2000 22:15:00   0.84
24SCS25           01/01/2000 22:30:00   0.84
24SCS25           01/01/2000 22:45:00   0.84
24SCS25           01/01/2000 23:00:00   0.84
24SCS25           01/01/2000 23:15:00   0.84
24SCS25           01/01/2000 23:30:00   0.84
24SCS25           01/01/2000 23:45:00   0.84
24SCS25           01/02/2000 00:00:00   0

;Rainfall (mm/hr)
24SCS5            01/01/2000 00:00:00   0.936
24SCS5            01/01/2000 00:15:00   0.936
24SCS5            01/01/2000 00:30:00   0.936
24SCS5            01/01/2000 00:45:00   0.936
24SCS5            01/01/2000 01:00:00   0.4368
24SCS5            01/01/2000 01:15:00   0.4368
24SCS5            01/01/2000 01:30:00   0.4368
24SCS5            01/01/2000 01:45:00   0.4368
24SCS5            01/01/2000 02:00:00   0.8112
24SCS5            01/01/2000 02:15:00   0.8112
24SCS5            01/01/2000 02:30:00   0.8112
24SCS5            01/01/2000 02:45:00   0.8112
24SCS5            01/01/2000 03:00:00   0.8112
24SCS5            01/01/2000 03:15:00   0.8112
24SCS5            01/01/2000 03:30:00   0.8112
24SCS5            01/01/2000 03:45:00   0.8112
24SCS5            01/01/2000 04:00:00   1.0608
24SCS5            01/01/2000 04:15:00   1.0608
24SCS5            01/01/2000 04:30:00   1.0608
24SCS5            01/01/2000 04:45:00   1.0608
24SCS5            01/01/2000 05:00:00   0.936
24SCS5            01/01/2000 05:15:00   0.936
24SCS5            01/01/2000 05:30:00   0.936
24SCS5            01/01/2000 05:45:00   0.936
24SCS5            01/01/2000 06:00:00   1.248
24SCS5            01/01/2000 06:15:00   1.248
24SCS5            01/01/2000 06:30:00   1.248
24SCS5            01/01/2000 06:45:00   1.248
24SCS5            01/01/2000 07:00:00   1.248
24SCS5            01/01/2000 07:15:00   1.248
24SCS5            01/01/2000 07:30:00   1.248
24SCS5            01/01/2000 07:45:00   1.248
24SCS5            01/01/2000 08:00:00   1.6848
24SCS5            01/01/2000 08:15:00   1.6848
24SCS5            01/01/2000 08:30:00   1.6848
24SCS5            01/01/2000 08:45:00   1.6848
24SCS5            01/01/2000 09:00:00   1.9968
24SCS5            01/01/2000 09:15:00   1.9968
24SCS5            01/01/2000 09:30:00   2.2464
24SCS5            01/01/2000 09:45:00   2.2464
24SCS5            01/01/2000 10:00:00   2.8704
24SCS5            01/01/2000 10:15:00   2.8704
24SCS5            01/01/2000 10:30:00   3.8688
24SCS5            01/01/2000 10:45:00   3.8688
24SCS5            01/01/2000 11:00:00   5.9904
24SCS5            01/01/2000 11:15:00   5.9904
24SCS5            01/01/2000 11:30:00   25.9584
24SCS5            01/01/2000 11:45:00   68.8896
24SCS5            01/01/2000 12:00:00   8.9856
24SCS5            01/01/2000 12:15:00   8.9856
24SCS5            01/01/2000 12:30:00   4.6176
24SCS5            01/01/2000 12:45:00   4.6176
24SCS5            01/01/2000 13:00:00   3.3696
24SCS5            01/01/2000 13:15:00   3.3696
24SCS5            01/01/2000 13:30:00   2.6208
24SCS5            01/01/2000 13:45:00   2.6208
24SCS5            01/01/2000 14:00:00   1.9968
24SCS5            01/01/2000 14:15:00   1.9968
24SCS5            01/01/2000 14:30:00   1.9968
24SCS5            01/01/2000 14:45:00   1.9968
24SCS5            01/01/2000 15:00:00   1.7472
24SCS5            01/01/2000 15:15:00   1.7472
24SCS5            01/01/2000 15:30:00   1.7472
24SCS5            01/01/2000 15:45:00   1.7472
24SCS5            01/01/2000 16:00:00   1.3728
```

24SCS5	01/01/2000 16:15:00	1.3728
24SCS5	01/01/2000 16:30:00	1.3728
24SCS5	01/01/2000 16:45:00	1.3728
24SCS5	01/01/2000 17:00:00	1.4352
24SCS5	01/01/2000 17:15:00	1.4352
24SCS5	01/01/2000 17:30:00	1.4352
24SCS5	01/01/2000 17:45:00	1.4352
24SCS5	01/01/2000 18:00:00	0.936
24SCS5	01/01/2000 18:15:00	0.936
24SCS5	01/01/2000 18:30:00	0.936
24SCS5	01/01/2000 18:45:00	0.936
24SCS5	01/01/2000 19:00:00	0.7488
24SCS5	01/01/2000 19:15:00	0.7488
24SCS5	01/01/2000 19:30:00	0.7488
24SCS5	01/01/2000 19:45:00	0.7488
24SCS5	01/01/2000 20:00:00	1.0608
24SCS5	01/01/2000 20:15:00	1.0608
24SCS5	01/01/2000 20:30:00	1.0608
24SCS5	01/01/2000 20:45:00	1.0608
24SCS5	01/01/2000 21:00:00	0.6864
24SCS5	01/01/2000 21:15:00	0.6864
24SCS5	01/01/2000 21:30:00	0.6864
24SCS5	01/01/2000 21:45:00	0.6864
24SCS5	01/01/2000 22:00:00	0.624
24SCS5	01/01/2000 22:15:00	0.624
24SCS5	01/01/2000 22:30:00	0.624
24SCS5	01/01/2000 22:45:00	0.624
24SCS5	01/01/2000 23:00:00	0.624
24SCS5	01/01/2000 23:15:00	0.624
24SCS5	01/01/2000 23:30:00	0.624
24SCS5	01/01/2000 23:45:00	0.624
24SCS5	01/02/2000 00:00:00	0

;Rainfall (mm/hr)

24SCS50	01/01/2000 00:00:00	1.404
24SCS50	01/01/2000 00:15:00	1.404
24SCS50	01/01/2000 00:30:00	1.404
24SCS50	01/01/2000 00:45:00	1.404
24SCS50	01/01/2000 01:00:00	0.6552
24SCS50	01/01/2000 01:15:00	0.6552
24SCS50	01/01/2000 01:30:00	0.6552
24SCS50	01/01/2000 01:45:00	0.6552
24SCS50	01/01/2000 02:00:00	1.2168
24SCS50	01/01/2000 02:15:00	1.2168
24SCS50	01/01/2000 02:30:00	1.2168
24SCS50	01/01/2000 02:45:00	1.2168
24SCS50	01/01/2000 03:00:00	1.2168
24SCS50	01/01/2000 03:15:00	1.2168
24SCS50	01/01/2000 03:30:00	1.2168
24SCS50	01/01/2000 03:45:00	1.2168
24SCS50	01/01/2000 04:00:00	1.5912
24SCS50	01/01/2000 04:15:00	1.5912
24SCS50	01/01/2000 04:30:00	1.5912
24SCS50	01/01/2000 04:45:00	1.5912
24SCS50	01/01/2000 05:00:00	1.404
24SCS50	01/01/2000 05:15:00	1.404
24SCS50	01/01/2000 05:30:00	1.404
24SCS50	01/01/2000 05:45:00	1.404
24SCS50	01/01/2000 06:00:00	1.872
24SCS50	01/01/2000 06:15:00	1.872
24SCS50	01/01/2000 06:30:00	1.872
24SCS50	01/01/2000 06:45:00	1.872
24SCS50	01/01/2000 07:00:00	1.872
24SCS50	01/01/2000 07:15:00	1.872
24SCS50	01/01/2000 07:30:00	1.872
24SCS50	01/01/2000 07:45:00	1.872
24SCS50	01/01/2000 08:00:00	2.5272
24SCS50	01/01/2000 08:15:00	2.5272
24SCS50	01/01/2000 08:30:00	2.5272
24SCS50	01/01/2000 08:45:00	2.5272
24SCS50	01/01/2000 09:00:00	2.9952
24SCS50	01/01/2000 09:15:00	2.9952
24SCS50	01/01/2000 09:30:00	3.3696
24SCS50	01/01/2000 09:45:00	3.3696
24SCS50	01/01/2000 10:00:00	4.3056
24SCS50	01/01/2000 10:15:00	4.3056
24SCS50	01/01/2000 10:30:00	5.803199
24SCS50	01/01/2000 10:45:00	5.803199
24SCS50	01/01/2000 11:00:00	8.9856
24SCS50	01/01/2000 11:15:00	8.9856
24SCS50	01/01/2000 11:30:00	38.9376
24SCS50	01/01/2000 11:45:00	103.3344
24SCS50	01/01/2000 12:00:00	13.4784
24SCS50	01/01/2000 12:15:00	13.4784
24SCS50	01/01/2000 12:30:00	6.9264
24SCS50	01/01/2000 12:45:00	6.9264
24SCS50	01/01/2000 13:00:00	5.0544
24SCS50	01/01/2000 13:15:00	5.0544
24SCS50	01/01/2000 13:30:00	3.9312
24SCS50	01/01/2000 13:45:00	3.9312
24SCS50	01/01/2000 14:00:00	2.9952
24SCS50	01/01/2000 14:15:00	2.9952
24SCS50	01/01/2000 14:30:00	2.9952
24SCS50	01/01/2000 14:45:00	2.9952
24SCS50	01/01/2000 15:00:00	2.6208
24SCS50	01/01/2000 15:15:00	2.6208
24SCS50	01/01/2000 15:30:00	2.6208
24SCS50	01/01/2000 15:45:00	2.6208
24SCS50	01/01/2000 16:00:00	2.0592
24SCS50	01/01/2000 16:15:00	2.0592
24SCS50	01/01/2000 16:30:00	2.0592
24SCS50	01/01/2000 16:45:00	2.0592
24SCS50	01/01/2000 17:00:00	2.1528
24SCS50	01/01/2000 17:15:00	2.1528
24SCS50	01/01/2000 17:30:00	2.1528
24SCS50	01/01/2000 17:45:00	2.1528
24SCS50	01/01/2000 18:00:00	1.404
24SCS50	01/01/2000 18:15:00	1.404
24SCS50	01/01/2000 18:30:00	1.404
24SCS50	01/01/2000 18:45:00	1.404
24SCS50	01/01/2000 19:00:00	1.1232
24SCS50	01/01/2000 19:15:00	1.1232
24SCS50	01/01/2000 19:30:00	1.1232
24SCS50	01/01/2000 19:45:00	1.1232
24SCS50	01/01/2000 20:00:00	1.5912
24SCS50	01/01/2000 20:15:00	1.5912
24SCS50	01/01/2000 20:30:00	1.5912
24SCS50	01/01/2000 20:45:00	1.5912
24SCS50	01/01/2000 21:00:00	1.0296
24SCS50	01/01/2000 21:15:00	1.0296
24SCS50	01/01/2000 21:30:00	1.0296
24SCS50	01/01/2000 21:45:00	1.0296
24SCS50	01/01/2000 22:00:00	0.936
24SCS50	01/01/2000 22:15:00	0.936
24SCS50	01/01/2000 22:30:00	0.936
24SCS50	01/01/2000 22:45:00	0.936
24SCS50	01/01/2000 23:00:00	0.936
24SCS50	01/01/2000 23:15:00	0.936
24SCS50	01/01/2000 23:30:00	0.936
24SCS50	01/01/2000 23:45:00	0.936
24SCS50	01/02/2000 00:00:00	0

;Rainfall (mm/hr)

3CHI10	01/01/2000 00:00:00	3.755
3CHI10	01/01/2000 00:10:00	4.478
3CHI10	01/01/2000 00:20:00	5.593
3CHI10	01/01/2000 00:30:00	7.551
3CHI10	01/01/2000 00:40:00	11.936
3CHI10	01/01/2000 00:50:00	30.856
3CHI10	01/01/2000 01:00:00	122.142
3CHI10	01/01/2000 01:10:00	35.237
3CHI10	01/01/2000 01:20:00	18.159
3CHI10	01/01/2000 01:30:00	12.238
3CHI10	01/01/2000 01:40:00	9.269
3CHI10	01/01/2000 01:50:00	7.492
3CHI10	01/01/2000 02:00:00	6.309
3CHI10	01/01/2000 02:10:00	5.465
3CHI10	01/01/2000 02:20:00	4.831
3CHI10	01/01/2000 02:30:00	4.338
3CHI10	01/01/2000 02:40:00	3.942
3CHI10	01/01/2000 02:50:00	3.617
3CHI10	01/01/2000 03:00:00	0

;Rainfall (mm/hr)

3CHI100	01/01/2000 00:00:00	5.339
3CHI100	01/01/2000 00:10:00	6.376
3CHI100	01/01/2000 00:20:00	7.977
3CHI100	01/01/2000 00:30:00	10.797
3CHI100	01/01/2000 00:40:00	17.136
3CHI100	01/01/2000 00:50:00	45.128
3CHI100	01/01/2000 01:00:00	178.107
3CHI100	01/01/2000 01:10:00	51.056
3CHI100	01/01/2000 01:20:00	26.163
3CHI100	01/01/2000 01:30:00	17.571
3CHI100	01/01/2000 01:40:00	13.277
3CHI100	01/01/2000 01:50:00	10.712
3CHI100	01/01/2000 02:00:00	9.008
3CHI100	01/01/2000 02:10:00	7.793
3CHI100	01/01/2000 02:20:00	6.883
3CHI100	01/01/2000 02:30:00	6.174
3CHI100	01/01/2000 02:40:00	5.607
3CHI100	01/01/2000 02:50:00	5.142
3CHI100	01/01/2000 03:00:00	0

;Rainfall (mm/hr)

3CHI120	01/01/2000 00:00:00	6.406801
3CHI120	01/01/2000 00:10:00	7.6512
3CHI120	01/01/2000 00:20:00	9.572401
3CHI120	01/01/2000 00:30:00	12.9564
3CHI120	01/01/2000 00:40:00	20.5632
3CHI120	01/01/2000 00:50:00	54.1536
3CHI120	01/01/2000 01:00:00	213.7284
3CHI120	01/01/2000 01:10:00	61.2672
3CHI120	01/01/2000 01:20:00	31.3956
3CHI120	01/01/2000 01:30:00	21.0852
3CHI120	01/01/2000 01:40:00	15.9324
3CHI120	01/01/2000 01:50:00	12.8544
3CHI120	01/01/2000 02:00:00	10.8096
3CHI120	01/01/2000 02:10:00	9.351601
3CHI120	01/01/2000 02:20:00	8.259601
3CHI120	01/01/2000 02:30:00	7.4088
3CHI120	01/01/2000 02:40:00	6.7284
3CHI120	01/01/2000 02:50:00	6.170401
3CHI120	01/01/2000 03:00:00	0

;Rainfall (mm/hr)

3CHI2	01/01/2000 00:00:00	2.491
3CHI2	01/01/2000 00:10:00	2.966
3CHI2	01/01/2000 00:20:00	3.696
3CHI2	01/01/2000 00:30:00	4.976
3CHI2	01/01/2000 00:40:00	7.828
3CHI2	01/01/2000 00:50:00	19.966
3CHI2	01/01/2000 01:00:00	76.805
3CHI2	01/01/2000 01:10:00	22.777
3CHI2	01/01/2000 01:20:00	11.852
3CHI2	01/01/2000 01:30:00	8.025
3CHI2	01/01/2000 01:40:00	6.096
3CHI2	01/01/2000 01:50:00	4.938
3CHI2	01/01/2000 02:00:00	4.165
3CHI2	01/01/2000 02:10:00	3.613
3CHI2	01/01/2000 02:20:00	3.197
3CHI2	01/01/2000 02:30:00	2.873
3CHI2	01/01/2000 02:40:00	2.613
3CHI2	01/01/2000 02:50:00	2.4
3CHI2	01/01/2000 03:00:00	0

;Rainfall (mm/hr)

3CHI25	01/01/2000 00:00:00	4.358
3CHI25	01/01/2000 00:10:00	5.202
3CHI25	01/01/2000 00:20:00	6.506
3CHI25	01/01/2000 00:30:00	8.801
3CHI25	01/01/2000 00:40:00	13.954
3CHI25	01/01/2000 00:50:00	36.302
3CHI25	01/01/2000 01:00:00	144.693
3CHI25	01/01/2000 01:10:00	41.479
3CHI25	01/01/2000 01:20:00	21.286
3CHI25	01/01/2000 01:30:00	14.308
3CHI25	01/01/2000 01:40:00	10.818
3CHI25	01/01/2000 01:50:00	8.732
3CHI25	01/01/2000 02:00:00	7.345
3CHI25	01/01/2000 02:10:00	6.356
3CHI25	01/01/2000 02:20:00	5.615
3CHI25	01/01/2000 02:30:00	5.038
3CHI25	01/01/2000 02:40:00	4.576
3CHI25	01/01/2000 02:50:00	4.197
3CHI25	01/01/2000 03:00:00	0

;Rainfall (mm/hr)

3CHI5	01/01/2000 00:00:00	3.256
3CHI5	01/01/2000 00:10:00	3.881
3CHI5	01/01/2000 00:20:00	4.844
3CHI5	01/01/2000 00:30:00	6.532
3CHI5	01/01/2000 00:40:00	10.308
3CHI5	01/01/2000 00:50:00	26.792
3CHI5	01/01/2000 01:00:00	103.93
3CHI5	01/01/2000 01:10:00	30.286
3CHI5	01/01/2000 01:20:00	15.655
3CHI5	01/01/2000 01:30:00	10.568
3CHI5	01/01/2000 01:40:00	8.013
3CHI5	01/01/2000 01:50:00	6.482
3CHI5	01/01/2000 02:00:00	5.462
3CHI5	01/01/2000 02:10:00	4.733
3CHI5	01/01/2000 02:20:00	4.186
3CHI5	01/01/2000 02:30:00	3.76
3CHI5	01/01/2000 02:40:00	3.418
3CHI5	01/01/2000 02:50:00	3.137
3CHI5	01/01/2000 03:00:00	0

;Rainfall (mm/hr)

3CHI50	01/01/2000 00:00:00	4.828
3CHI50	01/01/2000 00:10:00	5.766
3CHI50	01/01/2000 00:20:00	7.214
3CHI50	01/01/2000 00:30:00	9.763
3CHI50	01/01/2000 00:40:00	15.496
3CHI50	01/01/2000 00:50:00	40.401
3CHI50	01/01/2000 01:00:00	161.471
3CHI50	01/01/2000 01:10:00	46.17
3CHI50	01/01/2000 01:20:00	23.66
3CHI50	01/01/2000 01:30:00	15.89
3CHI50	01/01/2000 01:40:00	12.006
3CHI50	01/01/2000 01:50:00	9.687
3CHI50	01/01/2000 02:00:00	8.146
3CHI50	01/01/2000 02:10:00	7.047
3CHI50	01/01/2000 02:20:00	6.224
3CHI50	01/01/2000 02:30:00	5.583
3CHI50	01/01/2000 02:40:00	5.07
3CHI50	01/01/2000 02:50:00	4.649
3CHI50	01/01/2000 03:00:00	0

;Rainfall (mm/hr)

4hr-25mm	01/01/2000 00:00:00	1.777
4hr-25mm	01/01/2000 00:15:00	2.357
4hr-25mm	01/01/2000 00:30:00	3.618
4hr-25mm	01/01/2000 00:45:00	8.975
4hr-25mm	01/01/2000 01:00:00	45.631
4hr-25mm	01/01/2000 01:15:00	11.911
4hr-25mm	01/01/2000 01:30:00	6.051
4hr-25mm	01/01/2000 01:45:00	4.108
4hr-25mm	01/01/2000 02:00:00	3.138
4hr-25mm	01/01/2000 02:15:00	2.555
4hr-25mm	01/01/2000 02:30:00	2.165
4hr-25mm	01/01/2000 02:45:00	1.885
4hr-25mm	01/01/2000 03:00:00	1.675
4hr-25mm	01/01/2000 03:15:00	1.509
4hr-25mm	01/01/2000 03:30:00	1.376
4hr-25mm	01/01/2000 03:45:00	1.266

;Rainfall (mm/hr)

```
6CHI10          01/01/2000 00:00:00   1.944
6CHI10          01/01/2000 00:10:00   2.097
6CHI10          01/01/2000 00:20:00   2.278
6CHI10          01/01/2000 00:30:00   2.499
6CHI10          01/01/2000 00:40:00   2.772
6CHI10          01/01/2000 00:50:00   3.122
6CHI10          01/01/2000 01:00:00   3.585
6CHI10          01/01/2000 01:10:00   4.231
6CHI10          01/01/2000 01:20:00   5.199
6CHI10          01/01/2000 01:30:00   6.823
6CHI10          01/01/2000 01:40:00   10.137
6CHI10          01/01/2000 01:50:00   20.829
6CHI10          01/01/2000 02:00:00   122.142
6CHI10          01/01/2000 02:10:00   41.92
6CHI10          01/01/2000 02:20:00   21.263
6CHI10          01/01/2000 02:30:00   13.557
6CHI10          01/01/2000 02:40:00   9.991
6CHI10          01/01/2000 02:50:00   7.945
6CHI10          01/01/2000 03:00:00   6.62
6CHI10          01/01/2000 03:10:00   5.692
6CHI10          01/01/2000 03:20:00   5.004
6CHI10          01/01/2000 03:30:00   4.474
6CHI10          01/01/2000 03:40:00   4.052
6CHI10          01/01/2000 03:50:00   3.708
6CHI10          01/01/2000 04:00:00   3.422
6CHI10          01/01/2000 04:10:00   3.181
6CHI10          01/01/2000 04:20:00   2.973
6CHI10          01/01/2000 04:30:00   2.794
6CHI10          01/01/2000 04:40:00   2.636
6CHI10          01/01/2000 04:50:00   2.497
6CHI10          01/01/2000 05:00:00   2.373
6CHI10          01/01/2000 05:10:00   2.262
6CHI10          01/01/2000 05:20:00   2.162
6CHI10          01/01/2000 05:30:00   2.071
6CHI10          01/01/2000 05:40:00   1.988
6CHI10          01/01/2000 05:50:00   1.912
6CHI10          01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6CHI100         01/01/2000 00:00:00   2.752
6CHI100         01/01/2000 00:10:00   2.969
6CHI100         01/01/2000 00:20:00   3.228
6CHI100         01/01/2000 00:30:00   3.542
6CHI100         01/01/2000 00:40:00   3.933
6CHI100         01/01/2000 00:50:00   4.432
6CHI100         01/01/2000 01:00:00   5.095
6CHI100         01/01/2000 01:10:00   6.021
6CHI100         01/01/2000 01:20:00   7.412
6CHI100         01/01/2000 01:30:00   9.748
6CHI100         01/01/2000 01:40:00   14.532
6CHI100         01/01/2000 01:50:00   30.054
6CHI100         01/01/2000 02:00:00   178.559
6CHI100         01/01/2000 02:10:00   60.818
6CHI100         01/01/2000 02:20:00   30.678
6CHI100         01/01/2000 02:30:00   19.483
6CHI100         01/01/2000 02:40:00   14.32
6CHI100         01/01/2000 02:50:00   11.366
6CHI100         01/01/2000 03:00:00   9.456
6CHI100         01/01/2000 03:10:00   8.119
6CHI100         01/01/2000 03:20:00   7.131
6CHI100         01/01/2000 03:30:00   6.37
6CHI100         01/01/2000 03:40:00   5.765
6CHI100         01/01/2000 03:50:00   5.272
6CHI100         01/01/2000 04:00:00   4.863
6CHI100         01/01/2000 04:10:00   4.517
6CHI100         01/01/2000 04:20:00   4.22
6CHI100         01/01/2000 04:30:00   3.964
6CHI100         01/01/2000 04:40:00   3.739
6CHI100         01/01/2000 04:50:00   3.54
6CHI100         01/01/2000 05:00:00   3.363
6CHI100         01/01/2000 05:10:00   3.205
6CHI100         01/01/2000 05:20:00   3.062
6CHI100         01/01/2000 05:30:00   2.932
6CHI100         01/01/2000 05:40:00   2.814
6CHI100         01/01/2000 05:50:00   2.706
6CHI100         01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6CHI120         01/01/2000 00:00:00   3.3024
6CHI120         01/01/2000 00:10:00   3.5628
6CHI120         01/01/2000 00:20:00   3.8736
6CHI120         01/01/2000 00:30:00   4.2504
6CHI120         01/01/2000 00:40:00   4.7196
6CHI120         01/01/2000 00:50:00   5.3184
6CHI120         01/01/2000 01:00:00   6.114
6CHI120         01/01/2000 01:10:00   7.2252
6CHI120         01/01/2000 01:20:00   8.894401
6CHI120         01/01/2000 01:30:00   11.6976
6CHI120         01/01/2000 01:40:00   17.4384
6CHI120         01/01/2000 01:50:00   36.0648
6CHI120         01/01/2000 02:00:00   214.2708
6CHI120         01/01/2000 02:10:00   72.98161
6CHI120         01/01/2000 02:20:00   36.8136
6CHI120         01/01/2000 02:30:00   23.3796
6CHI120         01/01/2000 02:40:00   17.184
6CHI120         01/01/2000 02:50:00   13.6392
6CHI120         01/01/2000 03:00:00   11.3472
6CHI120         01/01/2000 03:10:00   9.742801
6CHI120         01/01/2000 03:20:00   8.5572
6CHI120         01/01/2000 03:30:00   7.644
6CHI120         01/01/2000 03:40:00   6.918
6CHI120         01/01/2000 03:50:00   6.3264
6CHI120         01/01/2000 04:00:00   5.8356
6CHI120         01/01/2000 04:10:00   5.420401
6CHI120         01/01/2000 04:20:00   5.064
6CHI120         01/01/2000 04:30:00   4.7568
6CHI120         01/01/2000 04:40:00   4.4868
6CHI120         01/01/2000 04:50:00   4.248
6CHI120         01/01/2000 05:00:00   4.0356
6CHI120         01/01/2000 05:10:00   3.846
6CHI120         01/01/2000 05:20:00   3.6744
6CHI120         01/01/2000 05:30:00   3.5184
6CHI120         01/01/2000 05:40:00   3.3768
6CHI120         01/01/2000 05:50:00   3.2472
6CHI120         01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6CHI2           01/01/2000 00:00:00   1.297
6CHI2           01/01/2000 00:10:00   1.398
6CHI2           01/01/2000 00:20:00   1.518
6CHI2           01/01/2000 00:30:00   1.663
6CHI2           01/01/2000 00:40:00   1.843
6CHI2           01/01/2000 00:50:00   2.074
6CHI2           01/01/2000 01:00:00   2.379
6CHI2           01/01/2000 01:10:00   2.803
6CHI2           01/01/2000 01:20:00   3.439
6CHI2           01/01/2000 01:30:00   4.501
6CHI2           01/01/2000 01:40:00   6.66
6CHI2           01/01/2000 01:50:00   13.563
6CHI2           01/01/2000 02:00:00   76.805
6CHI2           01/01/2000 02:10:00   27.028
6CHI2           01/01/2000 02:20:00   13.849
6CHI2           01/01/2000 02:30:00   8.88
6CHI2           01/01/2000 02:40:00   6.566
6CHI2           01/01/2000 02:50:00   5.234
6CHI2           01/01/2000 03:00:00   4.369
6CHI2           01/01/2000 03:10:00   3.761
6CHI2           01/01/2000 03:20:00   3.311
6CHI2           01/01/2000 03:30:00   2.963
6CHI2           01/01/2000 03:40:00   2.686
6CHI2           01/01/2000 03:50:00   2.46
6CHI2           01/01/2000 04:00:00   2.272
6CHI2           01/01/2000 04:10:00   2.113
6CHI2           01/01/2000 04:20:00   1.976
6CHI2           01/01/2000 04:30:00   1.858
6CHI2           01/01/2000 04:40:00   1.754
6CHI2           01/01/2000 04:50:00   1.662
6CHI2           01/01/2000 05:00:00   1.58
6CHI2           01/01/2000 05:10:00   1.507
6CHI2           01/01/2000 05:20:00   1.441
6CHI2           01/01/2000 05:30:00   1.38
6CHI2           01/01/2000 05:40:00   1.326
6CHI2           01/01/2000 05:50:00   1.275
6CHI2           01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6CHI25          01/01/2000 00:00:00   2.249
6CHI25          01/01/2000 00:10:00   2.426
6CHI25          01/01/2000 00:20:00   2.637
6CHI25          01/01/2000 00:30:00   2.893
6CHI25          01/01/2000 00:40:00   3.212
6CHI25          01/01/2000 00:50:00   3.619
6CHI25          01/01/2000 01:00:00   4.159
6CHI25          01/01/2000 01:10:00   4.914
6CHI25          01/01/2000 01:20:00   6.046
6CHI25          01/01/2000 01:30:00   7.947
6CHI25          01/01/2000 01:40:00   11.837
6CHI25          01/01/2000 01:50:00   24.442
6CHI25          01/01/2000 02:00:00   144.693
6CHI25          01/01/2000 02:10:00   49.392
6CHI25          01/01/2000 02:20:00   24.95
6CHI25          01/01/2000 02:30:00   15.861
6CHI25          01/01/2000 02:40:00   11.666
6CHI25          01/01/2000 02:50:00   9.263
6CHI25          01/01/2000 03:00:00   7.71
6CHI25          01/01/2000 03:10:00   6.622
6CHI25          01/01/2000 03:20:00   5.817
6CHI25          01/01/2000 03:30:00   5.197
6CHI25          01/01/2000 03:40:00   4.705
6CHI25          01/01/2000 03:50:00   4.303
6CHI25          01/01/2000 04:00:00   3.97
6CHI25          01/01/2000 04:10:00   3.688
6CHI25          01/01/2000 04:20:00   3.446
6CHI25          01/01/2000 04:30:00   3.237
6CHI25          01/01/2000 04:40:00   3.054
6CHI25          01/01/2000 04:50:00   2.892
6CHI25          01/01/2000 05:00:00   2.747
6CHI25          01/01/2000 05:10:00   2.618
6CHI25          01/01/2000 05:20:00   2.501
6CHI25          01/01/2000 05:30:00   2.396
6CHI25          01/01/2000 05:40:00   2.299
6CHI25          01/01/2000 05:50:00   2.211
6CHI25          01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6CHI5           01/01/2000 00:00:00   1.69
6CHI5           01/01/2000 00:10:00   1.822
6CHI5           01/01/2000 00:20:00   1.979
6CHI5           01/01/2000 00:30:00   2.169
6CHI5           01/01/2000 00:40:00   2.406
6CHI5           01/01/2000 00:50:00   2.708
6CHI5           01/01/2000 01:00:00   3.109
6CHI5           01/01/2000 01:10:00   3.667
6CHI5           01/01/2000 01:20:00   4.504
6CHI5           01/01/2000 01:30:00   5.905
6CHI5           01/01/2000 01:40:00   8.759
6CHI5           01/01/2000 01:50:00   17.944
6CHI5           01/01/2000 02:00:00   104.193
6CHI5           01/01/2000 02:10:00   36.002
6CHI5           01/01/2000 02:20:00   18.319
6CHI5           01/01/2000 02:30:00   11.702
6CHI5           01/01/2000 02:40:00   8.634
6CHI5           01/01/2000 02:50:00   6.872
6CHI5           01/01/2000 03:00:00   5.73
6CHI5           01/01/2000 03:10:00   4.929
6CHI5           01/01/2000 03:20:00   4.335
6CHI5           01/01/2000 03:30:00   3.877
6CHI5           01/01/2000 03:40:00   3.513
6CHI5           01/01/2000 03:50:00   3.216
6CHI5           01/01/2000 04:00:00   2.969
6CHI5           01/01/2000 04:10:00   2.76
6CHI5           01/01/2000 04:20:00   2.58
6CHI5           01/01/2000 04:30:00   2.425
6CHI5           01/01/2000 04:40:00   2.289
6CHI5           01/01/2000 04:50:00   2.168
6CHI5           01/01/2000 05:00:00   2.061
6CHI5           01/01/2000 05:10:00   1.965
6CHI5           01/01/2000 05:20:00   1.878
6CHI5           01/01/2000 05:30:00   1.799
6CHI5           01/01/2000 05:40:00   1.727
6CHI5           01/01/2000 05:50:00   1.661
6CHI5           01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6CHI50          01/01/2000 00:00:00   2.489
6CHI50          01/01/2000 00:10:00   2.685
6CHI50          01/01/2000 00:20:00   2.919
6CHI50          01/01/2000 00:30:00   3.203
6CHI50          01/01/2000 00:40:00   3.556
6CHI50          01/01/2000 00:50:00   4.008
6CHI50          01/01/2000 01:00:00   4.608
6CHI50          01/01/2000 01:10:00   5.445
6CHI50          01/01/2000 01:20:00   6.702
6CHI50          01/01/2000 01:30:00   8.815
6CHI50          01/01/2000 01:40:00   13.141
6CHI50          01/01/2000 01:50:00   27.177
6CHI50          01/01/2000 02:00:00   161.471
6CHI50          01/01/2000 02:10:00   54.997
6CHI50          01/01/2000 02:20:00   27.742
6CHI50          01/01/2000 02:30:00   17.619
6CHI50          01/01/2000 02:40:00   12.949
6CHI50          01/01/2000 02:50:00   10.278
6CHI50          01/01/2000 03:00:00   8.551
6CHI50          01/01/2000 03:10:00   7.342
6CHI50          01/01/2000 03:20:00   6.448
6CHI50          01/01/2000 03:30:00   5.76
6CHI50          01/01/2000 03:40:00   5.213
6CHI50          01/01/2000 03:50:00   4.768
6CHI50          01/01/2000 04:00:00   4.397
6CHI50          01/01/2000 04:10:00   4.084
6CHI50          01/01/2000 04:20:00   3.817
6CHI50          01/01/2000 04:30:00   3.584
6CHI50          01/01/2000 04:40:00   3.381
6CHI50          01/01/2000 04:50:00   3.201
6CHI50          01/01/2000 05:00:00   3.041
6CHI50          01/01/2000 05:10:00   2.898
6CHI50          01/01/2000 05:20:00   2.769
6CHI50          01/01/2000 05:30:00   2.651
6CHI50          01/01/2000 05:40:00   2.545
6CHI50          01/01/2000 05:50:00   2.447
6CHI50          01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6SCS10          01/01/2000 00:00:00   3.564
6SCS10          01/01/2000 00:15:00   1.6632
6SCS10          01/01/2000 00:30:00   3.0888
6SCS10          01/01/2000 00:45:00   3.0888
6SCS10          01/01/2000 01:00:00   4.0392
6SCS10          01/01/2000 01:15:00   3.564
6SCS10          01/01/2000 01:30:00   4.752
6SCS10          01/01/2000 01:45:00   4.752
6SCS10          01/01/2000 02:00:00   6.4152
6SCS10          01/01/2000 02:15:00   8.078401
6SCS10          01/01/2000 02:30:00   12.8304
6SCS10          01/01/2000 02:45:00   101.6928
6SCS10          01/01/2000 03:00:00   25.8984
6SCS10          01/01/2000 03:15:00   11.4048
6SCS10          01/01/2000 03:30:00   7.6032
6SCS10          01/01/2000 03:45:00   6.652801
6SCS10          01/01/2000 04:00:00   5.2272
6SCS10          01/01/2000 04:15:00   5.4648
6SCS10          01/01/2000 04:30:00   3.564
6SCS10          01/01/2000 04:45:00   2.8512
6SCS10          01/01/2000 05:00:00   4.0392
6SCS10          01/01/2000 05:15:00   2.6136
6SCS10          01/01/2000 05:30:00   2.376
6SCS10          01/01/2000 05:45:00   2.376
6SCS10          01/01/2000 06:00:00   0
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;Rainfall (mm/hr)
6SCS100          01/01/2000 00:00:00   5.22
6SCS100          01/01/2000 00:15:00   2.436
6SCS100          01/01/2000 00:30:00   4.524
6SCS100          01/01/2000 00:45:00   4.524
6SCS100          01/01/2000 01:00:00   5.916
6SCS100          01/01/2000 01:15:00   5.22
6SCS100          01/01/2000 01:30:00   6.96
6SCS100          01/01/2000 01:45:00   6.96
6SCS100          01/01/2000 02:00:00   9.396
6SCS100          01/01/2000 02:15:00   11.832
6SCS100          01/01/2000 02:30:00   18.792
6SCS100          01/01/2000 02:45:00   148.944
6SCS100          01/01/2000 03:00:00   37.932
6SCS100          01/01/2000 03:15:00   16.704
6SCS100          01/01/2000 03:30:00   11.136
6SCS100          01/01/2000 03:45:00   9.744
6SCS100          01/01/2000 04:00:00   7.656
6SCS100          01/01/2000 04:15:00   8.004
6SCS100          01/01/2000 04:30:00   5.22
6SCS100          01/01/2000 04:45:00   4.176
6SCS100          01/01/2000 05:00:00   5.916
6SCS100          01/01/2000 05:15:00   3.828
6SCS100          01/01/2000 05:30:00   3.48
6SCS100          01/01/2000 05:45:00   3.48
6SCS100          01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6SCS120          01/01/2000 00:00:00   6.264
6SCS120          01/01/2000 00:15:00   2.9232
6SCS120          01/01/2000 00:30:00   5.4288
6SCS120          01/01/2000 00:45:00   5.4288
6SCS120          01/01/2000 01:00:00   7.099201
6SCS120          01/01/2000 01:15:00   6.264
6SCS120          01/01/2000 01:30:00   8.352
6SCS120          01/01/2000 01:45:00   8.352
6SCS120          01/01/2000 02:00:00   11.2752
6SCS120          01/01/2000 02:15:00   14.1984
6SCS120          01/01/2000 02:30:00   22.5504
6SCS120          01/01/2000 02:45:00   178.7328
6SCS120          01/01/2000 03:00:00   45.5184
6SCS120          01/01/2000 03:15:00   20.0448
6SCS120          01/01/2000 03:30:00   13.3632
6SCS120          01/01/2000 03:45:00   11.6928
6SCS120          01/01/2000 04:00:00   9.187201
6SCS120          01/01/2000 04:15:00   9.6048
6SCS120          01/01/2000 04:30:00   6.264
6SCS120          01/01/2000 04:45:00   5.0112
6SCS120          01/01/2000 05:00:00   7.099201
6SCS120          01/01/2000 05:15:00   4.5936
6SCS120          01/01/2000 05:30:00   4.176
6SCS120          01/01/2000 05:45:00   4.176
6SCS120          01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6SCS2            01/01/2000 00:00:00   2.232
6SCS2            01/01/2000 00:15:00   1.0416
6SCS2            01/01/2000 00:30:00   1.9344
6SCS2            01/01/2000 00:45:00   1.9344
6SCS2            01/01/2000 01:00:00   2.5296
6SCS2            01/01/2000 01:15:00   2.232
6SCS2            01/01/2000 01:30:00   2.976
6SCS2            01/01/2000 01:45:00   2.976
6SCS2            01/01/2000 02:00:00   4.0176
6SCS2            01/01/2000 02:15:00   5.0592
6SCS2            01/01/2000 02:30:00   8.0352
6SCS2            01/01/2000 02:45:00   63.6864
6SCS2            01/01/2000 03:00:00   16.2192
6SCS2            01/01/2000 03:15:00   7.1424
6SCS2            01/01/2000 03:30:00   4.7616
6SCS2            01/01/2000 03:45:00   4.1664
6SCS2            01/01/2000 04:00:00   3.2736
6SCS2            01/01/2000 04:15:00   3.4224
6SCS2            01/01/2000 04:30:00   2.232
6SCS2            01/01/2000 04:45:00   1.7856
6SCS2            01/01/2000 05:00:00   2.5296
6SCS2            01/01/2000 05:15:00   1.6368
6SCS2            01/01/2000 05:30:00   1.488
6SCS2            01/01/2000 05:45:00   1.488
6SCS2            01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6SCS25           01/01/2000 00:00:00   4.212
6SCS25           01/01/2000 00:15:00   1.9656
6SCS25           01/01/2000 00:30:00   3.6504
6SCS25           01/01/2000 00:45:00   3.6504
6SCS25           01/01/2000 01:00:00   4.7736
6SCS25           01/01/2000 01:15:00   4.212
6SCS25           01/01/2000 01:30:00   5.616
6SCS25           01/01/2000 01:45:00   5.616
6SCS25           01/01/2000 02:00:00   7.5816
6SCS25           01/01/2000 02:15:00   9.5472
6SCS25           01/01/2000 02:30:00   15.1632
6SCS25           01/01/2000 02:45:00   120.1824
6SCS25           01/01/2000 03:00:00   30.6072
6SCS25           01/01/2000 03:15:00   13.4784
6SCS25           01/01/2000 03:30:00   8.9856
6SCS25           01/01/2000 03:45:00   7.8624
6SCS25           01/01/2000 04:00:00   6.1776
6SCS25           01/01/2000 04:15:00   6.4584
6SCS25           01/01/2000 04:30:00   4.212
6SCS25           01/01/2000 04:45:00   3.3696
6SCS25           01/01/2000 05:00:00   4.7736
6SCS25           01/01/2000 05:15:00   3.0888
6SCS25           01/01/2000 05:30:00   2.808
6SCS25           01/01/2000 05:45:00   2.808
6SCS25           01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6SCS5            01/01/2000 00:00:00   3.024
6SCS5            01/01/2000 00:15:00   1.4112
6SCS5            01/01/2000 00:30:00   2.6208
6SCS5            01/01/2000 00:45:00   2.6208
6SCS5            01/01/2000 01:00:00   3.4272
6SCS5            01/01/2000 01:15:00   3.024
6SCS5            01/01/2000 01:30:00   4.032
6SCS5            01/01/2000 01:45:00   4.032
6SCS5            01/01/2000 02:00:00   5.4432
6SCS5            01/01/2000 02:15:00   6.854401
6SCS5            01/01/2000 02:30:00   10.8864
6SCS5            01/01/2000 02:45:00   86.28481
6SCS5            01/01/2000 03:00:00   21.9744
6SCS5            01/01/2000 03:15:00   9.676801
6SCS5            01/01/2000 03:30:00   6.4512
6SCS5            01/01/2000 03:45:00   5.6448
6SCS5            01/01/2000 04:00:00   4.4352
6SCS5            01/01/2000 04:15:00   4.6368
6SCS5            01/01/2000 04:30:00   3.024
6SCS5            01/01/2000 04:45:00   2.4192
6SCS5            01/01/2000 05:00:00   3.4272
6SCS5            01/01/2000 05:15:00   2.2176
6SCS5            01/01/2000 05:30:00   2.016
6SCS5            01/01/2000 05:45:00   2.016
6SCS5            01/01/2000 06:00:00   0

;Rainfall (mm/hr)
6SCS50           01/01/2000 00:00:00   4.716
6SCS50           01/01/2000 00:15:00   2.2008
6SCS50           01/01/2000 00:30:00   4.0872
6SCS50           01/01/2000 00:45:00   4.0872
6SCS50           01/01/2000 01:00:00   5.3448
6SCS50           01/01/2000 01:15:00   4.716
6SCS50           01/01/2000 01:30:00   6.288
6SCS50           01/01/2000 01:45:00   6.288
6SCS50           01/01/2000 02:00:00   8.4888
6SCS50           01/01/2000 02:15:00   10.6896
6SCS50           01/01/2000 02:30:00   16.9776
6SCS50           01/01/2000 02:45:00   134.5632
6SCS50           01/01/2000 03:00:00   34.2696
6SCS50           01/01/2000 03:15:00   15.0912
6SCS50           01/01/2000 03:30:00   10.0608
6SCS50           01/01/2000 03:45:00   8.8032
6SCS50           01/01/2000 04:00:00   6.9168
6SCS50           01/01/2000 04:15:00   7.2312
6SCS50           01/01/2000 04:30:00   4.716
6SCS50           01/01/2000 04:45:00   3.7728
6SCS50           01/01/2000 05:00:00   5.3448
6SCS50           01/01/2000 05:15:00   3.4584
6SCS50           01/01/2000 05:30:00   3.144
6SCS50           01/01/2000 05:45:00   3.144
6SCS50           01/01/2000 06:00:00   0

;Depth (m)
POND             01/01/2000 00:01:00   0
POND             01/01/2000 00:02:00   0
POND             01/01/2000 00:03:00   0
POND             01/01/2000 00:04:00   0
POND             01/01/2000 00:05:00   0
POND             01/01/2000 00:06:00   0
POND             01/01/2000 00:07:00   0
POND             01/01/2000 00:08:00   0
POND             01/01/2000 00:09:00   0
POND             01/01/2000 00:10:00   0
POND             01/01/2000 00:11:00   0
......
Too many data points (720 in total).

[REPORT]
;;Reporting Options
INPUT     YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]
Subcatch   SWM_BLOCK        Dry_Pond
Node       OGS              OGS_Unit
Node       POND             Pond
Link       CULV-1           Culvert

[MAP]
DIMENSIONS       467680.54815     5030256.89155    467898.30085     5030528.60145
UNITS            Meters

[COORDINATES]
;;Node            X-Coord            Y-Coord
;;--------------- ------------------ ------------------
Ditch            467770.833         5030279.242
OF1              467764.696         5030276.585
OF2              467862.637         5030430.33
J3               467763.915         5030297.109
OGS              467762.549         5030300.204
POND             467741.875         5030351.271
SU1              467762.068         5030301.327

[VERTICES]
;;Link            X-Coord            Y-Coord
;;--------------- ------------------ ------------------
W1               467745.933         5030349.124
W1               467763.697         5030305.328

[POLYGONS]
;;Subcatchment   X-Coord            Y-Coord
;;--------------- ------------------ ------------------
B1               467825.173         5030505.586
B1               467821.722         5030514.009
B1               467821.722         5030514.009
B1               467820.804         5030516.251
B1               467820.804         5030516.251
B1               467805.391         5030510.029
B1               467805.391         5030510.029
B1               467806.913         5030506.25
B1               467806.913         5030506.25
B1               467809.628         5030499.477
B1               467809.628         5030499.477
B1               467799.956         5030495.6
B1               467799.956         5030495.6
B1               467800.403         5030494.499
B1               467800.403         5030494.499
B1               467796.705         5030493.02
B1               467796.705         5030493.02
B1               467796.578         5030492.964
B1               467796.456         5030492.9
B1               467796.338         5030492.828
B1               467796.226         5030492.747
B1               467796.119         5030492.659
B1               467796.019         5030492.564
B1               467795.925         5030492.462
B1               467795.839         5030492.354
B1               467795.76          5030492.241
B1               467795.689         5030492.122
B1               467795.627         5030491.998
B1               467795.573         5030491.871
B1               467795.528         5030491.74
B1               467795.493         5030491.607
B1               467795.466         5030491.471
B1               467795.449         5030491.334
B1               467795.441         5030491.196
B1               467795.443         5030491.058
B1               467795.454         5030490.92
B1               467795.475         5030490.783
B1               467795.505         5030490.648
B1               467795.544         5030490.516
B1               467795.592         5030490.386
B1               467795.592         5030490.386
B1               467817.28          5030437.626
B1               467817.28          5030437.626
B1               467825.025         5030432.901
B1               467825.025         5030432.901
B1               467831.539         5030417.002
B1               467831.539         5030417.002
B1               467847.984         5030423.628
B1               467847.984         5030423.628
B1               467858.412         5030398.201
B1               467858.412         5030398.201
B1               467858.751         5030390.215
B1               467858.751         5030390.215
B1               467871.967         5030357.957
B1               467871.967         5030357.957
B1               467872.826         5030355.81
B1               467872.826         5030355.81
B1               467882.228         5030359.571
B1               467882.228         5030359.571
B1               467884.498         5030359.541
B1               467884.498         5030359.541
B1               467884.569         5030359.544
B1               467884.639         5030359.552
B1               467884.709         5030359.565
B1               467884.778         5030359.582
B1               467884.845         5030359.603
B1               467884.911         5030359.63
B1               467884.911         5030359.63
B1               467884.936         5030359.641
B1               467884.962         5030359.654
B1               467885.012         5030359.681
B1               467825.173         5030505.586
B2               467732.466         5030359.95
B2               467711.599         5030411.409
B2               467711.599         5030411.409
B2               467691.952         5030459.86
B2               467691.952         5030459.86
B2               467690.446         5030463.586
B2               467690.446         5030463.586
B2               467747.92          5030486.808
B2               467747.92          5030486.808
B2               467805.391         5030510.029
```

```
B2              467805.391      5030510.029
B2              467809.621      5030499.474
B2              467809.621      5030499.474
B2              467799.971      5030495.562
B2              467799.971      5030495.562
B2              467800.403      5030494.499
B2              467800.403      5030494.499
B2              467796.705      5030493.02
B2              467796.705      5030493.02
B2              467796.579      5030492.964
B2              467796.456      5030492.9
B2              467796.339      5030492.828
B2              467796.227      5030492.748
B2              467796.12       5030492.66
B2              467796.02       5030492.565
B2              467795.926      5030492.463
B2              467795.84       5030492.356
B2              467795.761      5030492.242
B2              467795.69       5030492.124
B2              467795.628      5030492.001
B2              467795.574      5030491.873
B2              467795.529      5030491.743
B2              467795.493      5030491.61
B2              467795.466      5030491.474
B2              467795.449      5030491.337
B2              467795.441      5030491.199
B2              467795.443      5030491.061
B2              467795.454      5030490.924
B2              467795.474      5030490.787
B2              467795.504      5030490.652
B2              467795.543      5030490.52
B2              467795.591      5030490.39
B2              467795.591      5030490.39
B2              467817.28       5030437.626
B2              467817.28       5030437.626
B2              467825.025      5030432.901
B2              467825.025      5030432.901
B2              467831.539      5030417.002
B2              467831.539      5030417.002
B2              467847.984      5030423.628
B2              467847.984      5030423.628
B2              467858.412      5030398.201
B2              467858.412      5030398.201
B2              467858.751      5030390.215
B2              467858.751      5030390.215
B2              467871.967      5030357.957
B2              467871.967      5030357.957
B2              467872.826      5030355.81
B2              467872.826      5030355.81
B2              467882.228      5030359.571
B2              467882.228      5030359.571
B2              467884.911      5030359.571
B2              467884.911      5030359.571
B2              467888.403      5030350.841
B2              467888.403      5030350.841
B2              467843.38       5030332.831
B2              467843.38       5030332.831
B2              467803.795      5030316.584
B2              467803.795      5030316.584
B2              467803.097      5030318.284
B2              467803.097      5030318.284
B2              467803.254      5030318.35
B2              467803.405      5030318.426
B2              467803.551      5030318.513
B2              467803.69       5030318.609
B2              467803.823      5030318.715
B2              467803.948      5030318.83
B2              467804.064      5030318.953
B2              467804.172      5030319.084
B2              467804.271      5030319.222
B2              467804.36       5030319.367
B2              467804.438      5030319.517
B2              467804.506      5030319.672
B2              467804.564      5030319.832
B2              467804.61       5030319.995
B2              467804.644      5030320.161
B2              467804.668      5030320.329
B2              467804.679      5030320.499
B2              467804.679      5030320.668
B2              467804.667      5030320.837
B2              467804.643      5030321.005
B2              467804.608      5030321.171
B2              467804.562      5030321.334
B2              467804.504      5030321.494
B2              467804.504      5030321.494
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B2              467797.013      5030340.175
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B2              467796.866      5030340.478
B2              467796.777      5030340.622
B2              467796.678      5030340.758
B2              467796.57       5030340.888
B2              467796.454      5030341.01
B2              467796.329      5030341.123
B2              467796.196      5030341.227
B2              467796.056      5030341.322
B2              467795.911      5030341.407
B2              467795.759      5030341.481
B2              467795.603      5030341.545
B2              467795.443      5030341.598
B2              467795.279      5030341.639
B2              467795.113      5030341.669
B2              467794.945      5030341.687
B2              467794.777      5030341.694
B2              467794.608      5030341.688
B2              467794.441      5030341.671
B2              467794.274      5030341.643
B2              467794.11       5030341.602
B2              467793.95       5030341.551
B2              467793.793      5030341.488
B2              467793.793      5030341.488
B2              467786.936      5030338.739
B2              467786.936      5030338.739
B2              467786.768      5030338.678
B2              467786.596      5030338.63
B2              467786.421      5030338.594
B2              467786.245      5030338.571
B2              467786.066      5030338.56
B2              467785.888      5030338.562
B2              467785.71       5030338.577
B2              467785.534      5030338.604
B2              467785.36       5030338.644
B2              467785.189      5030338.696
B2              467785.023      5030338.761
B2              467785.023      5030338.761
B2              467767.422      5030346.286
B2              467767.422      5030346.286
B2              467767.26       5030346.362
B2              467767.105      5030346.45
B2              467766.956      5030346.548
B2              467766.814      5030346.656
B2              467766.681      5030346.775
B2              467766.556      5030346.902
B2              467766.441      5030347.039
B2              467766.335      5030347.183
B2              467766.24       5030347.334
B2              467766.157      5030347.492
B2              467766.084      5030347.655
B2              467766.084      5030347.655
B2              467758.096      5030367.577
B2              467758.096      5030367.577
B2              467758.024      5030367.74
B2              467757.94       5030367.898
B2              467757.845      5030368.049
B2              467757.74       5030368.193
B2              467757.625      5030368.33
B2              467757.5        5030368.457
B2              467757.366      5030368.576
B2              467757.225      5030368.684
B2              467757.076      5030368.782
B2              467756.92       5030368.87
B2              467756.759      5030368.946
B2              467756.592      5030369.01
B2              467756.421      5030369.062
B2              467756.247      5030369.102
B2              467756.071      5030369.129
B2              467755.893      5030369.144
B2              467755.715      5030369.146
B2              467755.537      5030369.135
B2              467755.36       5030369.112
B2              467755.185      5030369.076
B2              467755.013      5030369.028
B2              467754.845      5030368.967
B2              467754.845      5030368.967
B2              467732.466      5030359.95
SWM_BLOCK       467732.466      5030359.95
SWM_BLOCK       467754.845      5030368.967
SWM_BLOCK       467754.845      5030368.967
SWM_BLOCK       467755.006      5030369.026
SWM_BLOCK       467755.17       5030369.073
SWM_BLOCK       467755.337      5030369.109
SWM_BLOCK       467755.506      5030369.133
SWM_BLOCK       467755.676      5030369.146
SWM_BLOCK       467755.847      5030369.147
SWM_BLOCK       467756.017      5030369.137
SWM_BLOCK       467756.187      5030369.114
SWM_BLOCK       467756.354      5030369.081
SWM_BLOCK       467756.519      5030369.036
SWM_BLOCK       467756.68       5030368.979
SWM_BLOCK       467756.837      5030368.912
SWM_BLOCK       467756.989      5030368.835
SWM_BLOCK       467757.136      5030368.747
SWM_BLOCK       467757.276      5030368.649
SWM_BLOCK       467757.409      5030368.542
SWM_BLOCK       467757.534      5030368.426
SWM_BLOCK       467757.651      5030368.302
SWM_BLOCK       467757.76       5030368.17
SWM_BLOCK       467757.859      5030368.03
SWM_BLOCK       467757.948      5030367.885
SWM_BLOCK       467758.027      5030367.734
SWM_BLOCK       467758.096      5030367.577
SWM_BLOCK       467758.096      5030367.577
SWM_BLOCK       467766.084      5030347.655
SWM_BLOCK       467766.084      5030347.655
SWM_BLOCK       467766.157      5030347.492
SWM_BLOCK       467766.24       5030347.334
SWM_BLOCK       467766.335      5030347.183
SWM_BLOCK       467766.441      5030347.039
SWM_BLOCK       467766.556      5030346.902
SWM_BLOCK       467766.681      5030346.775
SWM_BLOCK       467766.814      5030346.656
SWM_BLOCK       467766.956      5030346.548
SWM_BLOCK       467767.105      5030346.45
SWM_BLOCK       467767.26       5030346.362
SWM_BLOCK       467767.422      5030346.286
SWM_BLOCK       467785.023      5030338.761
SWM_BLOCK       467785.023      5030338.761
SWM_BLOCK       467785.189      5030338.696
SWM_BLOCK       467785.36       5030338.644
SWM_BLOCK       467785.534      5030338.604
SWM_BLOCK       467785.71       5030338.577
SWM_BLOCK       467785.888      5030338.562
SWM_BLOCK       467786.066      5030338.56
SWM_BLOCK       467786.245      5030338.571
SWM_BLOCK       467786.421      5030338.594
SWM_BLOCK       467786.596      5030338.63
SWM_BLOCK       467786.768      5030338.678
SWM_BLOCK       467786.936      5030338.739
SWM_BLOCK       467786.936      5030338.739
SWM_BLOCK       467793.793      5030341.488
SWM_BLOCK       467793.793      5030341.488
SWM_BLOCK       467793.958      5030341.548
SWM_BLOCK       467794.126      5030341.595
SWM_BLOCK       467794.297      5030341.631
SWM_BLOCK       467794.47       5030341.655
SWM_BLOCK       467794.644      5030341.667
SWM_BLOCK       467794.819      5030341.666
SWM_BLOCK       467794.993      5030341.654
SWM_BLOCK       467795.166      5030341.629
SWM_BLOCK       467795.337      5030341.592
SWM_BLOCK       467795.505      5030341.543
SWM_BLOCK       467795.669      5030341.483
SWM_BLOCK       467795.828      5030341.411
SWM_BLOCK       467795.982      5030341.329
SWM_BLOCK       467796.13       5030341.236
SWM_BLOCK       467796.271      5030341.132
SWM_BLOCK       467796.404      5030341.02
SWM_BLOCK       467796.53       5030340.898
SWM_BLOCK       467796.646      5030340.767
SWM_BLOCK       467796.753      5030340.629
SWM_BLOCK       467796.85       5030340.484
SWM_BLOCK       467796.937      5030340.332
SWM_BLOCK       467797.013      5030340.175
SWM_BLOCK       467797.013      5030340.175
SWM_BLOCK       467804.504      5030321.494
SWM_BLOCK       467804.504      5030321.494
SWM_BLOCK       467804.562      5030321.334
SWM_BLOCK       467804.608      5030321.171
SWM_BLOCK       467804.643      5030321.005
SWM_BLOCK       467804.667      5030320.837
SWM_BLOCK       467804.679      5030320.668
SWM_BLOCK       467804.679      5030320.499
SWM_BLOCK       467804.668      5030320.329
SWM_BLOCK       467804.644      5030320.161
SWM_BLOCK       467804.61       5030319.995
SWM_BLOCK       467804.564      5030319.832
SWM_BLOCK       467804.506      5030319.672
SWM_BLOCK       467804.438      5030319.517
SWM_BLOCK       467804.36       5030319.367
SWM_BLOCK       467804.271      5030319.222
SWM_BLOCK       467804.172      5030319.084
SWM_BLOCK       467804.064      5030318.953
SWM_BLOCK       467803.948      5030318.83
SWM_BLOCK       467803.823      5030318.715
SWM_BLOCK       467803.69       5030318.609
SWM_BLOCK       467803.551      5030318.513
SWM_BLOCK       467803.405      5030318.426
SWM_BLOCK       467803.254      5030318.35
SWM_BLOCK       467803.097      5030318.284
SWM_BLOCK       467803.097      5030318.284
SWM_BLOCK       467803.795      5030316.584
SWM_BLOCK       467803.795      5030316.584
SWM_BLOCK       467757.649      5030297.845
SWM_BLOCK       467757.649      5030297.845
SWM_BLOCK       467732.466      5030359.95

[SYMBOLS]
;;Gage          X-Coord         Y-Coord
;;--------------- ---------------- ----------------
```

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
  --------------------------------------------------------------


  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 3
  Number of nodes ........... 7
  Number of links ........... 6
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
                                                    Data       Recording
  Name                 Data Source                  Type       Interval
  -----------------------------------------------------------------------
  Rainfall             3CHI100                      INTENSITY  10 min.


  *********************
  Subcatchment Summary
  *********************
  Name                        Area     Width   %Imperv    %Slope Rain Gage
Outlet
  ------------------------------------------------------------------------------
----------
  B1                          0.37    165.75     14.55    2.0000 Rainfall
OF2
  B2                          1.89    180.23     62.21    2.0000 Rainfall
POND
  SWM_BLOCK                   0.26    211.33     50.00    3.0000 Rainfall
POND


  ************
  Node Summary
  ************
                                                Invert      Max.    Ponded    External
  Name                 Type                      Elev.     Depth      Area    Inflow
  ------------------------------------------------------------------------------
  Ditch                JUNCTION                 84.30      1.00       0.0
  OF1                  OUTFALL                  84.28      0.48       0.0
  OF2                  OUTFALL                  85.41      0.00       0.0
  J3                   STORAGE                  84.74      1.19       0.0
  OGS                  STORAGE                  84.61      1.32       0.0
  POND                 STORAGE                  85.00      0.94       0.0
  SU1                  STORAGE                  84.61      1.32       0.0


  ************
  Link Summary
  ************
  Name            From Node        To Node          Type            Length
%Slope Roughness
  ------------------------------------------------------------------------------
--------------
  C1              SU1              OGS              CONDUIT            2.1
2.3816    0.0130
  C1_2            OGS              J3               CONDUIT            4.5
2.0004    0.0130
  C3              Ditch            OF1              CONDUIT            6.7
0.2990    0.0250
  CULV-1          J3               Ditch            CONDUIT           16.0
0.3750    0.0240
  OR1             POND             SU1              ORIFICE
  W1              POND             SU1              WEIR


  *********************
  Cross Section Summary
  *********************
                                        Full     Full     Hyd.     Max.   No. of
Full
  Conduit         Shape                Depth     Area     Rad.    Width  Barrels
Flow
  ------------------------------------------------------------------------------
---------
  C1              CIRCULAR              0.45     0.16     0.11     0.45        1
0.44
  C1_2            CIRCULAR              0.45     0.16     0.11     0.45        1
0.40
  C3              Ditch                 0.48     2.01     0.30     7.56        1
1.97
  CULV-1          ARCH                  0.50     0.27     0.15     0.68        1
0.19



  ***************
  Transect Summary
  ***************

  Transect Ditch
  Area:
              0.0019     0.0070     0.0131     0.0199     0.0273
              0.0354     0.0441     0.0535     0.0636     0.0743
              0.0857     0.0977     0.1103     0.1235     0.1372
              0.1514     0.1662     0.1816     0.1975     0.2140
              0.2310     0.2486     0.2667     0.2853     0.3045
              0.3243     0.3445     0.3654     0.3874     0.4103
              0.4343     0.4594     0.4855     0.5124     0.5397
              0.5671     0.5949     0.6228     0.6510     0.6794
              0.7081     0.7371     0.7668     0.7975     0.8290
              0.8614     0.8948     0.9290     0.9640     1.0000
  Hrad:
              0.0161     0.0390     0.0655     0.0899     0.1129
              0.1348     0.1559     0.1762     0.1960     0.2153
              0.2342     0.2535     0.2738     0.2938     0.3134
              0.3328     0.3518     0.3707     0.3894     0.4078
              0.4261     0.4445     0.4627     0.4808     0.4988
              0.5166     0.5344     0.5443     0.5503     0.5572
              0.5649     0.5732     0.5822     0.6018     0.6273
              0.6525     0.6774     0.7021     0.7266     0.7509
              0.7749     0.8016     0.8304     0.8580     0.8842
              0.9094     0.9335     0.9566     0.9787     1.0000
  Width:
              0.1028     0.1587     0.1768     0.1949     0.2129
              0.2310     0.2491     0.2672     0.2852     0.3033
              0.3214     0.3385     0.3537     0.3688     0.3840
              0.3992     0.4144     0.4295     0.4447     0.4599
              0.4750     0.4899     0.5048     0.5197     0.5346
              0.5495     0.5644     0.5878     0.6164     0.6449
              0.6735     0.7020     0.7306     0.7452     0.7516
              0.7581     0.7646     0.7710     0.7775     0.7840
              0.7904     0.8053     0.8297     0.8540     0.8783
              0.9027     0.9270     0.9513     0.9757     1.0000


  ***********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ***********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CMS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... CURVE_NUMBER
  Flow Routing Method ...... DYNWAVE
  Surcharge Method ......... EXTRAN
  Starting Date ............ 01/01/2000 00:00:00
  Ending Date .............. 01/05/2000 00:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:01:00
  Wet Time Step ............ 00:05:00
  Dry Time Step ............ 00:05:00
  Routing Time Step ........ 1.00 sec
  Variable Time Step ....... YES
  Maximum Trials ........... 8
  Number of Threads ........ 1
  Head Tolerance ........... 0.001500 m

  *************************       Volume         Depth
  Runoff Quantity Continuity     hectare-m          mm
  *************************     ---------       -------
  Total Precipitation ......         0.181       71.708
  Evaporation Loss .........         0.000        0.000
  Infiltration Loss ........         0.052       20.629
  Surface Runoff ...........         0.127       50.289
  Final Storage ............         0.004        1.424
  Continuity Error (%) .....        -0.884

  *************************       Volume         Volume
  Flow Routing Continuity        hectare-m      10^6 ltr
  *************************     ----------      ---------
  Dry Weather Inflow .......         0.000        0.000
  Wet Weather Inflow .......         0.127        1.267
  Groundwater Inflow .......         0.000        0.000
  RDII Inflow ..............         0.000        0.000
  External Inflow ..........         0.000        0.000
  External Outflow .........         0.127        1.267
  Flooding Loss ............         0.000        0.000
  Evaporation Loss .........         0.000        0.000
  Exfiltration Loss ........         0.000        0.000
  Initial Stored Volume ....         0.000        0.000
  Final Stored Volume ......         0.000        0.000
  Continuity Error (%) .....         0.007


  ***************************
  Time-Step Critical Elements
  ***************************
  Link C1 (4.17%)


  *********************************
  Highest Flow Instability Indexes
  *********************************
  All links are stable.


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :     0.61 sec
  Average Time Step           :     0.99 sec
  Maximum Time Step           :     1.00 sec
  Percent in Steady State     :    -0.00
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      1.000 -  0.871 sec      :    96.70 %
      0.871 -  0.758 sec      :     0.95 %
      0.758 -  0.660 sec      :     1.30 %
      0.660 -  0.574 sec      :     1.04 %
      0.574 -  0.500 sec      :     0.00 %


  ***************************
  Subcatchment Runoff Summary
  ***************************

  ------------------------------------------------------------------------------
-----------------------------------------
                                  Total      Total      Total      Total      Imperv
Perv      Total      Total       Peak     Runoff
                                 Precip      Runon       Evap      Infil     Runoff
Runoff     Runoff     Runoff    Runoff     Coeff
  Subcatchment                       mm         mm         mm         mm         mm
mm         mm    10^6 ltr       CMS
  ------------------------------------------------------------------------------
-----------------------------------------
  B1                               71.71       0.00       0.00      32.83      10.23
38.04      38.04       0.14       0.07      0.530
  B2                               71.71       0.00       0.00      18.48      43.97
52.45      52.45       0.99       0.54      0.731
  SWM_BLOCK                        71.71       0.00       0.00      18.83      35.15
16.95      52.10       0.13       0.10      0.726


  ******************
  Node Depth Summary
  ******************

  ------------------------------------------------------------------------------
--
                                  Average  Maximum  Maximum  Time of Max
Reported
                                    Depth    Depth      HGL   Occurrence    Max
Depth
  Node                 Type       Meters   Meters   Meters  days hr:min
Meters
  ------------------------------------------------------------------------------
--
  Ditch                JUNCTION     0.01     0.13    84.43     0  01:53
0.13
  OF1                  OUTFALL      0.01     0.13    84.41     0  01:53
0.13
  OF2                  OUTFALL      0.00     0.00    85.41     0  00:00
0.00
  J3                   STORAGE      0.02     0.24    84.98     0  01:52
0.24
  OGS                  STORAGE      0.26     0.54    85.15     0  01:52
0.54
  POND                 STORAGE      0.06     0.58    85.58     0  01:52
0.58
  SU1                  STORAGE      0.31     0.64    85.25     0  01:52
0.64


  *******************
  Node Inflow Summary
  *******************

  ------------------------------------------------------------------------------
------------------
                                  Maximum  Maximum                    Lateral
Total        Flow
                                  Lateral    Total  Time of Max       Inflow
Inflow     Balance
                                   Inflow   Inflow   Occurrence       Volume
Volume       Error
  Node                 Type           CMS      CMS  days hr:min     10^6 ltr
10^6 ltr     Percent
  ------------------------------------------------------------------------------
------------------
  Ditch                JUNCTION     0.000    0.096     0  01:52            0
1.13      -0.005
  OF1                  OUTFALL      0.000    0.096     0  01:53            0
1.13       0.000
```

```
  OF2                OUTFALL      0.073    0.073     0  01:10        0.141
0.141       0.000
  J3                 STORAGE      0.000    0.096     0  01:52            0
1.13        0.004
  OGS                STORAGE      0.000    0.096     0  01:52            0
1.13        0.001
  POND               STORAGE      0.570    0.570     0  01:15         1.13
1.13       -0.000
  SU1                STORAGE      0.000    0.096     0  01:52            0
1.13        0.008


  **********************
  Node Surcharge Summary
  **********************

  No nodes were surcharged.


  **********************
  Node Flooding Summary
  **********************

  No nodes were flooded.


  **********************
  Storage Volume Summary
  **********************

  ------------------------------------------------------------------------------
-------------------
                         Average     Avg  Evap Exfil       Maximum     Max
Time of Max     Maximum
                          Volume    Pcnt  Pcnt  Pcnt        Volume    Pcnt
Occurrence     Outflow
  Storage Unit          1000 m3    Full  Loss  Loss       1000 m3    Full
days hr:min         CMS
  ------------------------------------------------------------------------------
-------------------
  J3                      0.000       1     0     0         0.001      19
0  01:52       0.096
  OGS                     0.000      20     0     0         0.001      41
0  01:52       0.096
  POND                    0.048       3     0     0         0.699      45
0  01:52       0.096
  SU1                     0.000      23     0     0         0.000      48
0  01:52       0.096


  **********************
  Outfall Loading Summary
  **********************

  ---------------------------------------------------
                        Flow       Avg       Max       Total
                        Freq      Flow      Flow      Volume
  Outfall Node           Pcnt       CMS       CMS    10^6 ltr
  ---------------------------------------------------
  OF1                   18.77     0.021     0.096       1.126
  OF2                    4.12     0.012     0.073       0.141
  ---------------------------------------------------
  System                11.44     0.033     0.111       1.267


  ********************
  Link Flow Summary
  ********************

  ---------------------------------------------------------------------------
                                  Maximum  Time of Max   Maximum    Max/    Max/
                                  |Flow|   Occurrence   |Veloc|    Full    Full
  Link                 Type          CMS  days hr:min     m/sec    Flow   Depth
  ---------------------------------------------------------------------------
  C1                   CONDUIT     0.096     0  01:52      0.79    0.22    0.72
  C1_2                 CONDUIT     0.096     0  01:52      1.01    0.24    0.58
  C3                   CHANNEL     0.096     0  01:53      0.42    0.05    0.27
  CULV-1               CONDUIT     0.096     0  01:52      0.82    0.50    0.40
  OR1                  ORIFICE     0.014     0  01:20                      1.00
  W1                   WEIR        0.084     0  01:52                      0.32


  ***************************
  Flow Classification Summary
  ***************************

  ------------------------------------------------------------------------------
------
                       Adjusted    ---------- Fraction of Time in Flow Class -----
-----
                        /Actual         Up    Down  Sub   Sup   Up    Down  Norm
Inlet
  Conduit                Length    Dry  Dry   Dry   Crit  Crit  Crit  Crit  Ltd
Ctrl
  ------------------------------------------------------------------------------
------
  C1                       1.00   0.00  0.06  0.00  0.90  0.03  0.00  0.00  0.82
0.00
  C1_2                     1.00   0.00  0.00  0.00  0.04  0.12  0.00  0.83  0.00
0.00
  C3                       1.00   0.01  0.00  0.00  0.99  0.00  0.00  0.00  0.91
0.00
  CULV-1                   1.00   0.00  0.00  0.00  0.00  0.00  0.00  1.00  0.00
0.01


  ************************
  Conduit Surcharge Summary
  ************************

  No conduits were surcharged.


  Analysis begun on:  Thu Sep  8 10:07:39 2022
  Analysis ended on:  Thu Sep  8 10:07:41 2022
  Total elapsed time: 00:00:02
```

Hydrologic Parameters

Table 1: Pre-Development Conditions

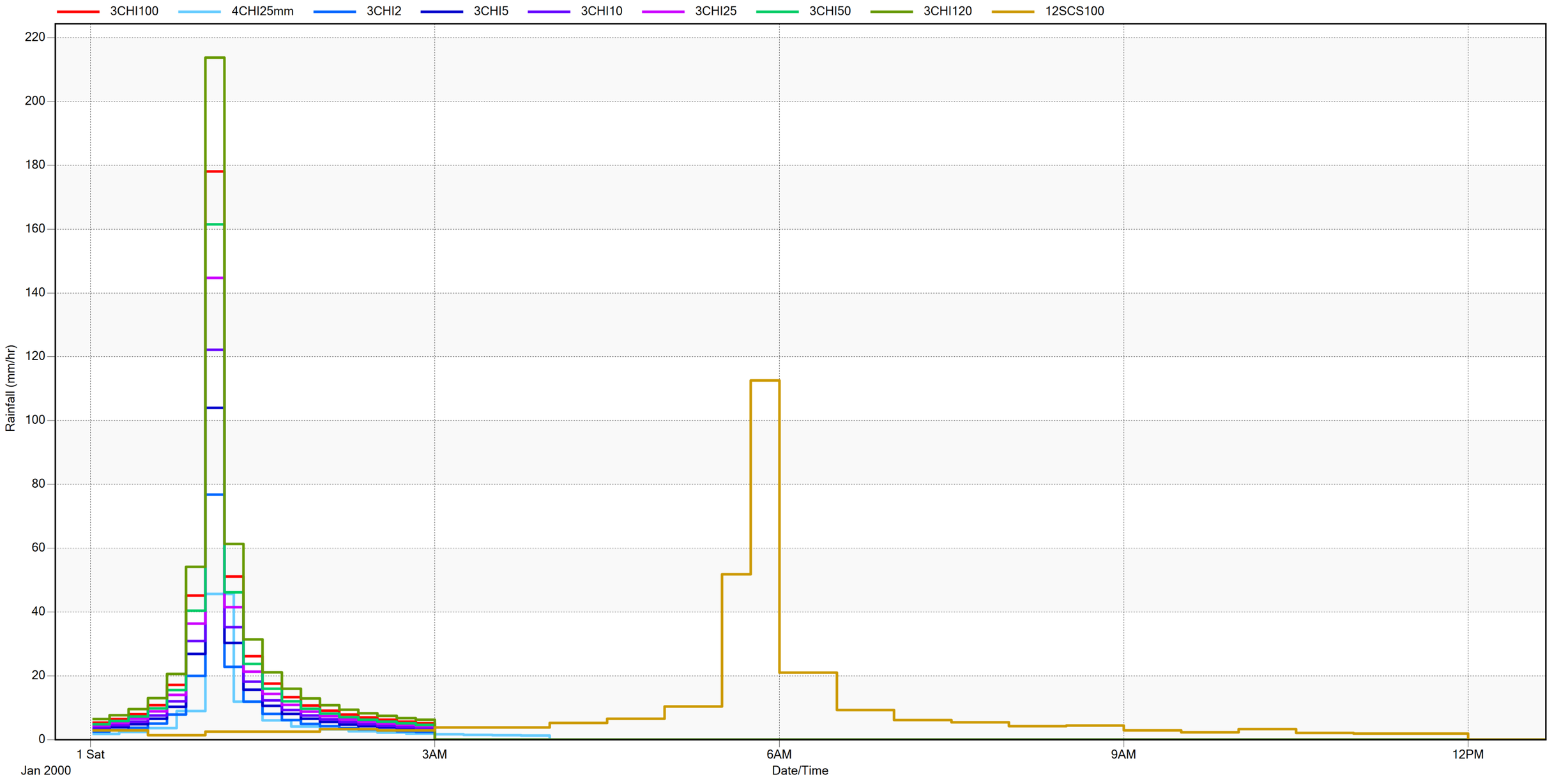
Name	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv (%)	N Imperv	N Perv	Dstore Imperv (mm)	Dstore Perv (mm)	Subarea Routing	Percent Routed (%)	CN
S1	2.102	231.963	90.635	0.707	3	0.013	0.25	1.57	4.67	OUTLET	100	86
S2	0.500	151.840	32.936	2.060	10	0.013	0.25	1.57	4.67	PERVIOUS	80	86

Table 2: Existing Conditions

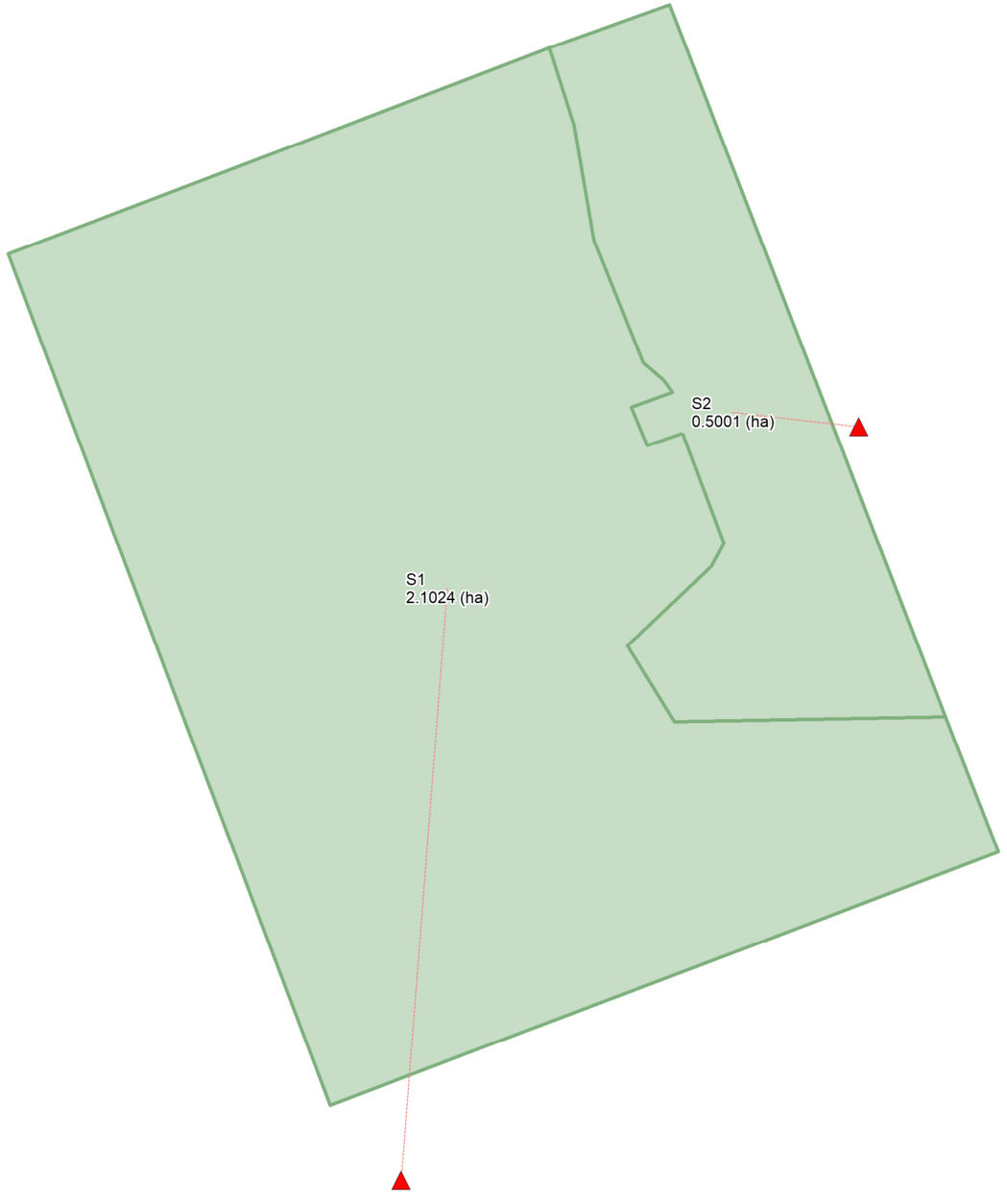
Name	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv (%)	N Imperv	N Perv	Dstore Imperv (mm)	Dstore Perv (mm)	Subarea Routing	Percent Routed (%)	CN
S1	1.150	107.730	106.721	0.732	0	0.013	0.25	1.57	4.67	OUTLET	100	86.0
S2	0.244	63.342	38.584	2.000	0	0.013	0.25	1.57	4.67	OUTLET	100	86.2
S3	0.060	81.941	7.322	2.000	0	0.013	0.25	1.57	4.67	OUTLET	100	85.5
S4	1.020	63.750	160.000	1.000	61	0.013	0.25	1.57	4.67	OUTLET	100	80
S5	0.152	125.440	12.101	33.330	50	0.013	0.25	1.57	4.67	OUTLET	100	80

Table 3: Post Development Conditions

Name	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv (%)	N Imperv	N Perv	Dstore Imperv (mm)	Dstore Perv (mm)	Subarea Routing	Percent Routed (%)	CN
B1	0.371	165.753	22.389	2	14.6	0.013	0.25	1.57	4.67	PERVIOUS	100	80
B2	1.892	180.230	104.949	2	62.2	0.013	0.25	1.57	4.67	PERVIOUS	100	71.2
SWM_BLOCK	0.258	211.330	12.199	3	50.0	0.013	0.25	1.57	4.67	OUTLET	100	80



PROJECT: **Hydro One Operations Centre** **3450 Frank Kenny Road, Orléans ON**			
DRAWING: Hyteographs			
J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS		DESIGN: BP DRAWN: BP CHECKED: BP	JLR NO.: 31500-000 DRAWING NO.: Figure 1



Legend

- Outfalls
- Subcatchments

N

45 m

PROJECT:

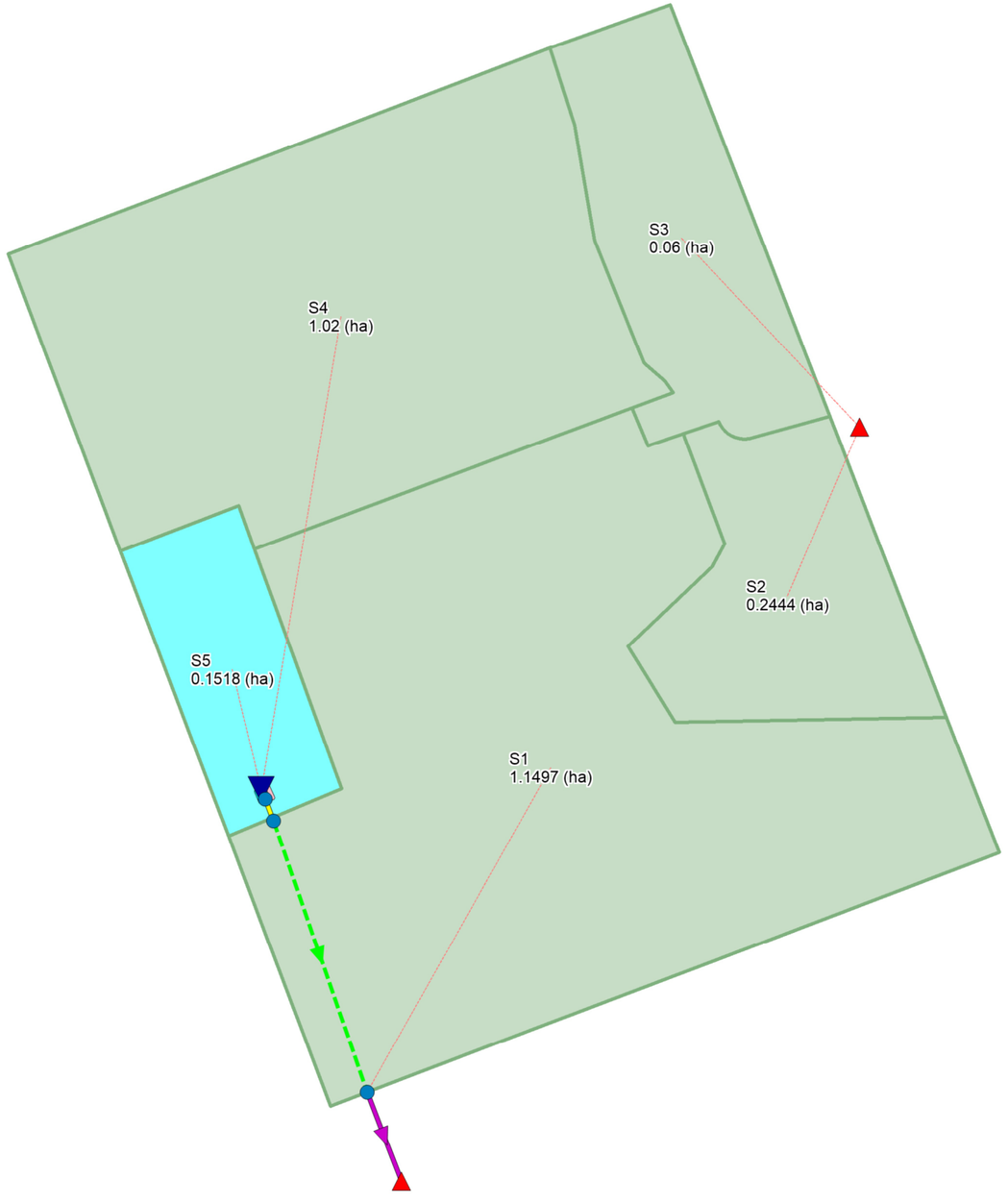
Hydro One Oprations Centre
3450 Frank Kenny Road, Orleans, ON

DRAWING:

Stormwater Management Report
Pre-Development Condition Model Schematic

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	ID	JLR NO.:	31500-000
DRAWN:	ID	DRAWING NO.:	FIGURE E-1
CHECKED:	BP		



Legend

- Junctions
- Outfalls
- Dry Pond - Existing Condition

Conduits

- Conduits
- Conduits
- Outlet Channel
- Culvert

- Orifices
- Weirs

Subcatchments

- Site
- SWM Block - Dry Pond

N

45 m

PROJECT:

Hydro One Oprations Centre
3450 Frank Kenny Road, Orleans, ON

DRAWING:

Stormwater Management Report
Existing Development Model Schematic

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	ID	JLR NO.:	31500-000
DRAWN:	ID	DRAWING NO.:	FIGURE E-2
CHECKED:	BP		

Legend

- Junctions
- Outfalls

Storages

- Storages
- Dry Pond

Conduits

- Conduits
- Conduits
- Culvert

- Orifices
- Weirs

Subcatchments

- Site
- Site

N

45 m

PROJECT:

Hydro One Oprations Centre
3450 Frank Kenny Road, Orleans, ON

DRAWING:

Stormwater Management Report
Post Development Condition Model Schematic

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	ID	JLR NO.:	31500-000
DRAWN:	ID	DRAWING NO.:	FIGURE E-3
CHECKED:	BP		

CDS AVERAGE ANNUAL EFFICIENCY FOR TSS REMOVAL & TOTAL ANNUAL VOLUME TREATED

Project: Honi Orleans
Location: Orleans
OGS ID: OGS

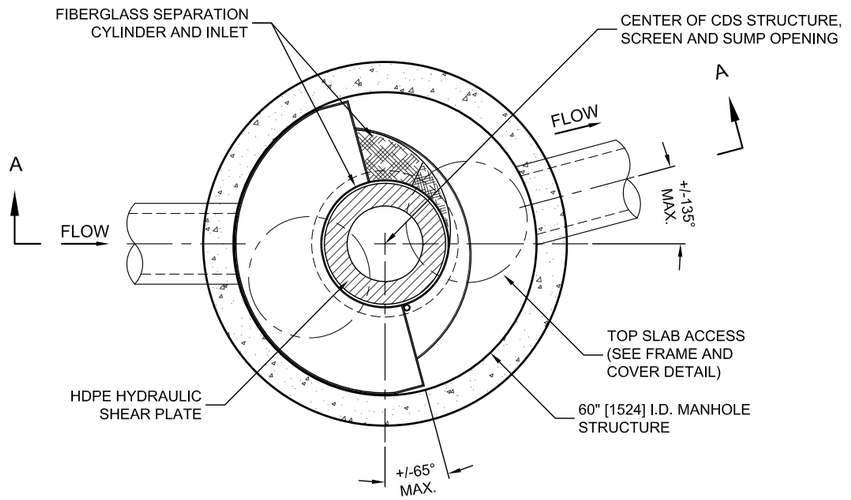
Engineer: JL Richards
Contact: Marie-France Duthilleul
Date: 26/Aug/22

Area: 2.13 ha
Rc: 0.58
Upstream Storage: 699 m3
CDS Model: PMSU2015_5

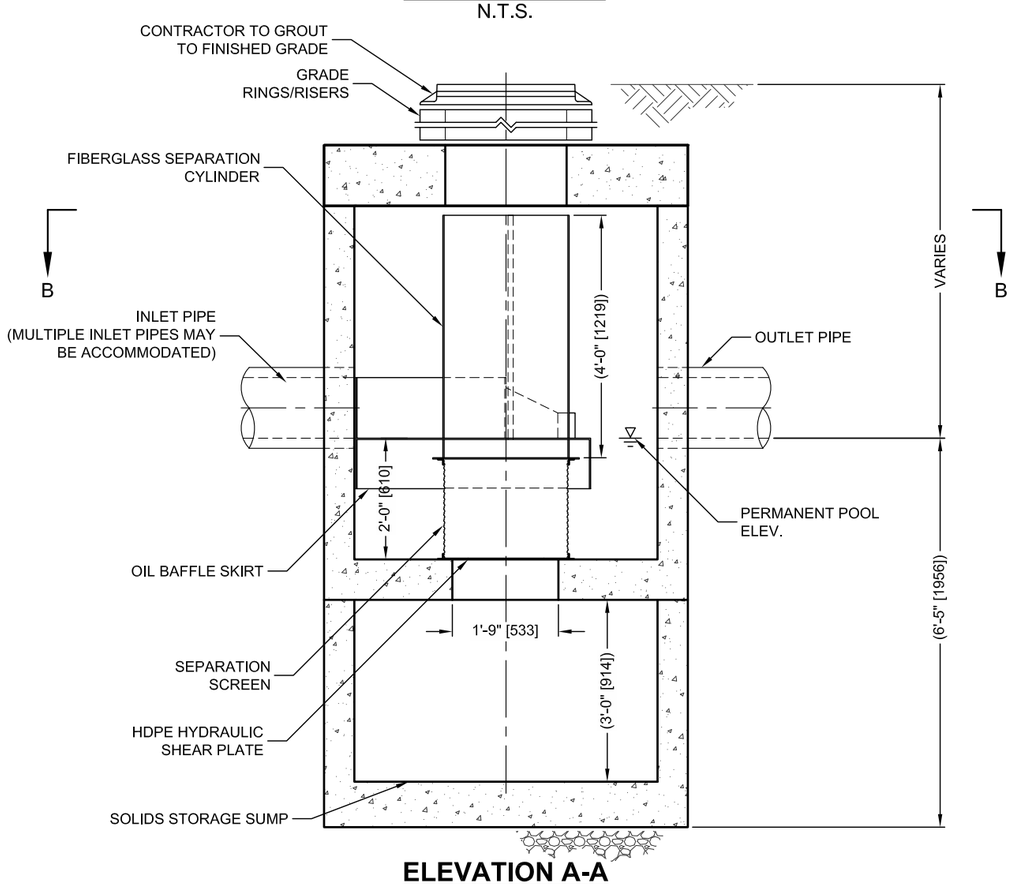
Treatment Capacity: 20 l/s
Particle Size Distribution: FINE
IDF Rainfall Data: City of Ottawa

Return	Period	Peak Flow	TSS Percentage Captured	Treated Flow Volume	Total Flow Volume	Annual Exceedance Probability	System Flow	CDS Flow	By-Pass Flow	Volume Percentage Treated
month / yr	Yr	l/s	%	litres	litres	%	l/s	l/s	l/s	%
1-M	0.083	3.43	95.00	24518	24518	**100.00**	3.43	3.43	0.00	100.00
2-M	0.1667	4.34	93.99	30831	30831	**99.75**	4.34	4.34	0.00	100.00
3-M	0.25	5.11	93.14	36123	36123	**98.17**	5.11	5.11	0.00	100.00
4-M	0.333	5.80	92.36	40964	40964	**95.04**	5.80	5.80	0.00	100.00
5-M	0.417	6.98	91.02	49201	49201	**90.91**	6.98	6.98	0.00	100.00
6-M	0.5	8.16	89.69	57438	57438	**86.47**	8.16	8.16	0.00	100.00
7-M	0.583	8.47	89.33	59647	59647	**82.01**	8.47	8.47	0.00	100.00
8-M	0.667	8.78	88.97	61856	61856	**77.67**	8.78	8.78	0.00	100.00
9-M	0.75	9.09	88.61	64065	64065	**73.64**	9.09	9.09	0.00	100.00
10-M	0.833	9.67	87.95	68191	68191	**69.90**	9.67	9.67	0.00	100.00
11-M	0.917	10.25	87.28	72316	72316	**66.40**	10.25	10.25	0.00	100.00
1-Yr	1	10.83	86.61	76442	76442	**63.21**	10.83	10.83	0.00	100.00
2-Yr	2	11.73	85.57	82845	82845	**39.35**	11.73	11.73	0.00	100.00
5-Yr	5	22.50	71.65	158597	163027	**18.13**	22.50	20.10	2.39	97.28
10-Yr	10	36.80	46.11	183003	279626	**9.52**	36.80	20.10	16.69	65.45
25-Yr	25	58.30	26.90	185067	484028	**3.92**	58.30	20.10	38.19	38.23
50-Yr	50	76.50	20.77	185974	629818	**1.98**	76.50	20.10	56.40	29.53
100-Yr	100	96.80	17.48	186267	749225	**1.00**	96.80	20.10	76.70	24.86
Average Annual TSS Removal Efficiency [%]:					**89.8**	Ave. Ann. T. Volume [%]:				**99.0**

Notes:
1) CDS Efficiency based on testing conducted at the University of Central Florida
2) CDS design flowrate and scaling based on standard manufacturer model & product specificiations



PLAN VIEW B-B
N.T.S.



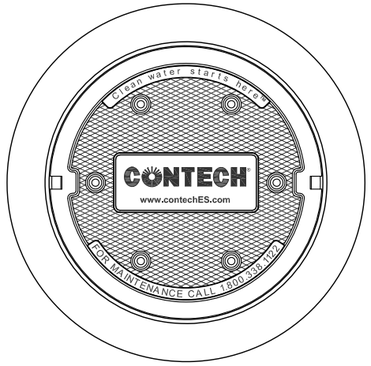
ELEVATION A-A
N.T.S.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,600; 6,581,783; RELATED FOREIGN PATENTS. OR OTHER PATENTS PENDING.

CDS PMSU2015-5-C DESIGN NOTES

THE STANDARD CDS PMSU2015-5-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
CUSTOMIZABLE SUMP DEPTH AVAILABLE
ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

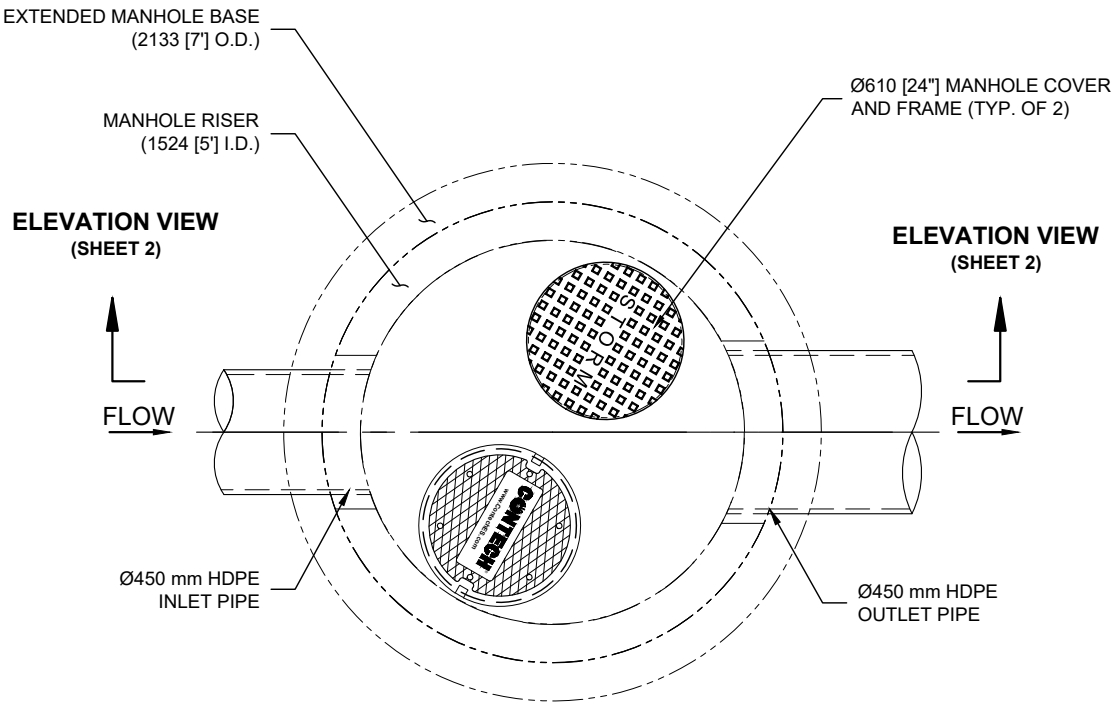
INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS PMSU2015-5-C INLINE CDS STANDARD DETAIL

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

PLAN VIEW



CDS MODEL PMSU2015-5-C, 0.7 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

MCON

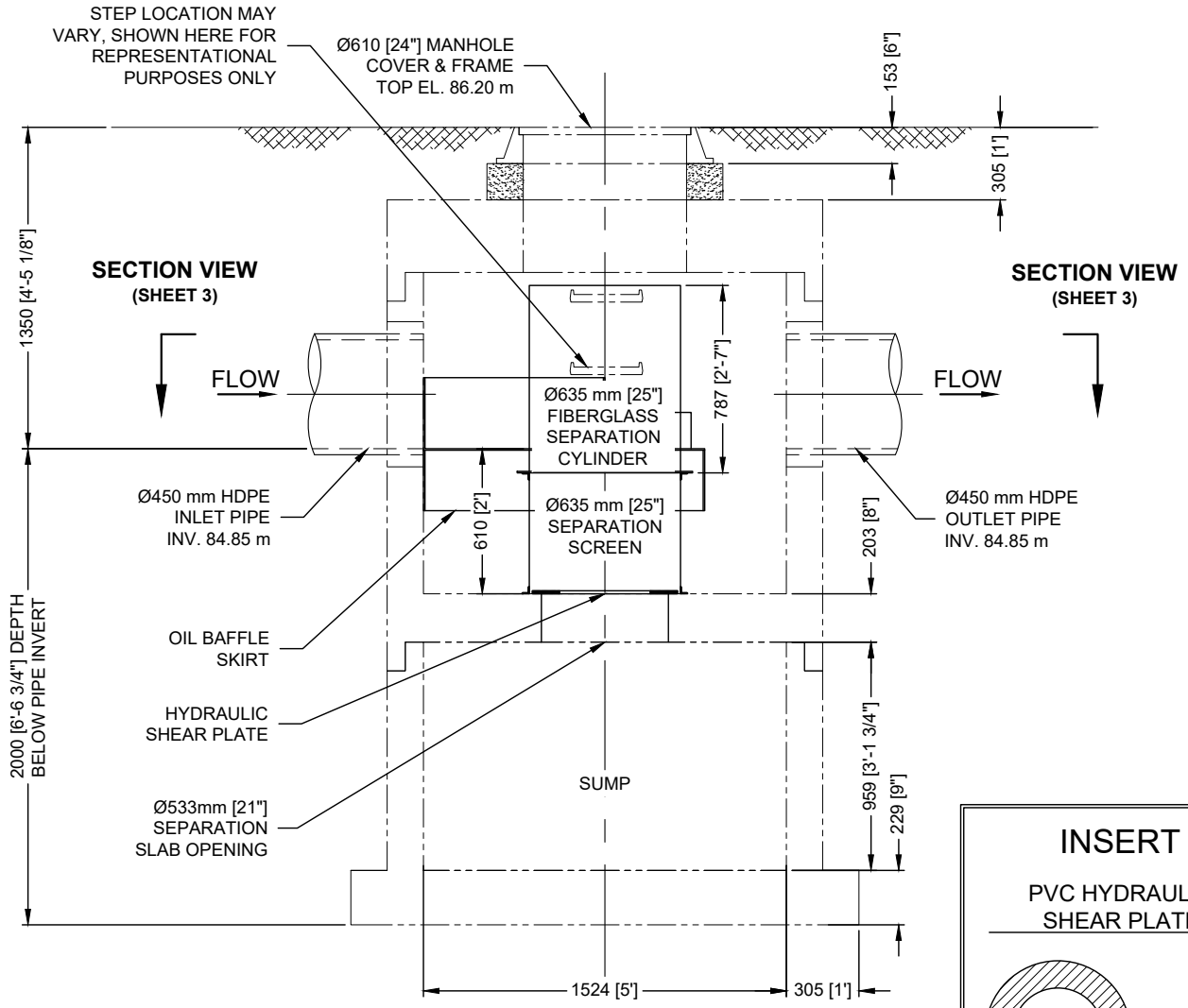
ALL UNITS IN mm UNLESS NOTED OTHERWISE.

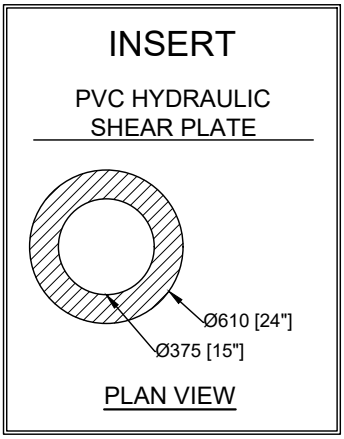
CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
200 Enterprise Drive, Scarborough, ME 04074
877-907-8676 207-885-9830 207-885-9825 FAX

HONI ORLEANS
ORLEANS, ON
SITE DESIGNATION: OGS

JOB No. : 10041-001	SCALE : 1:30
DATE : 9/1/2022	SHEET : 1
DRAWN : LY	
APPROV. :	

ELEVATION VIEW





NOTE:
CONTRACTOR TO FIELD VERIFY DIMENSIONS OF CONCRETE SECTIONS

CDS MODEL PMSU2015-5-C, 0.7 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

MCON

ALL UNITS IN mm UNLESS NOTED OTHERWISE.

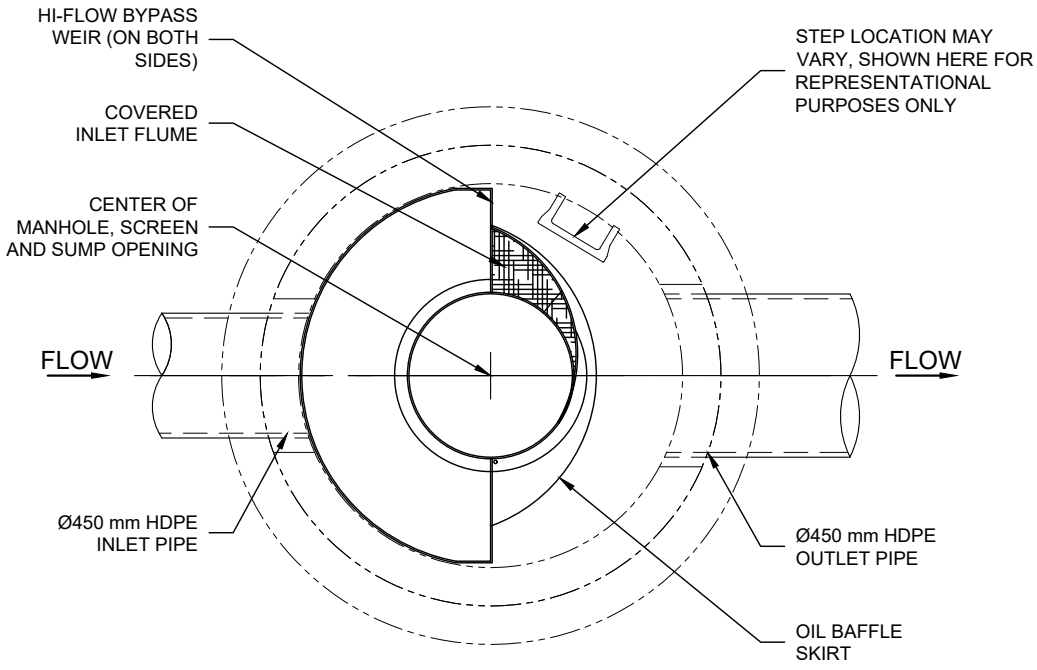
CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
200 Enterprise Drive, Scarborough, ME 04074
877-907-8676 207-885-9830 207-885-9825 FAX

HONI ORLEANS
ORLEANS, ON
SITE DESIGNATION: OGS

JOB No. : 10041-001	SCALE : 1:30
DATE : 9/1/2022	SHEET : 2
DRAWN : LY	
APPROV. :	

Echelon Environmental, 55 Albert Street, Suite 200, Markham, Ontario L3P 2T4 Tel: (905) 948-0000 Fax: (905) 948-0577

SECTION VIEW



CDS MODEL PMSU2015-5-C, 0.7 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

MCON

ALL UNITS IN mm UNLESS NOTED OTHERWISE.

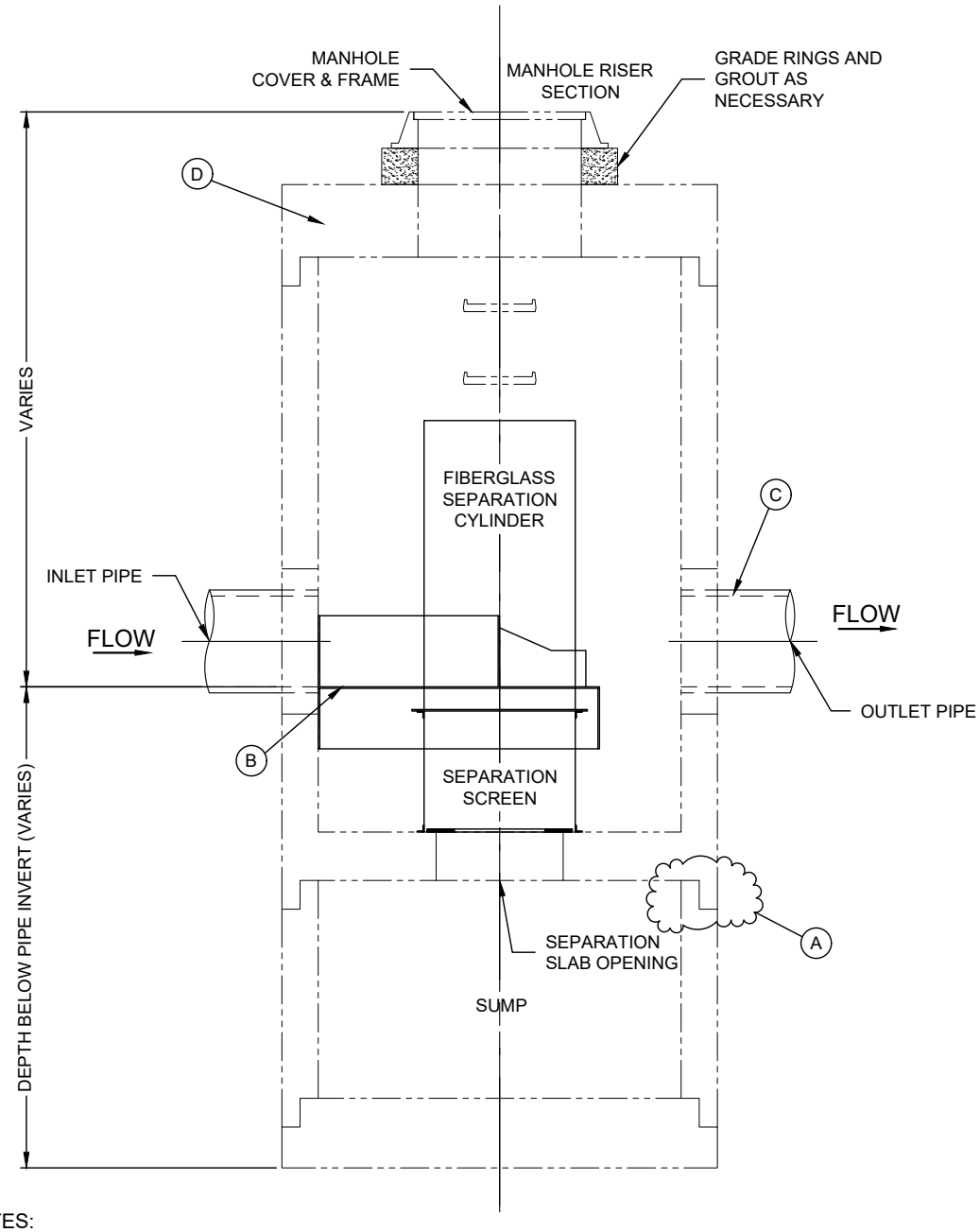
CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
200 Enterprise Drive, Scarborough, ME 04074
877-907-8676 207-885-9830 207-885-9825 FAX

HONI ORLEANS
ORLEANS, ON
SITE DESIGNATION: OGS

JOB No. : 10041-001	SCALE : 1:30
DATE : 9/1/2022	SHEET : 3
DRAWN : LY	
APPROV. :	

Echelon Environmental, 55 Albert Street, Suite 200, Markham, Ontario L3P 2T4 Tel: (905) 948-0000 Fax: (905) 948-0577

CONSTRUCTION NOTES



CONSTRUCTION NOTES:

A. APPLY BUTYL MASTIC AND/OR GROUT TO SEAL JOINTS OF MANHOLE STRUCTURE. APPLY LOAD TO MASTIC SEAL IN JOINTS OF MH SECTIONS TO COMPRESS SEALANT IF NECESSARY. UNIT MUST BE WATER TIGHT, HOLDING WATER UP TO FLOWLINE INVERT (MINIMUM).
B. BEFORE PLACING MORE PRECAST COMPONENTS OR BACKFILLING, ENSURE FIBERGLASS INLET AND PIPE INLET INVERT ELEVATIONS MATCH.
C. USE FLEXIBLE GASKETING OR GROUT TO SEAL INLET & OUTLET PIPE CONNECTIONS.
D. ENSURE THAT TOP SLAB IS PLACED CORRECTLY AS SHOWN ON DRAWINGS; USE GRADE RINGS, BLOCKS AND/OR GROUT TO MATCH FINISHED GRADE - SEAL AS REQ'D.

GENERAL NOTES:

1. CDS UNIT COMES COMPLETE W/ FIBERGLASS INLET/OIL BAFFLE & SEPARATION SCREEN ASSEMBLY PRE-INSTALLED AND PARTIALLY DISASSEMBLED FOR SHIPPING; CONTRACTOR TO RE-FASTEN ASSEMBLIES WHERE APPLICABLE.
2. INSTALL CDS UNIT PER CDS INSTALLATION SPECIFICATIONS.
3. CONTRACTOR TO BE EQUIPPED TO HANDLE THE HEAVIEST PICK SECTION.

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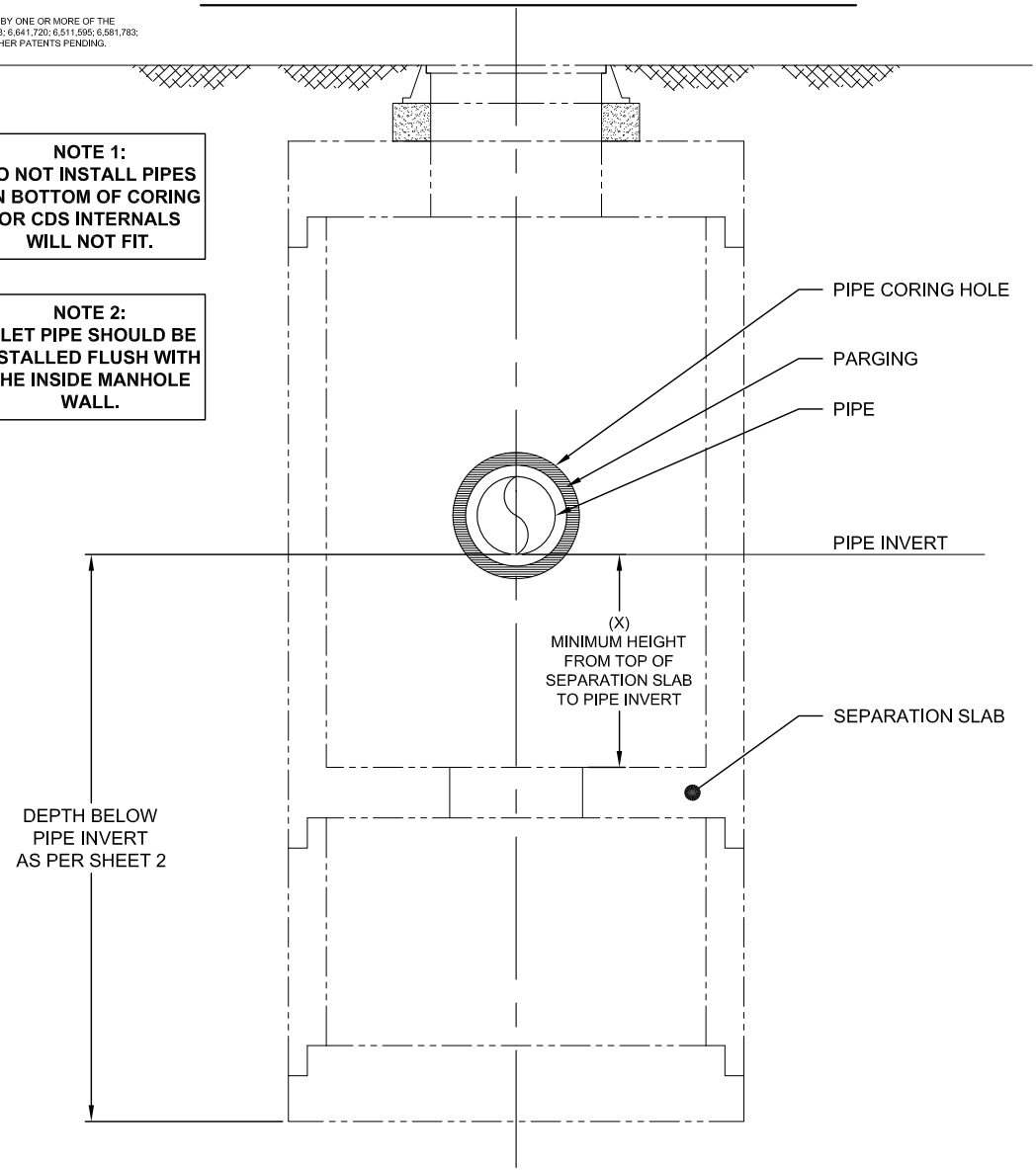
HONI ORLEANS
ORLEANS, ON
SITE DESIGNATION: OGS

JOB No. : 10041-001	SCALE : 1:30
DATE : 9/1/2022	SHEET : 4
DRAWN : LY	
APPROV. :	

CDS INTERNALS HEIGHT

NOTE 1:
DO NOT INSTALL PIPES ON BOTTOM OF CORING OR CDS INTERNALS WILL NOT FIT.

NOTE 2:
INLET PIPE SHOULD BE INSTALLED FLUSH WITH THE INSIDE MANHOLE WALL.



HEIGHT OF CDS INTERNALS

CDS MODEL	DIMENSION X (m)	CDS MODEL	DIMENSION X (M)
20_15	0.610	40_30	1.080
20_20	0.787	40_40	1.397
20_25	0.889	40_45	1.524
30_20	0.838	56_40	1.397
30_25	0.940	56_53	1.804
30_30	1.080	56_68	2.311
30_35	1.250	56_78	2.616

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PROJECT NAME
CITY, ON
SITE DESIGNATION: CDS

JOB No. : XXXX-XXX	SCALE : NTS
DATE : XX/XX/XXXX	SHEET : 5
DRAWN : XX	
APPROV. :	

CONTECH®
ENGINEERED SOLUTIONS

CDS Guide
Operation, Design, Performance and Maintenance

CDS®

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

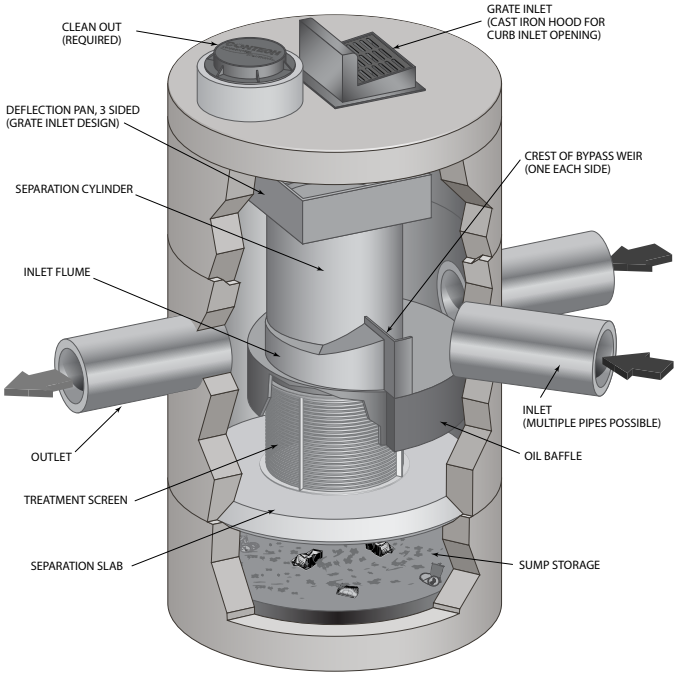
Operation Overview

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



Design Basics

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns (μm). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns (μm) or 50 microns (μm).

Water Quality Flow Rate Method

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are

determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Probabilistic Rational Method

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

Treatment Flow Rate

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

Hydraulic Capacity

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

Performance

Full-Scale Laboratory Test Results

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30 μm) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50 μm) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

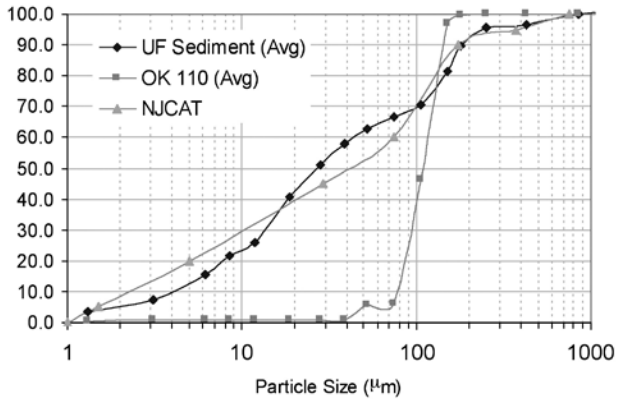


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

Results and Modeling

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect

to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

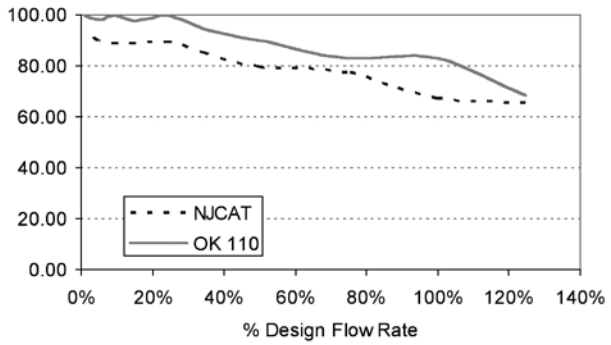


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125 μm).

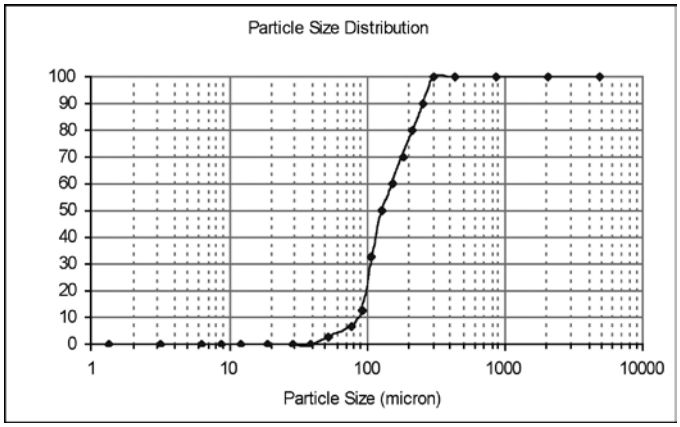


Figure 3. WASDOE PSD

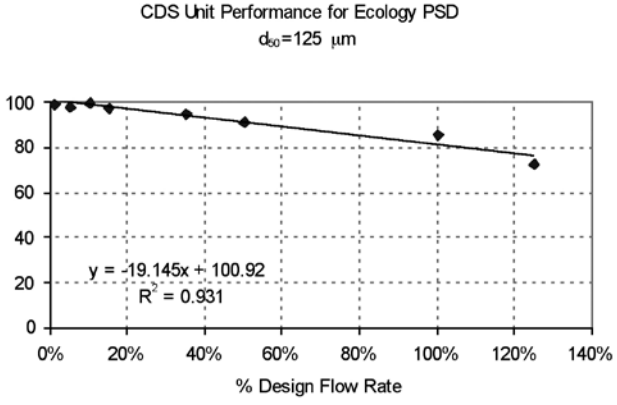


Figure 4. Modeled performance for WASDOE PSD.

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified

during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

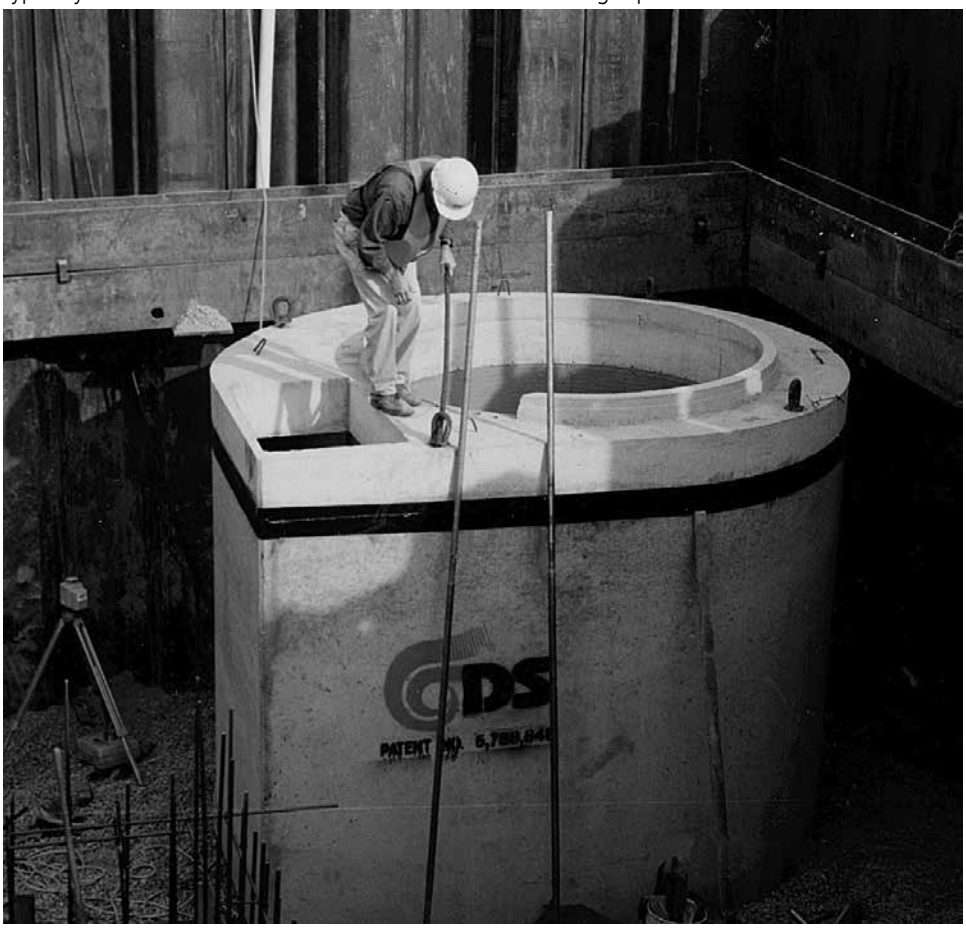
In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile**.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; related foreign patents or other patents pending.

cds_manual 3/17 PDF

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