TECHNICAL MEMORANDUM

DATE September 13, 2022 **Project No.** 21493887

TO City of Ottawa

FROM Scott Taylor, PEng **EMAIL Scott_Taylor@golder.com**

NEW SEPTIC SYSTEM
HYDRO ONE OPERATIONS CENTRE, PHASE 2
3440 FRANK KENNY ROAD, OTTAWA, ONTARIO

Golder Associates Ltd. (Golder) was retained by J.L. Richards & Associates Limited (JLR) to design the new sewage system at the proposed Hydro One Networks Inc. (HONI) Operations Centre (OC), Phase 2, located at 3440 Frank Kenny Road in Ottawa, Ontario. This technical memorandum has been prepared to support the Site Plan Approval application with the City of Ottawa.

Sewage System Design Flows

HONI has provided the following information for the proposed building use:

- Office staff will consist of 5 employees on one (1) 8-hour shift during normal operations and 10 employees constantly occupying the building over a 24-hour duration during emergency operations.
- Field staff will consist of 30 employees on an 8-hour shift during normal operations and 30 employees on a 16-hour shift during emergency operations.
- There is one (1) loading dock and deliveries to the warehouse will occur once per week or once every two weeks.
- Vehicle washing will be limited to removal of mud from the wheels of the vehicles and will be completed outside of the building.

Golder has pre-consulted with the Ottawa Septic System Office regarding the sewage system design flows. The following was determined during the pre-consultation:

- The building is split into multiple uses. The uses are separated by Gridlines as indicated below (Refer to Appendix A). Each area of the building will be calculated separately as follows:
  - Office (Gridlines 9 to 11): The office will be based on the number of employees and the floor area of the office portion of the building.
  - Warehouse (Gridlines 5 to 9): The common facilities (washrooms, locker rooms, etc.) and warehouse space will be calculated as a warehouse.

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- Vehicle Storage Canopy and Indoor Vehicle Storage (Gridlines 1 to 5): No additional flows have been considered from the vehicle storage areas of the building, as vehicle washing is to be completed outside of the building.

Based on the above, the total daily design sanitary sewage flow (Q) has been calculated as follows, in accordance with Table 8.2.1.3.B of the Ontario Building Code (OBC):

Normal Operations

Office (Staff) = 5 employees * 75 L/d/employee (8-hour shift) = 375 L/d

Office (Floor Space) = 295 m^2 * 75 L/d/9.3 m^2 = 2,379 L/d

Warehouse (Loading Dock) = 1 * 150 L/d = 150 L/d

Warehouse (Water Closets) = 4 * 950 L/d = 3,800 L/d

Q = 2,379 L/d[1] + 150 L/d + 3,800 L/d

Q = 6,329 L/d

[1] The total daily design sanitary sewage flow includes the highest flow from the office area.

Emergency Operations

Office (Staff) = 10 employees * 75 L/d/employee (8-hour shift) * 3 shifts = 2,250 L/d

Office (Floor Space) = 295 m^2 * 75 L/d/9.3 m^2 = 2,379 L/d

Warehouse (Loading Dock) = 1 * 150 L/d = 150 L/d

Warehouse (Water Closets) = 4 * 950 L/d = 3,800 L/d

Q = 2,379 L/d[1] + 150 L/d + 3,800 L/d

Q = 6,329 L/d

[1] The total daily design sanitary sewage flow includes the highest flow from the office area.

The total daily design sanitary sewage flow has been calculated to be 6,329 L/d for both normal and emergency operations as the floor area of the office governs the calculations, and also since the staffing for field staff has not been included directly, but instead assessed based on the warehouse facilities.

Treatment Units

A Class 4 Sewage System, as per Section 8.6 of the OBC, is proposed to service the new building and will consist of a Waterloo Biofilter basket tank system, model number BT-15500. The system will also consist of an anaerobic digester (septic tank) with a volume of 13,625 L (model number 13625AD), followed by a separate 6,000 L pump tank that will be used to dose the final 15,500 L Biofilter basket tank. Refer to Sewage System Plan, Figure 1 and Detail Sheet, Figure 2 in Appendix B.

Due to the anticipated elevations of the tanks and leaching bed, a second alternating duplex pump system will be required to dose the leaching bed. Waterloo Biofilter has confirmed that these pumps can be installed within the Biofilter basket tank.

In accordance with the terrain analysis calculations included in the Technical Memorandum titled “Resampling Results, Well PW11-1 and Updated Terrain Analysis”, prepared by Golder Associates Ltd., dated September 8, 2022, a 50% reduction in nitrogen will be required for the site. Therefore, the treatment unit will be constructed as a double-pass system for denitrification, which requires recirculation to the anaerobic digester. As per the literature from Waterloo Biofilter, a double-pass system can achieve between 50 to 65% nitrogen reduction. The 32 mm diameter recirculation forcemain will provide approximately 50% recirculation of treated effluent back to the anaerobic digester, in accordance with the requirements from Waterloo Biofilter.

The treatment units have been located on the site to conform with the minimum clearance distances as set out in Table 8.2.1.6.A of the OBC.

Leaching Bed

The previous geotechnical investigation (completed in 2011) included a test pit (Test Pit 11-3) in the vicinity of the proposed leaching bed. This geotechnical investigation has been updated to include recent site investigations and current standards. Refer to Geotechnical Investigation, Proposed Hydro One Operations Facility, 3440 Frank Kenny Road, Ottawa, Ontario, prepared by Golder Associates Ltd., Dated September 9, 2022.The existing soils at the proposed location of the leaching bed consist of grey brown silty clay (weathered crust), as indicated in Test Pit 11-3. Groundwater seepage was noted in Test Pit 11-3 at 2.0 m below ground surface (elevation 83.90 m). Groundwater was observed in Boreholes 11-3 and 11-5 between 1.1 and 1.3 m below ground surface (elevation of 84.40 m for both). A groundwater elevation of 85.60 m was measured in monitoring well DBW001 during GHD’s investigation. Conservatively, an elevation of 85.60 m has been assumed in the vicinity of the leaching bed, which is below the maximum excavation depth.

Based on the existing soils, a percolation rate (T) has been estimated at 50 min/cm. Since this is the maximum value used in determining the size of the proposed leaching bed, it is considered a conservative estimate.

Due to space restrictions on the site, a Type A Dispersal Bed is proposed to be used as the leaching bed. The contact area (overall footprint) of the Type A Dispersal Bed has been sized in accordance with 8.7.7.1.(5) of the OBC as follows:

Contact Area (A) = Q * T / 400

A = 6,329 * 50 / 400

A = 791 m^2

Therefore, the system will require a contact area of 791 m^2. A contact area measuring 25.0 m x 31.7 m has been provided, which provides a contact area of 792.5 m^2. Refer to Sewage System Plan, Figure 1 in Appendix B.

The stone layer for the Type A Dispersal Bed has been sized in accordance with 8.7.7.1.(6) of the OBC as follows:

Stone Area (A_s) = Q / 50

A_s = 6,329 / 50

A_s = 127 m^2

Therefore, the system will require a stone area of 127 m^2. A stone area measuring 6 m x 21.2 m has been provided, which provides a contact area of 127 m^2. Refer to Sewage System Plan, Figure 1 in Appendix B.

The effluent will be evenly distributed throughout the stone area by use of distribution piping installed to within 600 mm of the edge of stone layer, in accordance with 8.7.7.1.(8) of the OBC.

The stone layer has been located on the site to conform with the minimum clearance distances as set out in Table 8.2.1.6.B (and increased by Sentence 8.7.4.2.(11) for a raised system) of the OBC.

The leaching bed is proposed over the existing gravel parking lot for the Phase 1 building. Therefore, the gravel for the parking lot is proposed to be removed down to the native soils. The area under the contact area for the leaching bed will be scarified to a depth of 300 mm to loosen up the compacted subgrade and promote infiltration. Imported sand fill will be used to build up the area to the base of the leaching bed. As well, to prevent lateral movement of effluent through the gravel fill, an additional area extending 2.0 m around the perimeter of the leaching bed on three sides will be removed and replaced with compacted clay. This compacted clay barrier will direct the effluent in the direction of the 15 m mantle.

We trust that the above is sufficient for your purposes. If you have any questions or comments, please contact the undersigned.

Yours truly,

Golder Associates Ltd.

Scott Taylor, PEng
Senior Civil Engineer

Douglas Kerr, PEng
Associate, Senior Civil Engineer

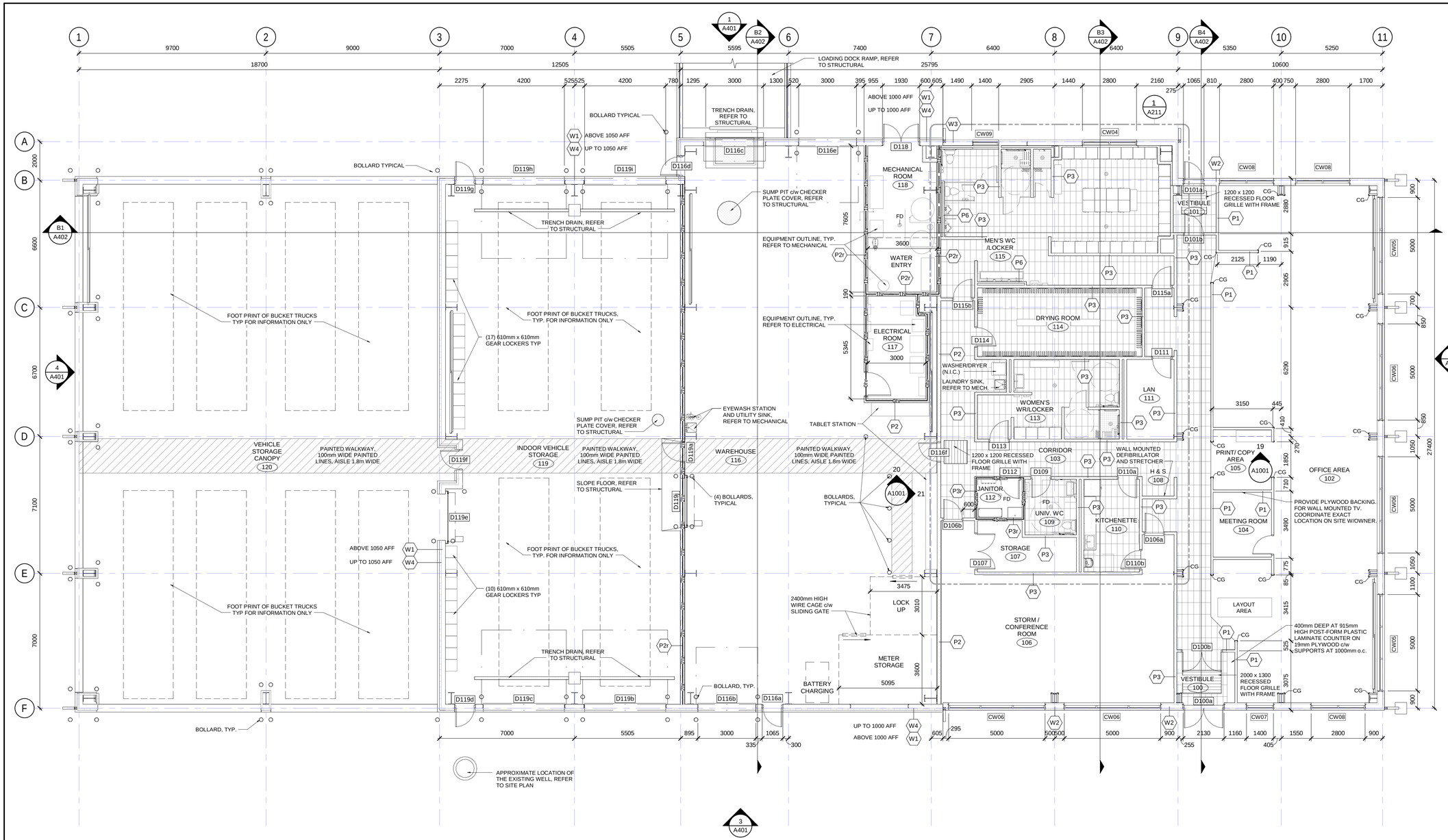
SWT/DVK/mp

Attachments: Appendix A – Floor Plan
Appendix B – Figures

https://golderassociates.sharepoint.com/sites/152302/project files/6 deliverables/sewage system design/city of ottawa spa 2022.09.07/21493887-tm-rev1-sewage system design-12sept2022.docx

APPENDIX A

Floor Plan



GROUND FLOOR PLAN

1 A201

SCALE : 1 : 100

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
G	ISSUED FOR 60% CLIENT REVIEW	27/04/22
F	RE-ISSUED FOR 60% COST CONSULTANT	22/04/22
E	ISSUED FOR 60% EXTERNAL PEER REVIEW	19/04/22
D	ISSUED FOR 60% COST CONSULTANT	14/04/22
C	ISSUED FOR 30% CLIENT REVIEW	04/04/22
B	ISSUED FOR 30% COST CONSULTANT	22/03/22
A	ISSUED FOR EXTERNAL PEER REVIEW	22/03/22

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

SCALE: 1 : 100

CLIENT: hydro one BGIS

CONSULTANT: www.jlrichards.ca

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

PROJECT NORTH

PROJECT:

HYDRO ONE OPERATIONS CENTRE, ORLEANS

3440 FRANK KENNY ROAD, NAVAN ONTARIO

DRAWING:

ARCHITECTURAL

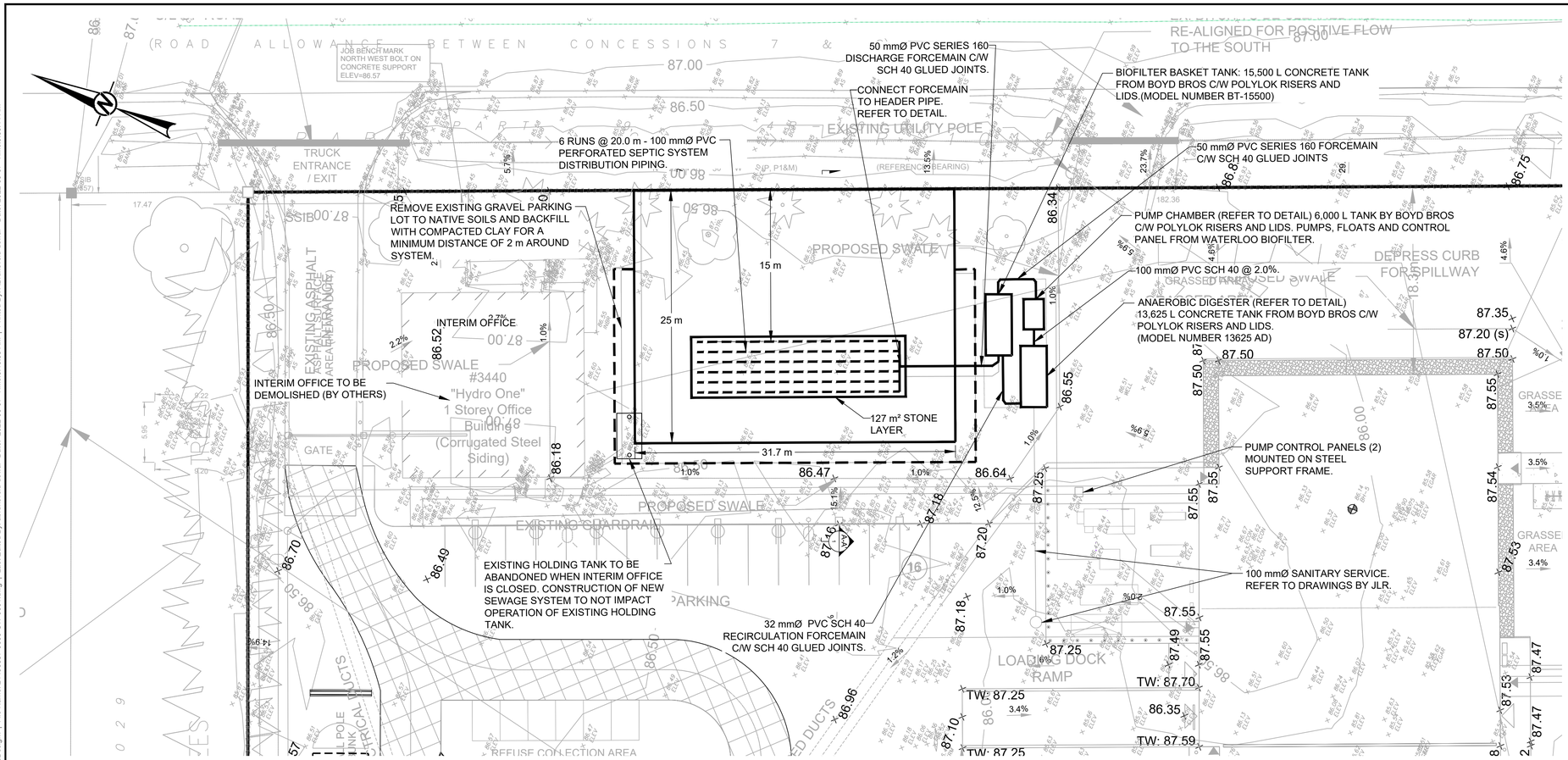
GROUND FLOOR PLAN

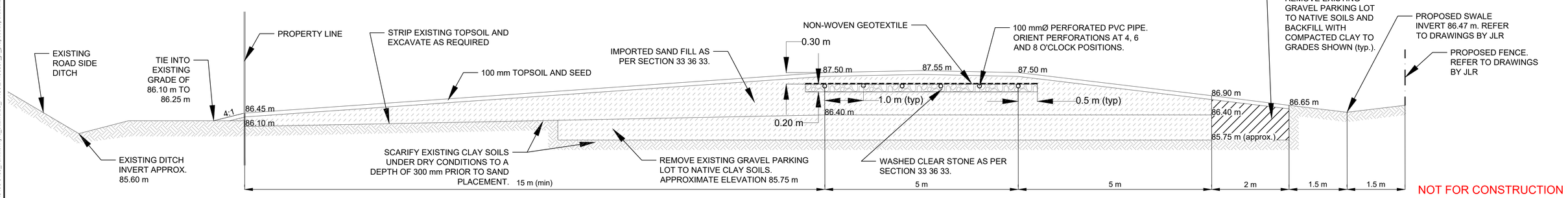
DESIGN: AE	
DRAWN: JG	DRAWING #: A201
CHECKED: MF/AE	
JLR #: 31500-000	

PLOT DATE: 5/16/2022 11:16:12 AM File Location: C:\Users\jgauthier\Desktop\31500-000 HONI\31500-000 - Architectural.rvt

APPENDIX B

Figures





NOTE(S)

1. PROJECT COORDINATE IS UTM NAD83 ZONE 18.

REFERENCE(S)

1. TOPOGRAPHIC SURVEY BY FAIRHALL MOFFATT & WOODLAND LIMITED. DRAWING TP_ac169.dwg, JUNE 10, 2022

GENERAL NOTES

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS WHERE APPLICABLE. ONTARIO PROVINCIAL STANDARDS SHALL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE. ALL DRAWINGS TO BE CHECKED FOR CONFIRMATION WITH APPLICABLE BUILDING CODES. NO ALTERATION OR GRADING OF SITE IS TO OCCUR PRIOR TO APPROVAL BY CITY.
2. THE CONTRACTOR IS RESPONSIBLE FOR ALL REMOVALS NECESSARY TO SATISFY ENGINEERING AND LANDSCAPE WORKS. CONTRACTOR TO VISIT SITE PRIOR TO TENDERING AND CONFIRM SITE CONDITIONS. CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND BEAR COST OF SAME.
3. LOCATION OF SERVICES ARE NOT ALL SHOWN. LOCATION OF UTILITIES AND UNDERGROUND WORKS THAT ARE SHOWN ARE APPROXIMATE. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF ALL SERVICES, UTILITIES AND UNDERGROUND STRUCTURES PRIOR TO ANY CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND REINSTATEMENT.
4. THE CONTRACTOR SHALL CONSTRUCT SANITARY SEWERS IN ACCORDANCE WITH OPSD 802.010, 802.013 AND 802.014. DURING CONSTRUCTION, PROTECT PIPES FROM HEAVY CONSTRUCTION EQUIPMENT AS PER OPSD 808.01. BEDDING AND BACKFILL SHALL BE COMPACTED TO 95% SPMDD. CONTRACTOR SHALL REFER TO THE GEOTECHNICAL REPORT FOR ANY FURTHER RECOMMENDATIONS. PROPOSED SEWER TRENCHES TO BE EXCAVATED TO REACH UNDISTURBED SOIL AND REPLACED WITH GRANULAR 'A' CRUSHED STONE BEDDING AND INITIAL BACKFILL TO 300MM ABOVE PIPE COMPACTED TO A MIN. OF 95% SPMDD.
5. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE FOR PROTECTION OF THE RECEIVING STORM SEWER DURING CONSTRUCTION ACTIVITIES. THESE PRACTICE ARE REQUIRED TO ENSURE NO SEDIMENT AND/OR ASSOCIATED POLLUTANTS ARE RELEASED TO THE RECEIVING WATERCOURSE. THESE PRACTICES INCLUDE INSTALLATION OF SEDIMENT BARRIERS ON ALL CATCH BASIN AND MAINTENANCE HOLES AND A SILT FENCE BARRIER (AS PER OPSD 219.110 AND ASSOCIATED SPECIFICATIONS) ALONG ALL OTHER AREAS THAT SHEET DRAIN OFF SITE. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
6. ALL DISTURBED AREAS TO BE REINSTATED TO EQUAL OR BETTER CONDITION. PAVEMENT REINSTATEMENT FOR UTILITY CUTS SHALL BE IN ACCORDANCE WITH R10. ALL NEW WORK SHALL BLEND INTO EXISTING (TO BE APPROVED BY CONSULTANT).
7. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED. DRAWINGS SHOULD NOT BE SCALED BY THE CONTRACTOR. ANY MISSING OR QUESTIONABLE DIMENSIONS ARE TO BE CONFIRMED WITH THE CONSULTANT IN WRITING.
8. STRIPPING AND SUBGRADE PREPARATION SHALL BE PERFORMED WITH AN EXCAVATOR EQUIPPED WITH A SMOOTH MOUTHED BUCKET TO MINIMIZE DISTURBANCE. EXPOSED SUBGRADE SOIL SHALL BE GRADED TO ALLOW EFFECTIVE DRAINAGE DURING CONSTRUCTION. REFER TO THE GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
9. SIDE SLOPE OF EXCAVATIONS SHOULD BE SLOPED IN ACCORDANCE WITH THE REQUIREMENTS OF ONT. REG. 213/91 UNDER THE OCCUPATIONAL HEALTH AND SAFETY ACT. REFER TO GEOTECHNICAL REPORT FOR CONSTRUCTION DETAILS.
10. NOTE THAT THE EXISTING GRADES AND WORKS SHOWN MAY NOT REFLECT ACTUAL SITE CONDITIONS DUE TO THE OVERLAPPING DEMOLITION AND NEW CONSTRUCTION. THE BIDDING CONTRACTORS ARE TO VERIFY ALL EXISTING UNDERGROUND AND ABOVE GROUND SITE CONDITIONS AND MAKE ALLOWANCE IN THE BID PRICE. NO EXTRAS WILL BE CONSIDERED FOR ANY VARIATION OR CONFLICTS TO CONSTRUCT THE WORKS AS PER THE DESIGN DRAWINGS.
11. REFER TO LANDSCAPE AND ARCHITECTURAL PLAN FOR FINISHES AND FENCING DETAILS AND LOCATIONS.

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2022-09-07	REISSUED FOR SITE PLAN APPROVAL	SWT	ABD	SWT	DVK
B	2022-05-20	ISSUED FOR SITE PLAN APPROVAL	SWT	ABD	SWT	DVK
A	2022-04-14	ISSUED FOR CLIENT REVIEW	ABD	SWT	SWT	DVK

SEAL

LICENSED PROFESSIONAL ENGINEER
S. A. W. TAYLOR
100078983
07 Sept 22
PROVINCE OF ONTARIO

CLIENT
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CANADA
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PROJECT
HYDRO ONE ORLEANS OC, PHASE 2
3440 FRANK KENNY ROAD, OTTAWA, ONTARIO

TITLE
SEWAGE SYSTEM PLAN

PROJECT NO.	CONTROL	REV.	of	FIGURE
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

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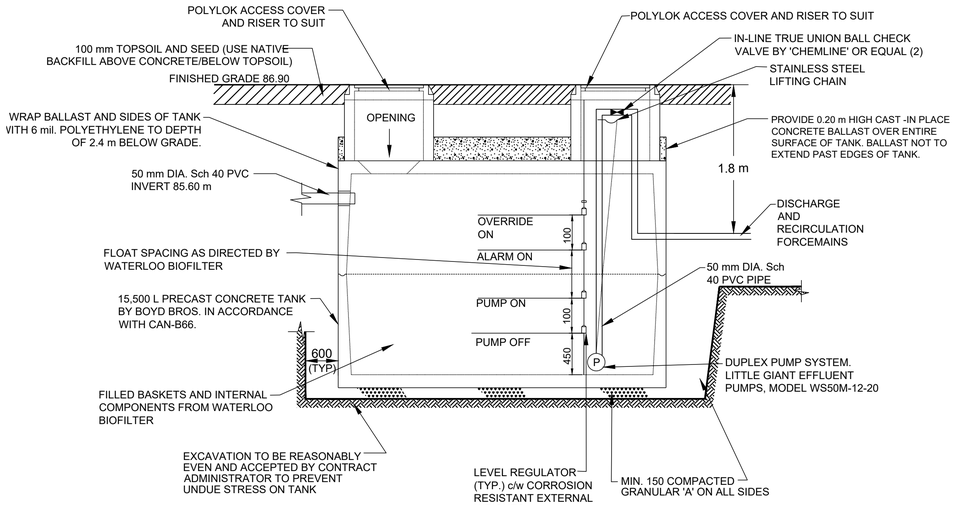
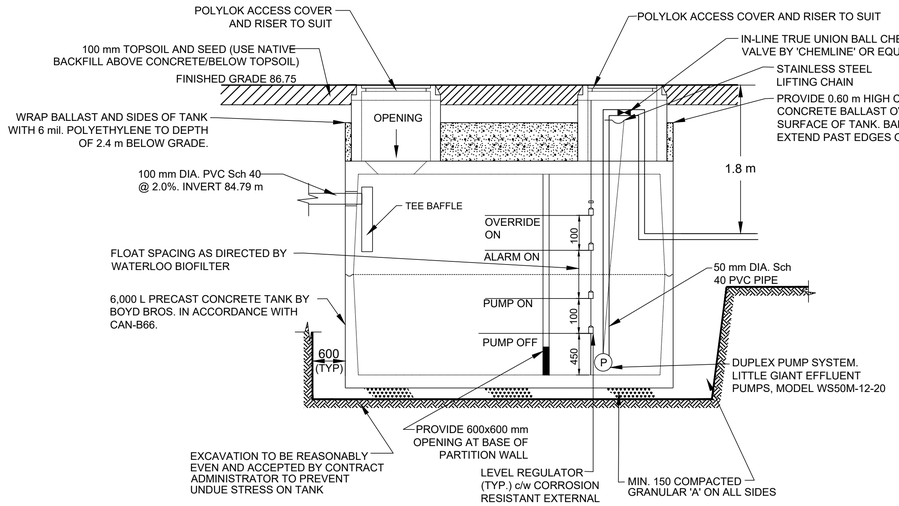


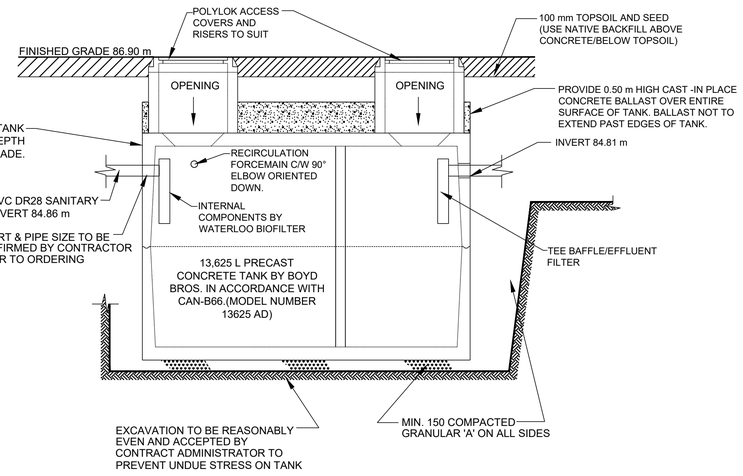
BIOFILTER BASKET TANK SECTION VIEW

SCALE: N.T.S.



PUMP CHAMBER SECTION VIEW

SCALE: N.T.S.



ANAEROBIC DIGESTER

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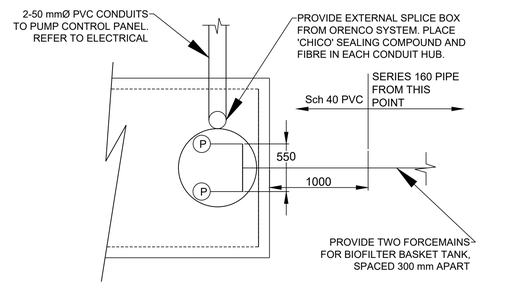
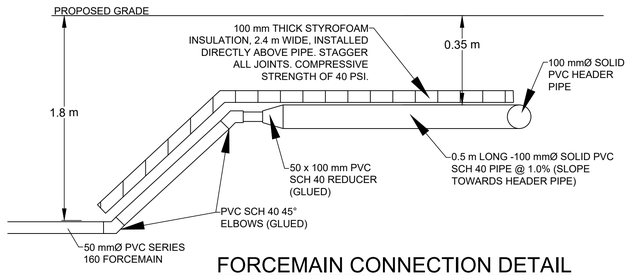


PUMP CHAMBER/BIOFILTER BASKET TANK PLAN VIEW

SCALE: N.T.S.



FORCEMAIN CONNECTION DETAIL

SCALE: N.T.S.

CONCRETE TANK NOTE(S)

1. SUBMERSIBLE PUMPS TO BE 208V, 1 PHASE c/w CORD LENGTH TO SUIT. VOLTAGE AND PHASE TO BE CONFIRMED. CONTRACTOR TO ENSURE CONSTRUCTION MEETS ELECTRICAL AND PLUMBING CODE REQUIREMENTS.
2. CONTROL PANELS TO BE PROVIDED BY WATERLOO BIOFILTER FOR DUPLEX PUMP SYSTEM. PROVIDE LOCKABLE CIRCUIT BREAKER ON POWER FEED TO PANEL. MOUNT CONTROL PANELS ON STEEL SUPPORT STRUCTURE AT LOCATION AS INDICATED.
3. ONCE ALL COMPONENTS INSTALLED, CONTRACTOR TO CARRY OUT STATIC TEST WITH PIPES SEALED AND WATER LEVEL TO TOP OF PIPE. TEST OVER 48 HOURS WITH NO DROP IN WATER LEVEL PERMITTED. CONTRACTOR TO CONFIRM NO LEAKAGE AFTER 24 HOURS. TANK SEAMS TO BE EXPOSED DURING TEST.CONSULTANT WILL PERFORM MEASUREMENTS FOR FINAL 24 HOURS.
4. ALL WIRING SHALL BE SPLICE FREE FROM PUMP CHAMBER TO SPLICE BOX AND FROM SPLICE BOX TO CONTROL PANEL.
5. ALL PIPING INSIDE PUMP CHAMBER SHALL BE SCHEDULE 40 PVC OR EQUAL.
6. ALL VOIDS AND ANY UNUSED KNOCKOUTS TO BE FILLED AND MADE WATERTIGHT WITH "SIKAFLEX 2cNS" EXPANDABLE GROUT OR APPROVED EQUAL.
7. CONTRACTOR TO BE RESPONSIBLE FOR COMPLETE COORDINATION OF ELECTRICAL AND MECHANICAL SUB-CONTRACTORS INCLUDING, CONNECTION IN ELECTRICAL ROOM, OBTAINING HYDRO INSPECTION AND APPROVAL, DELIVERY AND INSTALLATION OF DUPLEX PUMP ASSEMBLY IN WORKING ORDER, AND PERFORMANCE TEST AFTER INSTALLATION.
8. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED.
9. TANK TO BE CERTIFIED BY SUPPLIER TO WITHSTAND BALLAST WEIGHT, DEPTH OF BURIAL AND SOIL CONDITIONS. CERTIFICATION TO BE STAMPED AND SIGNED BY ENGINEER PRIOR TO DELIVERY OF TANK TO SITE. ASSUME HYDROSTATIC PRESSURE TO SURFACE.
10. GRANULARS TO BE COMPACTED TO 95% PROCTOR DENSITY.
11. AFTER EXCAVATING FOR TANKS, THE REQUIREMENT FOR TANK BALLAST IS TO BE RE-EXAMINED BY ENGINEER BASED ON HIGH WATER TABLE ELEVATIONS. GROUNDWATER ELEVATION ASSUMED TO BE 84.65 m.

NOT FOR CONSTRUCTION

REV.	YYYY-MM-DD	DESCRIPTION	DESIGNED	PREPARED	REVIEWED	APPROVED
C	2022-09-07	REISSUED FOR SITE PLAN APPROVAL	SWT	ABD	SWT	DVK
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TITLE
DETAIL SHEET

PROJECT NO.	CONTROL	REV.	of	FIGURE
21493887	0003	C		2

0 25 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D