



March 6, 2026

ADDENDUM # 1

RFT-SM-008-26 – Glencoe Wastewater System Upgrades - Industrial Park Sewage Pump Station Upgrade

Revise Closing Date and Time from:

2:00:00 p.m. LOCAL TIME, Wednesday, March 11, 2026

To:

12:00:00 p.m. LOCAL TIME, Tuesday, March 17, 2026

The location of the closing remains unchanged.

Revised Question Deadline:

The revised question deadline date and time has been revised from Wednesday, March 4, 2025 at 2:00 pm EST, to **Tuesday, March 10, 2025 at 2:00 pm EST.**

Note of Clarification:

With respect to the List of References to be provided by each bidder at the time of tender close, the Municipality reserves the right to perform reference checks of the listed projects in addition to other known projects the Contractor has performed for other Municipality's when assessing the overall performance and acceptance of the Contractor to perform this work.

Note of Clarification:

The new valve chamber is to be pre-cast with a monolithic base. The new valve chamber shall include 300mm thick crushed stone bedding and shall be backfilled with Granular A. The new valve chamber shall be waterproofed with Blueskin or approved equivalent. All pipe penetrations to include Link Seal or approved equivalent.

Drawing Revision:

Drawing DI-001, DI-002, DI-003, DI-101, DP-101, DP-102, DP-301, DP-302, DP-901:

- In response to pipe materials and line size designations please see attached drawing revisions. Couplings were removed where not needed and included coming out of the pumping station. The coupling type is in the revised Div 15060 section attached.

Questions**Question 1:** Section 16900 2.4 Pressure Transmitters

- Please confirm Winters diaphragm seal will acceptable manufacturer
- Confirm the pressure range required is 0-2000kpa

Answer 1:

-Winters would be an acceptable manufacture in lieu of Ashcroft for the diaphragm seal, provided it meets all listed specifications.

-Pressure range confirmed to be 0-2000kPa.

Question 2: Drawing DI-101 indicates two tags LE101A and LE101B but these are not shown in the specification documents. Please confirm which instruments these are associated with.

Answer 2: Please disregard LE101B. There is one transmitter, LIT-101 and associated transducer LT-101. Please refer to 16900 2.3 Radar Level Transmitters and 2.5 Level Controller.

Question 3: Section 16900 2.2 Magnetic Flow Meters

- Siemens model MAG5100/MAG6000 are now in the process of being phased out but its direct replacement the FMS500/FMT020 which is similar to its predecessor with more functionality.

- Confirm Hard Rubber liner and or EPDM is acceptable liner

Answer 3: Polyurethane is most preferred, but NBR Rubber is also acceptable. Siemens FMS500 is an acceptable replacement.

Question 4: Specification 15060 has a page for SS5 stainless steel piping. The schedule does not show any SS% piping required. Confirm this is the case.

Answer 4: SS5 not required. Refer to updated spec section 15060.

Question 5: Drawing C-100 - The Air/Vacuum Release Valve detail shows an H-Tec Model 986-04 automatic air/vacuum release valve. Spec 15100 states the direct buried air release valve (which is assumed to be the same as C-100) is noted to be ARI model D-025 SB 32. Confirm which contractors are to carry.

Answer 5: Contractors should provide the model indicated on the Civil drawings. See updated spec 15100.

Question 6: Drawing C-101 - For the existing SAN FM (which will be abandoned after commissioning), what is the pipe material type so that contractors can price out the appropriate caps required.

Answer 6: PVC.

Question 7: Drawing DI-101 - Confirm that couplings are required on the new piping at the existing SPS MH as shown as they are not shown on the DP drawings

Answer 7: Yes, couplings are required on both discharge lines leaving the SPS. Refer to updated drawings.

Question 8: Drawing DP-102 - Are the drains lines off the pump discharge piping in the Valve Chamber stainless steel as it seems noted on DP-102 or PVC per DI-101?

Answer 8: The drain lines are to be PVC schedule 80 (PVC3 per spec and DI-101). Refer to updated drawings.

Question 9: Drawing DP-301 - Is the temporary piping shown in section 1 to be stainless steel or PVC SCH80? Also, what size is this piping as no dimensions are provided.

Answer 9: 100mm, PVC Sch 80. Please note that this temporary piping system is conceptual only. The Contractor shall confirm all piping requirements necessary to connect to the existing valve chamber from their temporary pumping system.

Question 10: Division 7 specs does not exist. Please provide.

Answer 10: Refer to attached Division 7 spec.

Question 11: Section A Information to Bidders #19 says "A geotechnical investigation was not undertaken for this project." Yet Section 02200 1.5.1, Section 02200 1.6.2 and Section 03480 3.1.3.3.2 all instruct us to refer to the geotechnical report for information. Please Clarify or provide the report.

Answer 11: Section 2200 – 1.5.1 shall be revised to read "Employ such construction methods, plans, procedures and precautions to ensure that excavations are stable, and free from disturbance and, reasonably dry. The contractor shall investigate soil conditions and satisfy themselves as to the conditions to be encountered. The geotechnical investigation related to the recent forcemain project, which includes a borehole advanced in the vicinity of this project, is provided for information purposes only."

Section 03480 3.1.3.3.2 - shall be revised to read " Groundwater should be assumed to be at grade elevation for floating calculations."

Question 12: Section 03480 3.1.3.3.2 Instructs us to assume the water level is at grade. Does this only apply to the design of the precast chamber or does it apply to earthworks as well? If it applies to earthworks please provide details.

Answer 12: The reference to assumption of groundwater at grade relates to the design of the precast chamber as it relates to waterproofing and to requirements to prevent floatation. With regards to groundwater during excavation, it is anticipated that groundwater

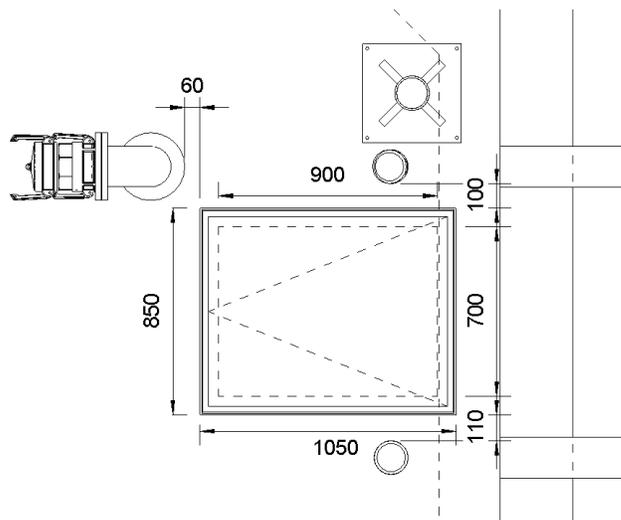
The contractor shall investigate soil conditions and satisfy themselves as to the conditions to be encountered. Refer to the response to Question 11, including supplemental borehole data obtained as part of the previous forcemain installation project.

Question 13: Please Provide the extent of work limits. C-101 shows property lines and lot lines. Some of these lines go through the middle of work shown on the drawings.

Answer 13: Lot lines and property lines belong to the same owner in this case and can be ignored for the purposes of construction.

Question 14: Drawings DP-101 and DP-301 both show the access hatch for the new valve chamber. However, measurements for the hatch appear to be absent. Please provide the measurements for this hatch.

Answer 14: Personnel access hatch – internal min 900mm x 700mm clear opening. Detail below.



Question 15: Regarding section 01500 1.13 please provide quantities of expected contaminated soil for the project. If not, please provide a provisional unit rate or a cash allowance to cover this issue.

Answer 15: Excess soil generated from the project site is not expected to be contaminated with respect to the definition of O.Reg. 406/19. The Contractor shall be responsible for proper disposal of all excess soil in accordance with the above noted regulation. In the event that contaminated waste is discovered, the Contractor shall notify the Contract Administrator and provide supporting documentation. The Contractor shall note that, depending on the time of year in which the excavation work is undertaken, waste characterization as a result of saturated soils will not be accepted as a rationale.

Question 16: Please confirm if there is a source of temporary power available on site for construction purposes.

Answer 16: No temporary power is available to the Contractor.

Question 17: Please confirm there is a water source available on site for connection.

Answer 17: There is no water source available on site for connection.

Question 18: Please confirm the building permit is by the owner.

Answer 18: There is no building associated with this project. As such, there is no Building Permit required.

Question 19: Does drawing S-002 Pre-cast Riser and Precast Slab Connection detail apply to the New Meter Chamber? Does it apply anywhere else?

Answer 19: Refer to the note of clarification with respect to the new valve chamber. The new chamber shall be pre-cast with monolithic base with exterior Blueskin waterproofing or approved equivalent.

Question 20: Drawing S-002 Pre-cast riser and precast slab connection detail shows waterproofing of exterior walls. Does this mean that the entire walls of whatever this detail applies to are to be waterproofed or only the area covering the grout in the detail?

Answer 20: Refer to the Answer to Question 19 above.

Question 21: DP-101 says to see civil drawings for buried gate valve and extension box. Please clarify, is there a detail?

Answer 21: Refer to Section 02600 item 2.8. Valve stem and valve box assembly to be as per OPSD 1101.020. See also DP-901 which shows valve stem and box assembly.

Question 22: On Drawing E-101 is there a pad required for CP-1 and PP-1? Please provide details if so.

Answer 22: Yes, an equipment pad is required for CP-1 and PP-1. The equipment pad will require the same installation details as "Concrete Generator Pad Details" for the new generator, as noted on S-002. The pad to be a minimum 4500mm x 1000mm.

Question 23: On Drawing E-101 Trench detail B has a dark line around the bedding. Does this represent geotextile?

Answer 23: The dark line around the trench detail B has no significance.

Question 24: Section 16900.2.4 Pressure Transmitter:

- i) Is a Rosemount threaded diaphragm seal acceptable as a replacement for the Ashcroft 100 series? Please note that the Rosemount diaphragm seal is permanently attached to the inline 3051TG pressure transmitter.
- ii) Is a shipped-loose Rosemount 2 valve manifold acceptable in place of an isolation ball valve?
- iii) Do you require formal classroom training for the pressure transmitter?

Answer 24:

- i) Provided the Rosemount meets all other specification requirements, the Rosemount would be an acceptable alternative.
- ii) This would be an acceptable alternative.
- iii) Client may request training as required per Division 16000 3.9 for training. There is not likely to be formal classroom training for the pressure transmitter but there may be onsite training for calibration, etc.

Question 25: Please confirm if generator is to be diesel or natural gas. There is reference to both in the specs.

Answer 25: The Generator is to be Natural Gas.

Question 26: Would it be possible for this tender to be closed electronically instead of a hand delivery? Also wondering if there is a chance this one will be extended?

Answer 26: Unfortunately, the Municipality is not set up to receive electronic bid submissions and therefore only a hard copy submission is possible at this time.

The closing date as been revised as noted on Page 1 of this addendum.

Question 27: There is a conflict in the tender documents regarding the submission of a construction schedule. Section A item 12iii) notes that we are to submit a proposed schedule of construction before the tender date. However, the tender form checklist, as well as the Proposed Schedule of Construction (page 9) both indicate the schedule of construction is not due until prior to commencement of work. Please clarify when the schedule of construction is due.

Answer 27: Delete Item 12 iii). The Construction Schedule is not due until prior to commencement of work.

Question 28: Wondering if there is a chance this one will be extended?

Answer 28: Refer to the updated question deadline and closing date.



REPORT

Geotechnical Exploration

*Southwest Middlesex WWTP Infrastructure Upgrades, Sanitary Forcemain
Twinning, Southwest Middlesex, Ontario*

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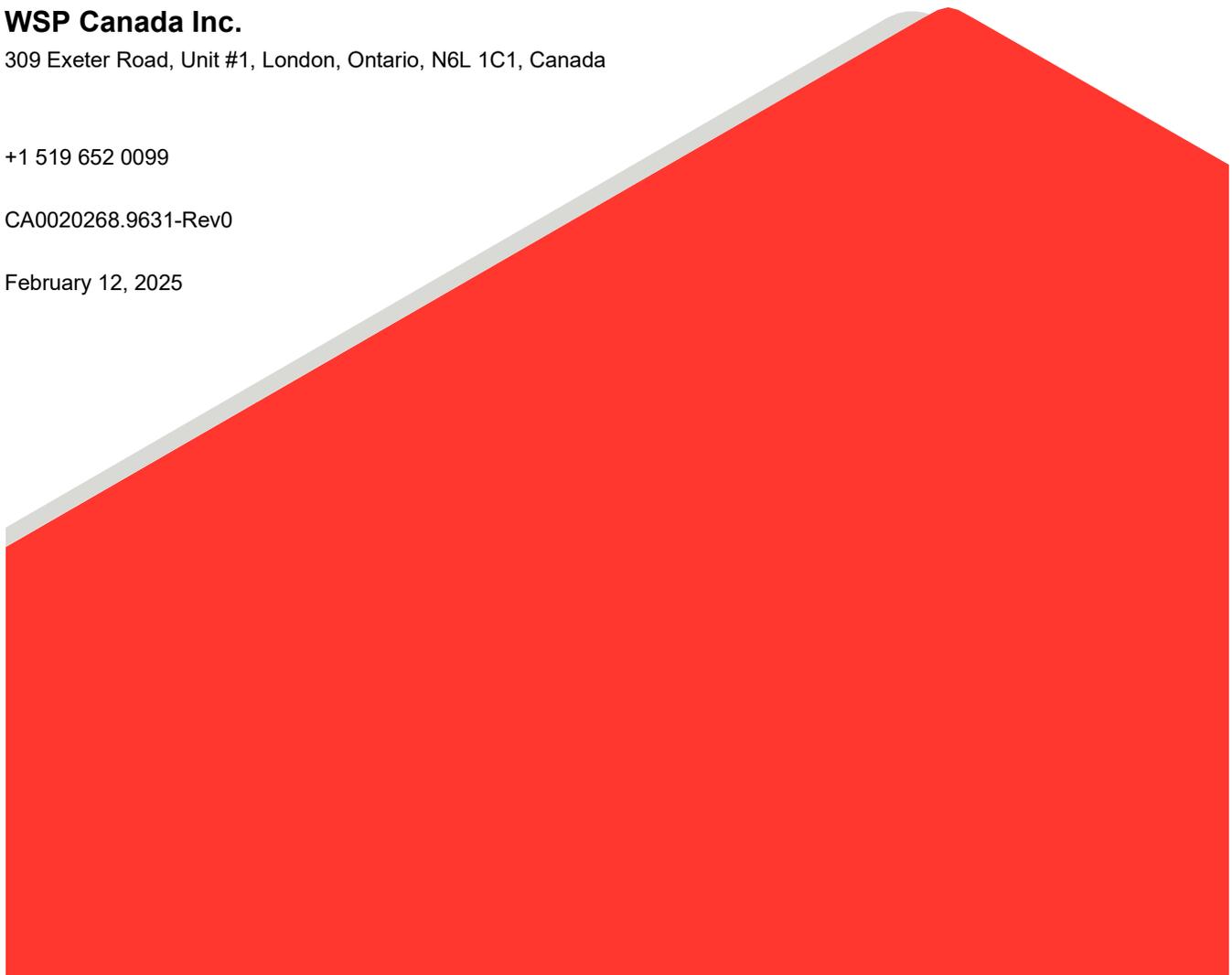
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Table of Contents

1.0 INTRODUCTION3

2.0 BACKGROUND3

3.0 SITE DESCRIPTION AND GEOLOGY3

4.0 EXPLORATION AND TESTING PROCEDURES3

5.0 SUBSURFACE CONDITIONS4

 5.1 Soil Conditions4

 5.1.1 Topsoil.....4

 5.1.2 Silty Clay4

 5.2 Groundwater Conditions5

6.0 DISCUSSION6

 6.1 Excavations6

 6.2 Frost Protection7

 6.3 Bedding7

 6.4 Trench Backfill.....7

 6.5 Pavements8

7.0 GEOTECHNICAL INSPECTIONS AND TESTING8

8.0 CLOSURE9

Important Information and Limitations of this Report

FIGURES

- Figure 1: Borehole Location Plan
- Figure 2: Grain Size Distribution – Silty Clay
- Figure 3: Plasticity Chart

ATTACHMENTS

- Method of Soil Classification
- Abbreviations and Terms Used in Records of Boreholes and Test Pits
- List of Symbols
- Record of Boreholes – BH 101 to BH 107

1.0 INTRODUCTION

This draft report presents the results of the geotechnical exploration and testing program carried out for the design of the proposed sanitary forcemain twinning as part of the Southwest Middlesex WWTP Infrastructure Upgrades in Glencoe, Ontario. The area of the site is shown on the Key Map, Figure 1.

The purpose of this work was to explore the subsurface soil and groundwater conditions at the site and to provide geotechnical engineering recommendations for the design of the proposed works. The work program was carried out in accordance with our proposal 2023CA129631-Rev1, dated January 25, 2024. Written authorization to proceed was provided by Mike Henry of the Municipality of Southwest Middlesex (the Municipality) on January 30, 2024.

This report should be read in conjunction with the attached “Important Information and Limitations of This Report” which comprises an integral part of this document. The reader’s attention is specifically drawn to this material, as it is essential for proper use and interpretation of the information presented and discussed herein.

2.0 BACKGROUND

Based on the information provided, the proposed work consists of the design and construction of a secondary sanitary forcemain running parallel to the existing 250-millimetre (mm) diameter sanitary forcemain from the Victoria Pumping Station to the Glencoe Wastewater Treatment Plant on Newbiggen Drive. The proposed alignment is approximately 1,450 metres (m) in length and generally traverses agricultural fields along the existing easement. It is understood that the forcemain is anticipated to be installed at a depth providing about 2.1m of cover. The proposed alignment includes the crossing of Parkhouse Drive, which it is understood will be carried out using conventional open-cut techniques.

3.0 SITE DESCRIPTION AND GEOLOGY

The site lies within the physiographic region of Southwestern Ontario known as Ekfrid Clay Plain. The subsurface soil conditions are characterized by a stratified clay derived from glaciolacustrine deposits.¹ The quaternary geology mapping indicates that the predominant soil at the site consists of silt to sandy silt becoming silt to silty clay towards Lake Erie.²

The bedrock underlying the site consists of medium brown microcrystalline limestone of the Dundee Formation of the Hamilton Group of Middle Devonian age³.

4.0 EXPLORATION AND TESTING PROCEDURES

The field work for the geotechnical exploration and testing program was carried out on April 4 and 5, 2024, during which time seven boreholes, designated as boreholes BH-101 to BH-107 were drilled at the approximate locations as shown on the Borehole Location Plan, Figure 1. The boreholes were drilled using track-mounted drilling equipment supplied and operated by a specialist drilling contractor. The soil stratigraphy encountered in the boreholes are shown on the attached Record of Borehole sheets.

¹ L. J. Chapman and D.F. Putnam, 1984: The Physiography of Southern Ontario, Third Edition. Ontario Geological Survey, Special Volume 2.

² Ontario Geological Survey 2000. Quaternary geology, seamless coverage of the Province of Ontario; Ontario Geological Survey, Data Set 14--Revised.

³ Sanford B.V., 1969: Geology, Toronto –Windsor Area, Ontario. Geological Survey of Canada, Map 1263A, scale 1:250,000.

Standard penetration testing and sampling was carried out in the boreholes at suitable intervals of depth using 35 millimetre (mm) inside diameter split spoon sampling equipment in accordance with ASTM International standard D1586: "Standard Test Method for Standard Penetration Test (SPT) and Spilt-Barrel Sampling of Soils". All of the samples obtained during the exploration were transported to our laboratory for further examination and representative testing.

Groundwater conditions in the boreholes were observed throughout the drilling operations. Upon completion of drilling and sampling, the boreholes were backfilled in accordance with the requirements of the Revised Regulations of Ontario (R.R.O.) 1990, Regulation 903 (as amended) of the Ontario Water Resources Act. Four 50-mm diameter monitoring wells were installed in BH 101, BH 103, BH 104 and BH 107 to permit subsequent groundwater level measurements.

Members of our engineering staff designated the borehole locations in the field, obtained clearances for underground utilities, monitored the drilling, logged the boreholes, and cared for the samples obtained.

The ground surface elevations at the borehole locations were surveyed by WSP and referenced to geodetic datum.

5.0 SUBSURFACE CONDITIONS

The subsurface soil and groundwater conditions encountered in the boreholes drilled at the site are shown on the attached Record of Borehole sheets and are summarized in the discussion below. The subsurface conditions have been simplified in terms of major soil strata for the purposes of geotechnical evaluation and design. The soil boundaries have been inferred from non-continuous samples and observations of drilling resistance and typically represent transitions from one soil to type to another rather than exact planes of geological change. Furthermore, subsurface conditions may vary significantly between and beyond the borehole locations.

5.1 Soil Conditions

The soil conditions encountered in the boreholes generally consisted of topsoil underlain by silty clay.

5.1.1 Topsoil

Topsoil was encountered at the ground surface in all of the boreholes. The topsoil was measured to be about 80 to 460 mm thick with an average thickness of about 170 mm.

Materials designated as topsoil in this report were classified solely based on visual and textural evidence. Testing of organic content or for other nutrients was not carried out. Therefore, the use of materials classified as topsoil cannot be relied upon for support and growth of landscaping vegetation.

5.1.2 Silty Clay

A deposit of firm to hard silty clay was encountered beneath the topsoil in all of the boreholes. All of the boreholes were terminated within the silty clay after exploring the stratum for some 3.3 to 5.0 m. Measured SPT N⁴ values within the silty clay ranged from 7 to 36 blows per 0.3 m of penetration. Water contents of samples of the silty clay ranged from about 7 to 45 per cent. Grain size distribution curves for four samples of the silty clay are shown on Figure 2. An Atterberg limits test was conducted on a sample of the silty clay, which indicated a liquid limit of

⁴ The SPT N value is defined as the number of blows required by a 63.5-kilogram hammer dropped from a height of 760 millimetres to drive a split spoon sampler a distance of 300 millimetres into the soil after having first penetrated 150 millimetres.

about 47 per cent, a plastic limit of about 19 per cent, and a plasticity index of about 29 per cent. The results of the Atterberg limits test, as shown on Figure 3, indicate that the material is an inorganic silty clay of intermediate plasticity.

5.2 Groundwater Conditions

During drilling, groundwater was not encountered in any of the boreholes. The depth at which the silty clay becomes saturated corresponds to the depth at which the soil colour transitions from brown to grey. Where encountered, the colour transition was observed between depths of about 2.0 to 3.7 m below ground surface (bgs) or about elevations 215.7 to 216.6 m above mean sea level (amsl). Grey soils were not observed in boreholes BH-105 to BH-107.

Four of the seven boreholes (BH-101, BH-103, BH-104 and BH-107) were completed as monitoring wells with well screens installed predominantly within the silty clay. The monitoring wells were constructed with 1.5-metre long, 50-mm diameter, slot 10 polyvinyl chloride (PVC) well screens threaded to PVC riser pipes. A sand pack consisting of commercially available silica sand was used in the borehole annulus surrounding the well screen. The annulus above the sand pack was filled with bentonite to about ground surface. Monitoring wells were completed with flush mount casings. The monitoring wells were developed using new polyethylene tubing equipped with a Waterra inertial foot valve and surge block. All four monitoring wells were lower yield wells where purging occurred while collecting field parameters (pH, electrical conductivity and temperature) until they went dry.

Details of the monitoring well installations are provided on the Record of Borehole sheets in Appendix A. A summary of encountered groundwater levels is provided in the table below:

Table 1: Summary of Groundwater Levels

Borehole	Date Drilled	Ground Surface Elevation (m amsl)	Encountered Groundwater Level*	Measured Groundwater Level May 7, 2024
			Depth (m bgs) / Elevation (m amsl)	
BH-101	April 4, 2024	218.58	Dry	2.47 / 216.11
BH-102	April 4, 2024	218.98	Dry	--
BH-103	April 4, 2024	218.90	Dry	1.21 / 217.69
BH-104	April 4, 2024	219.33	Dry	4.28 / 215.05
BH-105	April 5, 2024	219.02	Dry	--
BH-106	April 5, 2024	217.62	Dry	--
BH-107	April 5, 2024	216.95	Dry	2.75 / 214.20

* Dry denotes absence of free water

As shown in the above table, groundwater levels measured in the monitoring wells ranged from 1.21 to 4.28 m bgs, with elevations ranging from 217.69 to 214.20 m amsl, respectively. Overall, groundwater is moderately shallow at the Site with the anticipated groundwater flow direction inferred to be a subdued replica of topography, with flow convergence at surface watercourses.

In general, the hydrogeological regime along the site is that of an unconfined (water table) aquifer and consists of variable saturated granular unconsolidated materials. Future levels may differ from those listed herein since groundwater levels are naturally variable, susceptible to seasonality and significant precipitation events. Groundwater elevations should be confirmed and monitored for any future activities.

The available groundwater elevation data in addition to typical hydraulic conductivity values for silty clay deposits as taken from grain size results (Figure 2) and from established literature (typical range from 10^{-7} m/s to 10^{-9} m/s)⁵, suggests that little to no dewatering will be required to facilitate construction dewatering; therefore, permitting for dewatering (such as an Environmental Activity Sector Registry (EASR) or a Permit to Take Water (PTTW)) is not deemed necessary for this project.

6.0 DISCUSSION

This section of the report provides our interpretation of the factual geotechnical data obtained during the exploration and it is intended for the guidance of the design engineer. Where comments are made on construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the works should make their own independent interpretation of the subsurface information provided as it affects their proposed construction methods, equipment selection, pricing, scheduling and the like.

Based on the information provided, the proposed work consists of the installation of an additional 250 mm diameter sanitary forcemain with about 2.1 m of soil cover from the Victoria Pumping Station to the Glencoe Waste Water Treatment Plant on Newbiggen Drive. The proposed alignment is approximately 1,450 m in length and generally traverses agricultural fields along the existing easement. The proposed alignment includes the crossing of Parkhouse Drive, which it is understood will be carried out using conventional open-cut techniques.

6.1 Excavations

Excavations will generally encounter topsoil and silty clay. It is considered that the proposed services can be installed using conventional open cut or supported excavation techniques provided that groundwater is adequately controlled. All unsupported excavations should be carried out in accordance with the current Ontario Health and Safety Act and Regulations for Construction Projects (OHSA) and the excavation side slopes should not exceed an inclination of 1 horizontal to 1 vertical. Care will be required to ensure that adequate support is provided for all existing utilities located within the zone of influence of the excavation as defined by a line drawn upward from the base of the excavation at an inclination of 1 horizontal to 1 vertical.

Although boreholes were not advanced through Parkhouse Drive pavement surface it is anticipated that granular fill materials forming the pavement structure will be encountered during the crossing of Parkhouse Drive.

Based on the current OHSA criteria and results of the boreholes, the silty clay would be classified as Type 2 soils. The temporary excavation side slopes for Type 2 soils should not exceed an inclination of 1 horizontal to 1 vertical.

⁵ Freeze, R., & Cherry, J. (1979). *Groundwater*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

For OSHA compliance, unsupported excavations in Type 2 soils should be sloped to within a maximum of 1.2 m above the base with sidewall slopes inclined no steeper than a gradient of one horizontal to one vertical. During construction, the excavations and exposed soil conditions should be observed and an opinion as to the appropriate OSHA soil type category provided at that time.

If a trench liner box is used to reduce the extent of the excavation, it should be noted that the box only provides protection for the workmen once in place. The liner box does not restrict movement of the excavation walls or prevent soils from flowing due to groundwater seepage. Any voids between the trench liner box and the excavation should be filled immediately to reduce the potential for loss of ground. It is suggested that the trench excavation should be carried out in short sections with the support system installed immediately upon completion of excavation.

Based on the proposed invert depths and results of the boreholes, generally excavations for the proposed sanitary sewer will be above the groundwater level except potentially in the vicinity of BH-101 and BH-103. Considering this and the low permeability of the native silty clay, as mentioned in Section, proactive dewatering and the associated permitting (i.e., EASR or PTTW) are not anticipated to be required for this project. Any minor groundwater inflows can be addressed by pumping from properly filtered sumps located at the base of the excavation. Depending on the timing of construction, seasonal variations resulting in groundwater levels higher than those encountered during the exploration should be anticipated.

6.2 Frost Protection

For frost protection, services must be provided with a minimum of 1.2 m of earth cover or installed with thermal equivalent insulation.

6.3 Bedding

Bedding for the sewers should consist of granular material consistent with the type, size and class of pipe and Southwest Middlesex specifications. All bedding should be placed in maximum 300-mm thick loose lifts and uniformly compacted to at least 95 per cent of standard Proctor maximum dry density (SPMDD). Should a trench liner box be used, care will be required to ensure that the compacted bedding is not disturbed when the liner box is moved.

Should residual groundwater seepage be of sufficient volume that the bedding material cannot be adequately compacted, it may be necessary to use 19-mm crushed stone with a non-woven geotextile surround. A complete non-woven geotextile surround is considered critical with the crushed stone bedding to prevent migration of fines into the bedding which could subsequently result in loss of ground and loss of support of the pipe. Crushed stone bedding might also facilitate pumping from sumps as a supplementary groundwater control measure depending on the contractor's chosen staging and dewatering needs.

6.4 Trench Backfill

Based on the results of this exploration, the excavated materials will consist of topsoil and silty clay. The pavement structure of Parkhouse Drive, anticipated to consist of asphalt and granular fill materials, will be encountered during the excavation for the proposed open cut crossing of Parkhouse Drive. Provided that all deleterious materials such as the existing asphalt, topsoil and existing fill materials are wasted together with any organic or excessively wet materials, much of the remaining portions of the excavated materials are considered suitable for use as trench backfill.

Care will be required to ensure that sufficient effort is consistently put into placement and compaction of the trench backfill in order to limit settlements, especially if a trench liner box is used. The general trench backfill should be placed in maximum 300-mm thick lifts and uniformly compacted to at least 95 per cent of SPMDD. The upper 1 m of the trench backfill that will form the new pavement subgrade should be placed in maximum 200-mm lifts and uniformly compacted to at least 98 per cent of SPMDD. Any shortfall in backfill should be addressed using Granular C.

6.5 Pavements

It is anticipated that the pavement on Parkhouse Drive will be fully reconstructed following installation of the sanitary forcemain.

Traffic data including the Annual Average Daily Traffic (AADT) for the subject section of Parkhouse Drive was unavailable, however, for the purposes of pavement design, Parkhouse Drive within this section may be classified as a rural throughfare. For design purposes, the following pavement component thicknesses placed on a competent, properly shaped granular subgrade are recommended:

Component	Thickness (mm)
HL 3	40
HL 8	65
Granular A Base	150
Granular B Type I Subbase	400

The above-noted pavement structure is not intended to support heavy construction traffic. Depending on the actual types of construction equipment used and the prevailing weather conditions during construction, additional Granular B may be required to accommodate the construction traffic.

The exposed subgrade should be proofrolled under the direction of the geotechnical engineer and any excessively soft or poorly performing areas addressed. Any fill, organic or deleterious materials encountered at subgrade level should be removed prior to placement of the subbase material. The Granular A base and Granular B subbase should be placed in maximum 200-mm loose lifts and uniformly compacted to at least 100 per cent of SPMDD. Perforated stub drains should be provided at all catch basins. All new catch basins should be connected to a suitable hydraulic outlet.

The asphaltic materials should be produced, placed and compacted in accordance with the current Ontario Provincial Standard Specification (OPSS) requirements. Milled notches 40 mm deep by 500 mm wide should be provided where the new pavements abut existing pavements and care should be taken to properly tack coat all butt joints and milled surfaces.

Care should be taken to ensure that construction and/or through traffic does not adversely impact the subgrade, roadway granulars and placement of the asphaltic materials.

7.0 GEOTECHNICAL INSPECTIONS AND TESTING

During design, it would be beneficial for WSP to review the design drawings and specifications for consistency with the recommendations provided in this report. A regular program of geotechnical inspections and materials

testing should be carried out during construction to confirm that the conditions being encountered are consistent with the results of the boreholes, to confirm that the intent of the recommendations provided are being met and that the various project and material specifications are being consistently achieved.

8.0 CLOSURE

The factual data, interpretation and recommendations in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, or if the project is not initiated within eighteen months of the date of the report, WSP should be given an opportunity to confirm that the recommendations are still valid.

We trust that this draft report provides the geotechnical information presently required. Once design information is available, the recommendations in this draft report should be updated, as appropriate. Should any point require clarification, or should you have any questions or comments on this report, please contact this office.

Signature Page

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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 Ground Water 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, WSP 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 WSP 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.

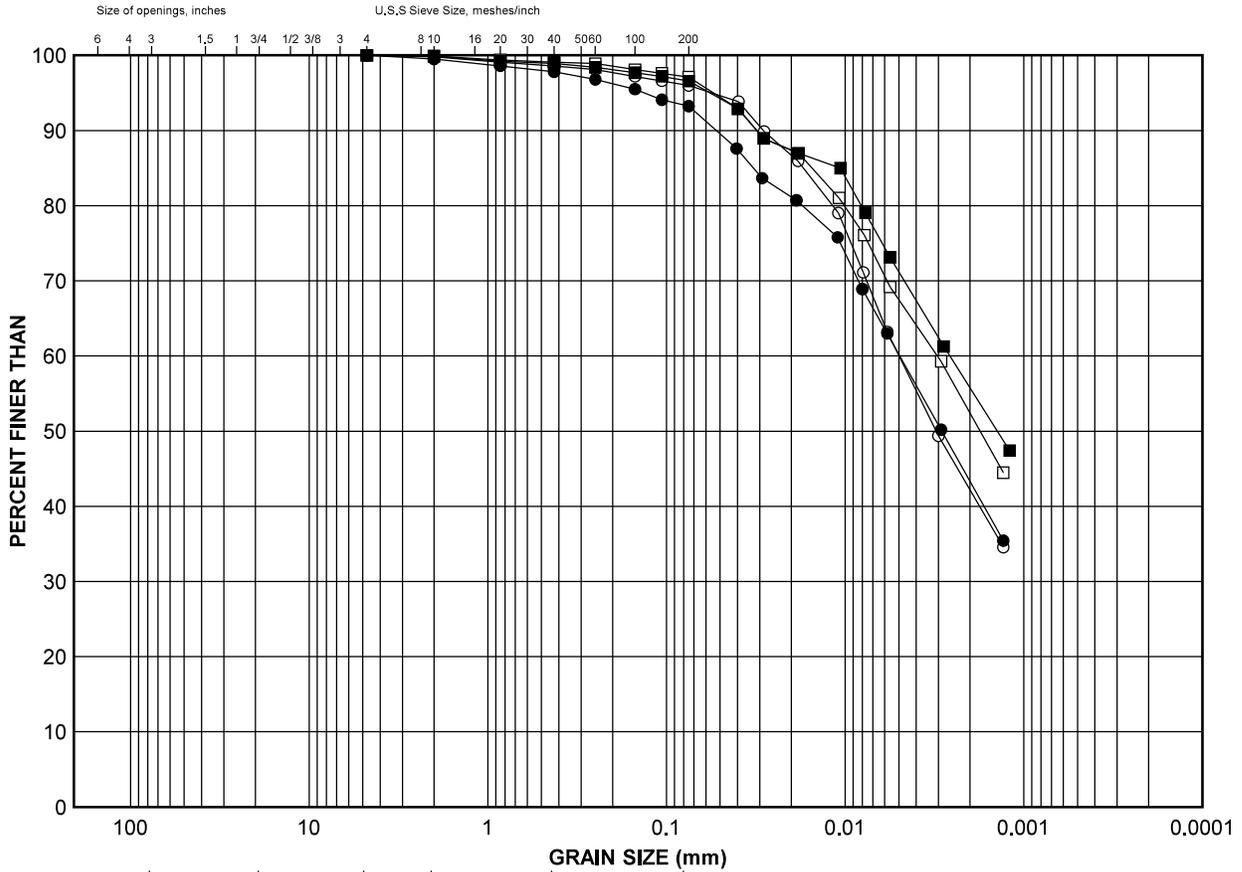
Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and 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: WSP 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 WSP's report. WSP 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 WSP's report.

During construction, WSP 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 WSP's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in WSP's report. Adequate field review, observation and testing during construction are necessary for WSP 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, WSP'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.

Figures

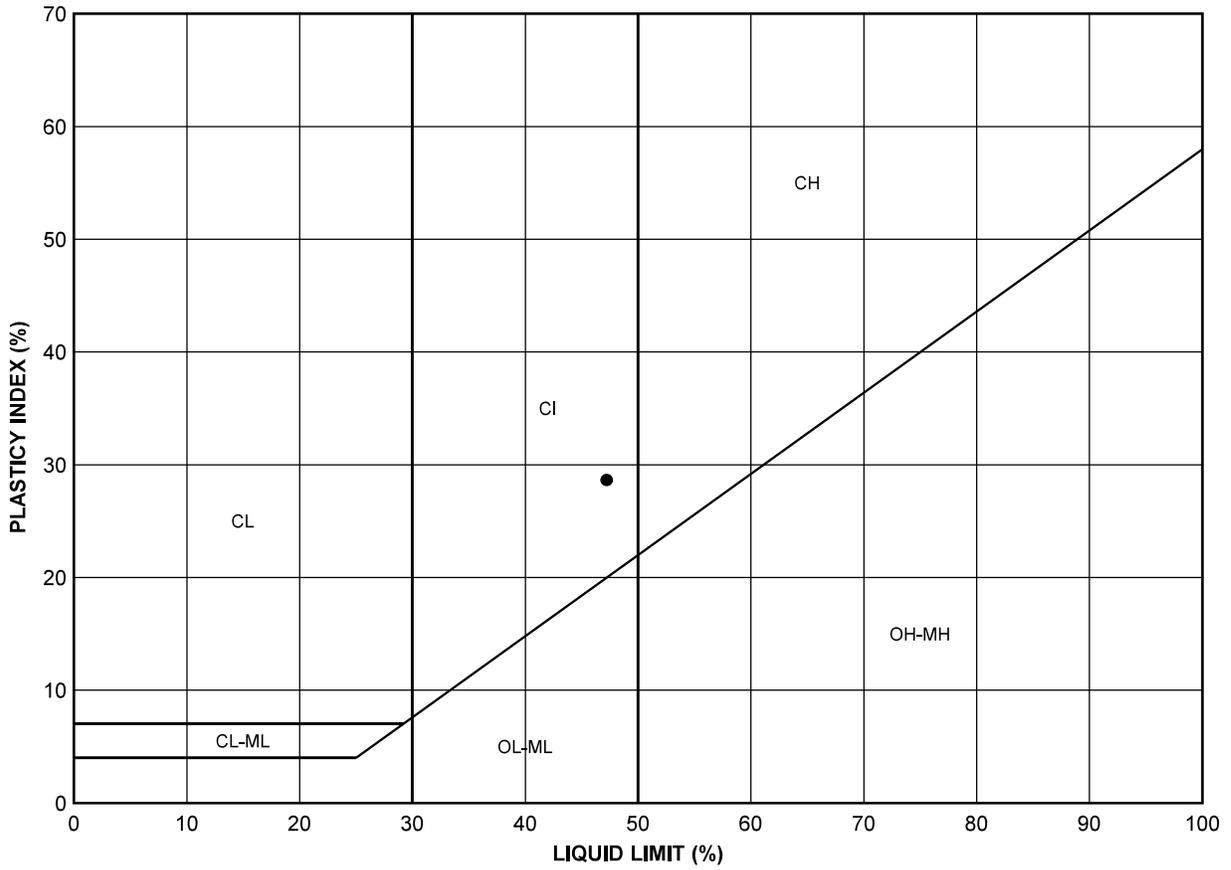


Cobble Size	coarse	fine	coarse	medium	fine	SILT AND CLAY
	GRAVEL SIZE		SAND SIZE			

LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEV (m)
○	101	2	216.8
●	103	4	215.6
□	104	3	216.8
■	107	2	215.2

PROJECT				GEOTECHNICAL EXPLORATION SANITARY FORCEMAIN TWINNING MUNICIPALITY OF SOUTHWEST MIDDLESEX			
TITLE				GRAIN SIZE DISTRIBUTION (CI) Silty Clay			
PROJECT No.		CA0020268.9631		FILE No.		Middlesex, Fig 2	
DRAWN		JAK		2024-05-17		SCALE N/A	
CHECK						REV. 0	
				<p style="text-align: center;">FIGURE 2</p>			



LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEV (m)
●	104	3	216.8

PROJECT				GEOTECHNICAL EXPLORATION SANITARY FORCEMAIN TWINNING MUNICIPALITY OF SOUTHWEST MIDDLESEX			
TITLE				PLASTICITY CHART			
PROJECT No.		CA0020268.9631		FILE No.		CA0020268.9631	
DRAWN		JAK		2024-05-17		SCALE	
CHECK						REV. 0	
				FIGURE 3			

Attachments

METHOD OF SOIL CLASSIFICATION

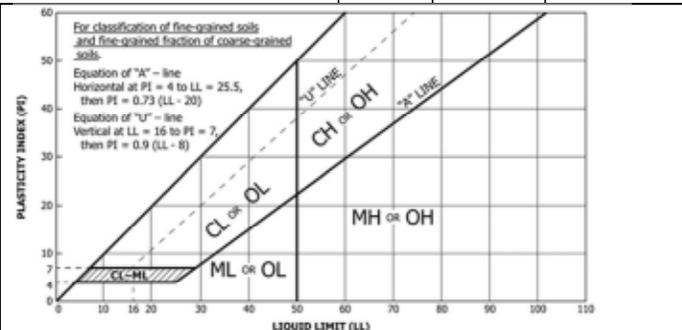
The WSP Canada Soil Classification¹ System is based on the Unified Soil Classification System (USCS) (after ASTM D2487)

Organic or Inorganic	Soil Group	Type of Soil	Gradation or Plasticity	$C_u = \frac{D_{60}}{D_{10}}$		$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$		Organic Content ^{6,9}	USCS Group Symbol ^{3,5,7}	Primary Group Name ²	
				≥ 4	(and)	≥ 1	≤ 3				< 4
INORGANIC (Organic Content <30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Clean Gravels with <5% fines ³ (by mass)	Well Graded	≥ 4	(and)	≥ 1	≤ 3	≤30%	GW	Well-graded GRAVEL ^{4,6}
			Poorly Graded	< 4	(and/or)	< 1	> 3	GP		Poorly graded GRAVEL ^{4,6}	
			Gravels with >12% fines ³ (by mass)	Below A Line	n/a					GM	SILTY GRAVEL ^{4,6}
			Above A Line	n/a				GC		CLAYEY GRAVEL ^{4,5,6}	
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Clean Sands with <5% fines ⁷ (by mass)	Well Graded	≥ 6	(and)	≥ 1	≤ 3		SW	Well-graded SAND ^{6,8}
			Poorly Graded	< 6	(and/or)	< 1	> 3	SP		Poorly graded SAND ^{6,8}	
			Sands with >12% fines ⁷ (by mass)	Below A Line	n/a					SM	SILTY SAND ^{6,8}
			Above A Line	n/a				SC		CLAYEY SAND ^{5,6,8}	

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content ^{B,H}	USCS Group Symbol ^A	Primary Group Name ^A
				Dilatancy	Dry Strength	Shine Test	Thread Diameter (mm)	Toughness (of 3 mm thread)			
INORGANIC (Organic Content <30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Nonplastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50 ^D	Rapid	None to Low	Dull to None	3 to >6	Low/can't roll 3 mm	<15%	ML	SILT ^H
			>50 ^D	None to Slow	Low to Medium	Dull to Slight	3 to 6	Low	15% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50 ^D	None to V.Slow	Low to Medium	Slight	3 to 6	Low to Medium	<15%	MH	ELASTIC SILT ^H
			>50 ^D	None	Medium to High	Dull to Slight	1 to 3	Low to Medium	15% to <30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <50 ^D	None to Medium Slow	Medium to High	Slight to Shiny	1 to 3	Medium	<15%	CL	LEAN CLAY ^{A,E,F,G,H}
			>50 ^D	None to V.Slow	Medium to High	Slight to Shiny	1 to 3	Medium	15% to <30%	OL	ORGANIC CLAY ^{E,F,G}
			Liquid Limit <50 ^D	None	High to V.High	Shiny	<1	High	<15%	CH	FAT CLAY ^{E,F,G,H}
			>50 ^D	None	High	Shiny	<1 to 1	High	15% to <30%	OH	ORGANIC CLAY ^{E,F,G}
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)	Peat and mineral soil mixtures	Relatively lightweight, possibly spongy. Some water may squeeze from sample. Some shrinkage may occur on air drying. Sand fraction may be visible. Low to high dilatancy. Thread weak near plastic limit. Low to medium dry strength.						30% to <75%	PT	SILTY PEAT, SANDY PEAT	
		Lightweight, spongy. Much water squeezes from sample. Shrinks considerably on air drying (i.e., very high water content). Plant structure identifiable to altered.						75% to 100%		PEAT	

Coarse-Grained Soil Note(s):

- Based on the material passing the 75 mm sieve.
- If field sample contains or drilling observations indicate cobbles or boulders or both, add, "with cobbles" or "with cobbles and boulders". Include notes on the depth(s) encountered, and sizes if possible.
- Gravels with 5% to 12% fines require dual symbols:
(GW-GM) Well-graded GRAVEL with silt,
(GW-GC) Well-graded GRAVEL with clay,
(GP-GM) Poorly graded GRAVEL with silt,
(GP-GC) Poorly graded GRAVEL with clay.
- If soil contains ≥15% sand, add "with sand" to Group Name.
- If fines classify as CL-ML, use dual symbol (GC-GM) or (SC-SM) for Group Symbol.
- If the soil has an organic content (OC) 15% ≤ OC < 30% the prefix "Organic" should be added before the Group Name. If the soil has an organic content 3% ≤ OC < 15% add "with organic fines" to Group Name. If the soil contains >0% to ≤3% organics, the descriptor "trace organics" may be added.
- Sands with 5% to 12% fines require dual symbols:
(SW-SM) Well-graded SAND with silt,
(SW-SC) Well-graded SAND with clay,
(SP-SM) Poorly graded SAND with silt,
(SP-SC) Poorly graded SAND with clay.
- If soil contains ≥15% gravel, add "with gravel" to Group Name.



Fine-Grained Soil Note(s):

- If Atterberg limits plot above the A-line but in the 'hatched' area on the plasticity chart, soil is a (CL-ML) SILTY CLAY.
- If the soil contains >0% to ≤3% organics, the descriptor "trace organics" may be added.
- If fine-grained materials are nonplastic (i.e., a plastic limit (PL) cannot be measured), soil is a (ML) SILT.
- If soil has a liquid limit (LL) >30% to <50%, the term 'medium plasticity' may be included in the description, but the Group Name/Symbol is not changed.
- If soil contains 15% to <30% +No.200, add "with sand" or "with gravel".
- If soil contains ≥30% +No.200 mainly sand, add "Sandy" to Group Name.
- If soil contains ≥30% +No.200 mainly gravel, add "Gravelly" to Group Name.
- If the soil has an organic content (OC) 3% ≤ OC < 15% add "with organic fines" to Group Name.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse	19 to 75	0.75 to 3
	Fine	4.75 to 19	(4) to 0.75
SAND	Coarse	2.00 to 4.75	(10) to (4)
	Medium	0.425 to 2.00	(40) to (10)
	Fine	0.075 to 0.425	(200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

GRADATIONAL COMPONENT TERMS

% (by mass)	Term
≤ 5	Use "trace"
> 5 to ≤ 12	Use "few"
> 12 to <30	Use "little"
≥ 30 to <50	Use "some"
≥ 50	Use "mostly"

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.) split-spoon sampler for a distance of 300 mm (12 in.). Values reported are as recorded in the field and are uncorrected.

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); Nd:

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° 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

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DD	Diamond Drilling
DO or DP	Seamless open ended, driven, pushed tube sampler, or geoprobe macro-core – note size
DS	Denison type sample
FS	Foil Sample
GS	Grab Sample
MC	Modified California Samples – note sample diameter and hammer weight
MS	Modified Shelby (for frozen soil)
RC	Rock core
SC	Soil core
SS	Split-spoon sampler (50 mm OD); larger sizes use MC
ST	Slotted tube
TO	Thin-walled, open – note size (Shelby tube)
TP	Thin-walled, piston – note size (Shelby tube)
WS	Wash sample

SOIL TESTS

w	water content
PL, w _p	plastic limit
LL, w _L	liquid limit
C	consolidation (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
GS	specific gravity
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 (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness²

Term	SPT 'N' (blows/0.3m) ¹
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

- SPT 'N' in general accordance with ASTM D1586, uncorrected for the effects of overburden pressure.
- Definition of compactness terms are based on SPT 'N' ranges as provided in Terzaghi, Peck and Mesri (1996). Many factors affect the recorded SPT 'N' value, including hammer efficiency (which may be greater than 60% in automatic trip hammers), overburden pressure, groundwater conditions, and grain size. As such, the recorded SPT 'N' value(s) should be considered only an approximate guide to the soil compactness. These factors need to be considered when evaluating the results, and the stated compactness terms should not be relied upon for design or construction.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N' ^{1,2} (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

- SPT 'N' in general accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
- SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

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
$\log_{10} x$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

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 stress (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 ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
NP	nonplastic
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 (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
C_v	coefficient of consolidation (vertical direction)
C_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = $\tan \delta$
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ 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

* Density symbol is ρ . Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

Notes: 1
2

$$\tau = c' + \sigma' \tan \phi'$$

$$\text{shear strength} = (\text{compressive strength})/2$$

PROJECT: CA0020268.9631
 LOCATION: N 4732810.94; E 442312.10

RECORD OF BOREHOLE: BH 101

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 4, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT						
								20	40	60	80	nat V. rem V.	+			⊕	Q - U -	●
0		GROUND SURFACE		218.58														
		TOPSOIL - SILTY CLAY; dark brown, contains roots; moist		0.00 218.33														
		(C) SILTY CLAY, some sand, trace gravel, trace roots; mottled brown, trace topsoil		0.25														
1	Power Auger 210 mm Diam. (Hollow Stem)	(C) SILTY CLAY, trace sand; brown; stiff to very stiff - becoming grey at 1.98 m	[Hatched Strata Plot]	217.82	1	SS	13											
				0.76														
2					2	SS	22											
3					3	SS	23											
4				215.07	4	SS	19											
				3.51														
4		END OF BOREHOLE																
4		Note(s): 1. Borehole dry upon completion of drilling on April 4, 2024.																
5																		
6																		
7																		
8																		
9																		
10																		

GTA-BHS 001 S:\CLIENTS\MUNICIPALITY OF SOUTHWEST MIDDLESEX\VICTORIA_PS_GLENCOE_WWTP\02_DATA\GINT\VICTORIA_PS_GLENCOE_WWTP.GPJ GAL-MIS.GDT 2/12/25

DEPTH SCALE

1 : 50



LOGGED: KB

CHECKED: JAK

PROJECT: CA0020268.9631
 LOCATION: N 4732747.77; E 442597.66

RECORD OF BOREHOLE: BH 102

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 4, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+			⊕	Q - U -
0		GROUND SURFACE		218.98													
		TOPSOIL - SILTY CLAY; dark brown, contains roots; moist		0.00													
		(CI) SILTY CLAY; brown to grey, trace to some topsoil, contains roots		0.08													
1		(CI) SILTY CLAY, some sand, trace gravel; mottled brown; stiff		218.17	1	SS	10										
		(CI) SILTY CLAY, some sand, trace gravel; brown, occasional wet silt pockets; stiff		217.61	2	SS	15										
2	Power Auger 160 mm Diam. (Hollow Stem)			1.37													
					3	SS	14										
3		- grey at 3.05 m			4	SS	14										
		END OF BOREHOLE		215.47													
4		Note(s): 1. Borehole dry upon completion of drilling on April 4, 2024.		3.51													
5																	
6																	
7																	
8																	
9																	
10																	

GTA-BHS 001 S:\CLIENTS\MUNICIPALITY OF SOUTHWEST MIDDLESEX\VICTORIA_PS_GLENCOE_WWTP\02_DATA\GINT\VICTORIA_PS_GLENCOE_WWTP.GPJ GAL-MIS.GDT 2/12/25

DEPTH SCALE

1 : 50



LOGGED: KB

CHECKED: JAK

PROJECT: CA0020268.9631
 LOCATION: N 4732575.08; E 442798.62

RECORD OF BOREHOLE: BH 103

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 4, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20 40 60 80		10 ⁻⁵ 10 ⁻⁶ 10 ⁻⁴ 10 ⁻³		nat V. rem V.				+	
0		GROUND SURFACE		218.90													
		TOPSOIL - SILTY CLAY; dark brown, contains roots		0.00											Concrete		
		(Cl) SILTY CLAY, some sand, trace gravel; mottled, trace topsoil, contains roots		0.46											Bentonite		
1		(Cl) SILTY CLAY, some sand, trace gravel; mottled brown; firm		0.76	1	SS	8								Sand		
2		(Cl) SILTY CLAY, trace to some sand, nil to trace gravel; brown, coarse sand seam; stiff to very stiff		1.52	2	SS	15										
3	Power Auger 210 mm Diam. (Hollow Stem)	- seams (wet) at 2.44 m			3	SS	19										
4		- grey at 3.05 m			4	SS	15								Screen		
5					5	SS	16								MH		
5					6	SS	15								Bentonite		
5		END OF BOREHOLE		213.87													
6		Note(s): 1. Borehole dry upon completion of drilling on April 4, 2024.		5.03													

GTA-BHS 001 S:\CLIENTS\MUNICIPALITY OF SOUTHWEST MIDDLESEX\VICTORIA_PS_GLENCOE_WWTP\02_DATA\GINT\VICTORIA_PS_GLENCOE_WWTP.GPJ GAL-MIS.GDT 2/12/25

DEPTH SCALE

1 : 50



LOGGED: KB

CHECKED: JAK

PROJECT: CA0020268.9631
 LOCATION: N 4732568.19; E 442848.86

RECORD OF BOREHOLE: BH 104

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 4, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+			⊕	Q - U -
0		GROUND SURFACE		219.33													
0.08		TOPSOIL - SILTY CLAY; dark brown, contains roots		0.00													
0.91		(C1) SILTY CLAY, some sand, trace gravel; mottled brown, trace topsoil		218.42	1	SS	7								Concrete		
1.52		(C1) SILTY CLAY, some sand, trace gravel; mottled brown; firm		217.81	2	SS	12								Bentonite		
2.3		(C1) SILTY CLAY; brown; stiff to very stiff		217.81	3	SS	23								Sand		
3.66		- becoming grey at 3.66 m			4	SS	19								MH		
5.03		END OF BOREHOLE		214.30	5	SS	14								Screen		
6.0		Note(s): 1. Borehole dry upon completion of drilling on April 4, 2024.			6	SS	14								Bentonite		

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DEPTH SCALE

1 : 50



LOGGED: KB

CHECKED: JAK

PROJECT: CA0020268.9631
 LOCATION: N 4732443.45; E 443218.16

RECORD OF BOREHOLE: BH 105

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 5, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+			⊕	Q - U -
0		GROUND SURFACE		219.02													
		TOPSOIL - SILTY CLAY; dark brown, contains roots		0.00													
		(C) SILTY CLAY; trace topsoil, mottled brown		0.08													
1		(C) SILTY CLAY, some sand, trace gravel; mottled brown; stiff to hard		218.26	1	SS	11										
2	Power Auger 90 mm Diam. (Hollow Stem)				2	SS	9										
3					3	SS	29										
4					4	SS	36										
4		END OF BOREHOLE		215.51													
4		Note(s): 1. Borehole dry upon completion of drilling.		3.51													

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DEPTH SCALE

1 : 50



LOGGED: KB

CHECKED: JAK

PROJECT: CA0020268.9631
 LOCATION: N 4732278.39; E 443510.76

RECORD OF BOREHOLE: BH 106

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 5, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20	40	60	80	nat V.	rem V.			+	⊕
0		GROUND SURFACE		217.62													
		TOPSOIL - SILTY CLAY; dark brown, contains roots; moist		0.00 0.08													
		(C) SILTY CLAY, trace gravel; dark brown, trace to some topsoil, contains roots		216.86													
1		(C) SILTY CLAY, trace to some sand, trace gravel; mottled brown; stiff to very stiff		0.76	1	SS	9										
2	Power Auger 90 mm Diam. (Hollow Stem)				2	SS	18										
3					3	SS	22										
4					4	SS	24										
4		END OF BOREHOLE		214.11													
4		Note(s): 1. Borehole dry upon completion of drilling.		3.51													
5																	
6																	
7																	
8																	
9																	
10																	

GTA-BHS 001 S:\CLIENTS\MUNICIPALITY OF SOUTHWEST MIDDLESEX\VICTORIA_PS_GLENCOE_WWTP\02_DATA\GINT\VICTORIA_PS_GLENCOE_WWTP.GPJ GAL-MIS.GDT 2/12/25

DEPTH SCALE

1 : 50



LOGGED: KB

CHECKED: JAK

PROJECT: CA0020268.9631
 LOCATION: N 4732139.94; E 443624.52

RECORD OF BOREHOLE: BH 107

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 5, 2024

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Diedrich D50 Mobile (London Soil)

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20	40	60	80	nat V. rem V.	+			⊕	Q - U -
0		GROUND SURFACE		216.95													
0		TOPSOIL - SILTY CLAY; dark brown, contains roots		216.99 0.18											Concrete		
0.18		(C1) SILTY CLAY; mottled, trace topsoil, contains roots; brown													Bentonite		
1		(C1) SILTY CLAY, trace sand; brown; very stiff		216.19 0.76	1	SS	19										
2	Power Auger 210 mm Diam. (Hollow Stem)				2	SS	24								MH		
3					3	SS	26								Screen		
4		END OF BOREHOLE		213.44 3.51	4	SS	19								Bentonite		
4		Note(s): 1. Borehole dry upon completion of drilling.															

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DEPTH SCALE

1 : 50



LOGGED: KB

CHECKED: JAK



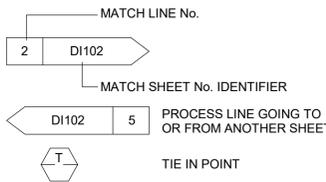
wsp.com

PROCESS DRAWINGS PIPING

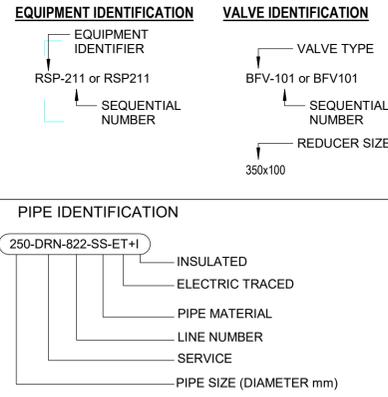
Table with 2 columns: Symbol and Description. Includes EXIST. PIPING, NEW PIPING, and EXISTING PIPING TO BE REMOVED.

LEGEND FOR PROCESS FLOW AND INSTRUMENTATION DIAGRAMS

Table with 2 columns: Symbol and Description. Includes INSTRUMENT SIGNAL, PRIMARY PIPING LINES, SECONDARY PIPING LINES, and REMOVAL.



IDENTIFICATION SYSTEM



Large alphabetical table of chemical and process symbols (A-N) with their corresponding full names.

Large alphabetical table of equipment and process symbols (A-Z) with their corresponding full names.

Large alphabetical table of miscellaneous symbols (A-Z) with their corresponding full names.

PIPE SPECIFICATION DATA SHEET

Table listing pipe materials and specifications such as ABS, Cast Iron, Carbon Steel, and Stainless Steel.

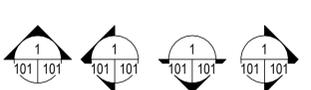
GENERAL NOTES

- 5 numbered notes providing general instructions and references for the drawing symbols and standards.

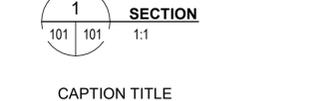
SECTION TAIL



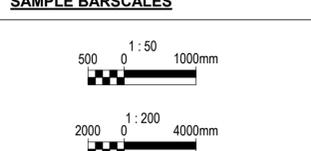
SECTION BUBBLES



SECTION



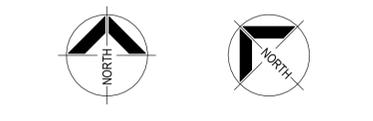
SAMPLE BARSCALES



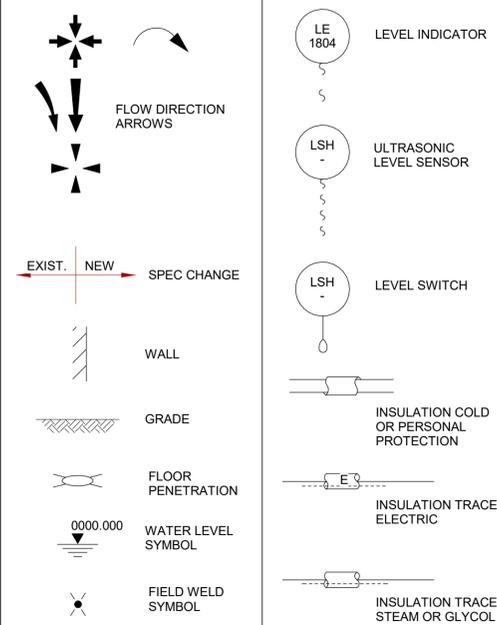
PIPE CONVERSION CHART

Table with 8 columns: Metric Size (mm), Equivalent Size (in), Metric Size (mm), Equivalent Size (in), Metric Size (mm), Equivalent Size (in), Metric Size (mm), Equivalent Size (in).

NORTH ARROW



MISCELLANEOUS SYMBOLS



Consultant

Table with columns for Name, Title, and Date. Includes entries for YYYMMDD.

Table with columns for Issue, Date, and Description. Includes entries for 2026.03.05 and 2026.01.30.

Permit/Seal



Client/Project: SOUTHWEST MIDDLESEX WWTP INFRASTRUCTURE DESIGN - GLENCOE INDUSTRIAL PARK SPS UPGRADES

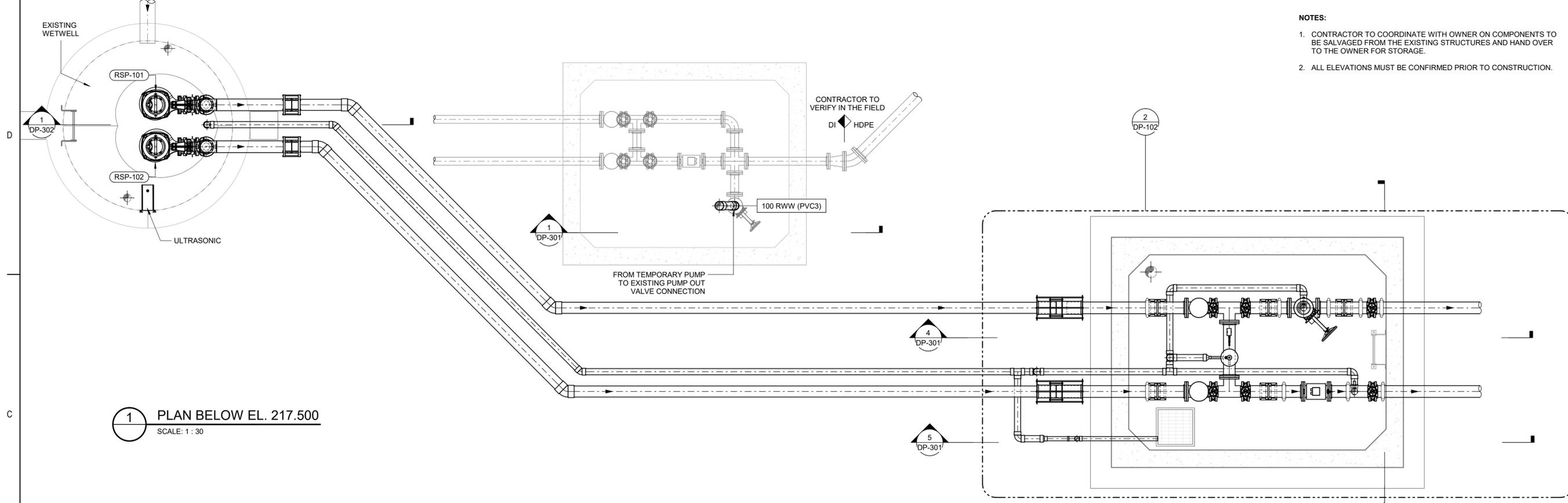
Project No.: 165630252 File Name: N/A Scale: 1:1

Title: PROCESS LEGEND SHEET 1

Revision: Sheet: 1 of 9 Drawing No.

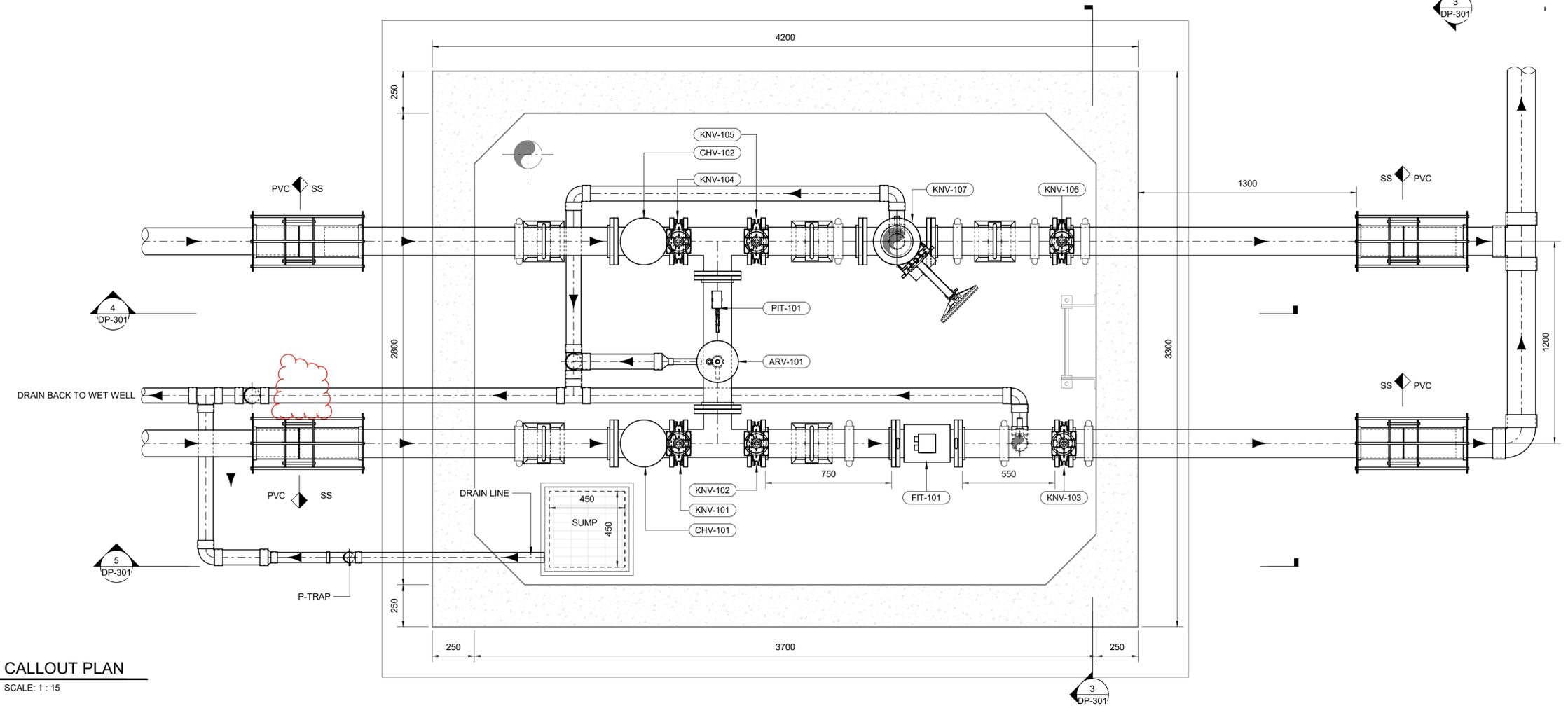
DI-001

1 2 3 4 5



NOTES:
 1. CONTRACTOR TO COORDINATE WITH OWNER ON COMPONENTS TO BE SALVAGED FROM THE EXISTING STRUCTURES AND HAND OVER TO THE OWNER FOR STORAGE.
 2. ALL ELEVATIONS MUST BE CONFIRMED PRIOR TO CONSTRUCTION.

1 PLAN BELOW EL. 217.500
 SCALE: 1 : 30



2 CALLOUT PLAN
 SCALE: 1 : 15

Revision	By	Appd	YYYY.MM.DD

ISSUED	By	Appd	YYYY.MM.DD



Client/Project
 SOUTHWEST MIDDLESEX
 WWTP INFRASTRUCTURE
 DESIGN - GLENCOE
 INDUSTRIAL PARK SPS
 UPGRADES
 Glencoe ON Canada

Project No.: 165630252
 File Name: N/A
 Scale: As indicated

SP	GA	NO	2026.03.05
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
 PLAN AT 217.500

Revision: Sheet: 6 of 9
 Drawing No.

DP-102

02600 Underground Piping

1.0 General

1.1 Description

- .1 Requirements for supply and installation of underground piping from the outside of a building or structure to its intended location, as described in these specifications and as shown on the Drawings.
- .2 The Contractor shall note that this contract includes underground piping as defined by these specifications, and additional underground piping as defined by the separate specifications for the road works. The Contractor shall review both specifications and the drawings to confirm the limits of each.

1.2 Reference Standard

- .1 Ontario Provincial Standard Specifications including but not limited to OPSS 201, 206, 407, 409, 410, 416, 517 and 701.
- .2 Ontario Provincial Standard Drawings OPSD.
- .3 Southwest Middlesex Design Standards.

1.3 Related Work Specified Elsewhere

- .1 Section 02150 Shoring and Bracing
- .2 Section 02200 Earthwork
- .3 Section 02140 Dewatering and Site Drainage
- .4 Section 02221 Dewatering and Site Drainage
- .5 Division 15 Mechanical

1.4 Definitions

- .1 Bedding:
 - .1 Material used to support pipe below and up to spring line.
- .2 Cover Material:
 - .1 Material placed from top of bedding to minimum distance of 300mm above outside top of pipe.

1.5 Protection Against Flotation

- .1 Prevent damage to pipeline due to hydrostatic pressure during construction and until completion of work.
- .2 Do not lay pipes on frozen ground.

1.6 Basis of Payment

- .1 Payment for supply and installation of all underground piping work to be included in lump sum price bid in Form of Tender under Division 2.

- .2 All OPSS quantity measurements and basis of payments do not apply to this contract, for the underground piping included as part of this Division.

2.0 Products

2.1 General

- .1 Supply and install pipes in material, size and class as shown on Drawings and as indicated in Division 15.
- .2 Supply fittings suitable for and compatible with class and type of pipe with which they will be used.
- .3 Contractor shall verify all pipe length and fitting requirements.

2.2 Concrete

- .1 To Section 03300 or as indicated on the Contract Drawings.
- .2 Cast-in-place and formed concrete to have 28-day compressive strength of 25 MPa unless otherwise indicated.

2.3 Reinforcing Steel

- .1 Refer to Section 03200 Concrete Reinforcement.

2.4 Precast Catch Basins, Manholes and Valve Chambers

- .1 Refer to Section 03480 - Precast Concrete Specialties

2.5 Pipe Bedding Materials

- .1 Granular materials greater than 19 mm in size shall not be used for pipe bedding. Bedding material shall be as specified in the Contract.
- .2 Concrete for bedding shall conform to OPSS.
- .3 Where wet fine grained granular material are encountered at bedding zone, geotextile material meeting the requirements of OPSS Form 1860, Type I shall be used to envelop the "sewer stone" bedding (See also Section 02240 – Geotextiles). Once this change is made (mid run), this bedding system will be maintained until the next maintenance hole location regardless if the trench conditions improve. Trench conditions will be re-evaluated at the beginning of each run to determine if geotextile wrapped crushed stone is warranted.

2.6 Cover Materials

- .1 Granular material shall be one of the following: Granular A, B, M, B select, Granular C and Coarse Sand shall conform to the requirements of O.P.S.S. 1010, unless otherwise specified in the Special Provisions.
- .2 Use Granular 'A' to OPSS Form 1010 as cover material for flexible pipe.
- .3 Use Granular 'B' Type II to OPSS Form 1010 for rigid pipe.

2.7 Backfill Materials

- .1 Refer to "Section 02200 Earthwork".

2.8 Buried Gate Valves and Boxes

- .1 Valves
 - .1 Valve boxes shall be CI 130 mm screw type.
 - .2 Opening direction of the valves to be confirmed by Southwest Middlesex.
 - .3 Valves shall be gate valves conforming to AWWA C500 or resilient seat gate valves conforming to AWWA C509 / C515.
 - .4 All valves must be epoxy coated inside and out (minimum of 3 mm thickness) and conforming to AWWA C-550.
 - .5 Epoxy coated gate valves do not require anodes.
 - .6 All valves up to 200 mm diameter may be push-on joint, valves 250 mm to 400 mm must be mechanical joints to allow for adequate mechanical thrust restraints.
 - .7 Valves shall work equally well with full pressure applied on either side of valve.
 - .8 Approved AWWA C500 gate valves
 - .1 Kennedy C571/F-5065
 - .2 Clow F5000 Series
 - .9 Approved AWWA C509 / C515 resilient seat gate valves
 - .1 Clow R/W F6100 Series
 - .2 Mueller A-2360
 - .3 AVK Series 45 / 65
 - .4 Bibby
 - .5 EJIW
- .2 Valve Boxes
 - .1 Extension pieces must be used for depths greater than 1.9 m.
 - .2 Approved boxes for 1.2 m to 1.65 m depth
 - .1 Bibby VB3000 Series
 - .2 Star Pipe Product VB-5007 Series (30" bottom)
 - .3 Approved boxes for 1.5 m to 1.9 m depth
 - .1 Bibby VB3000 Series
 - .2 Star Pipe Product VB-5007 Series (36" bottom)

2.9 Nuts and Bolts

- .1 For flanged joints: to AWWA C207
- .2 For mechanical joints: to AWWA C111/A21.11

2.10 U/G Gravity Flow Pipes and Accessories (Sewer and Drainage) to OPSS 410

- .1 Polyvinyl Chloride (PVC)
 - .1 Pipe size, class, material and type shall conform as shown in the contract. The following is an overall list of sewer pipe approved for use on City projects by the Owner for sizes certified by CSA. A substitution from that specified in the contract may be considered in accordance with the General Conditions.
 - .2 Polyvinyl chloride (P.V.C.) pipe - smooth wall (CSA B182.2) - 100mm - 600mm inclusive
 - .1 IPEX
 - .2 Royal

- .3 Northern Pipe – sizes 100mm to 150mm
- .4 Diamond
- .5 National
- .3 Polyvinyl chloride (P.V.C.) pipe – smooth wall (CSA B182.2) – 100mm – 375mm inclusive
 - .1 NEXT Polymers – DURALOC
- .4 Ribbed polyvinyl chloride (P.V.C.) pipe - 200 mm to 600 mm inclusive (CSA B182.4)
 - .1 IPEX
 - .2 Royal Pipe Co. (KOR-FLO) - 200mm to 450mm inclusive
 - .3 RauRib ribbed PVC pipe - 375mm, 450mm, and 600mm

2.11 Sanitary Forcemain

- .1 Unless otherwise specified, forcemain test pressure shall be 1030 KPa (150 p.s.i.).
- .2 Fittings shall be suitable for and compatible with the pipe material and class with which they will be used.
- .3 PVC/PVCO pipe 200mm diameter, PVC CSA B137.3 C900 (DR18) or C909 (PVCO) forcemain and fittings, white in colour, pressure rated to 235 psi.
- .4 All pipe to have custom print line to show “Sewage Forcemain”
- .5 Pipe shall have push-on PVC compatible with the pipe and pressures listed, white in colour.
- .6 Blue pipe will not be accepted.
- .7 Mechanical restraints to be supplied as per the table below. Joint restraints to be compatible with the chosen pipe and be as recommended by the pipe manufacturer. All mechanical restraints to be protected from corrosion using the DENSO system or approved equal.
- .8 Joint deflection to be half (1/2) that of the manufacturers recommended joint deflection. Axial deflection of the pipe barrel is not permitted.

Minimum Length to be Restrained on Each Side of Fittings (m)

Diameter of Main (mm)	Minimum No. of Steel Rods	11 ¼ deg bend	22 ½ deg bend	45 deg bend	90 deg bend	Dead End
200	2	4	4	4	7	20

Note:

- Steel Rods to be a minimum of 20mm in diameter.
- If any joint is encountered in the above restrained length, it must be restrained.
- 5 degree bends with bell and spigot must be restrained at joints.
- Valves are considered dead ends and are to be restrained on each side to the above lengths.

Concrete thrust blocking will not be permitted.

2.12 Tracer Wire

- .1 Tracer wire shall be installed on all non-metallic forcemains. The wire shall be install in such a manner as to be able to properly trace all forcemain without loss or deterioration of signal or without the transmitted signal migrating off the tracer wire.
- .2 Tracing wire shall be Direct Burial #12 AWG Solid (.0808" diameter), 21% conductivity annealed copper-clad high carbon steel high strength tracer wire, 452lb average tensile break load, 30 mil. High molecular weight-high density polyethylene jacket (**Green**) complying with ASTM-D-1248, 30-volt rating.
- .3 Approved tracer wire for open cut application:
 - .1 Copperhead 12.30 BHS
 - .2 Pro-Trace HS-CCS PE30
- .4 Approved Direct Bury Connectors:
 - .1 SnakeBite Locking Connector LSC 1230
- .5 For trenchless installations refer to OPSS 450. #12 AWG Solid (.0808" diameter), steel core hard drawn extra high strength horizontal directional drill tracer wire, 1150lb. average tensile break load, 45 mil high molecular weight-high density **Green** polyethylene jacket complying with ASTM-D-1248, 30-volt rating.
- .6 All tracer wire welds onto existing cast of ductile iron pipe shall be completely sealed with the use of Chace/Royston Handy Cap IP. In all cases, the pipe is to be properly cleaned and material shall be applied in accordance with the manufacturer's instructions.
- .7 All splices or repaired wire connections in the tracer wire system shall be made using waterproof connectors specifically rated for underground applications. Tracer wire shall have a Zinc anode installed as per OPSS 442 Table 5.

2.13 Pipe Insulation (Buried Rigid)

- .1 In all locations where yard piping is un-insulated and buried with less than 1.2m cover, 50 mm thick rigid insulation shall be installed for frost protection to a total width twice the height above the pipe, plus pipe outside diameter.
- .2 Material used to thermally insulate mains and services shall have a minimum compressive strength of 690 kPa. Approved material is STYROFOAM HI 100 BRAND by Dow Chemical or approved equal

2.14 Corrosion Protection

- .1 Material used to electrically insulate connections to steel mains shall be as listed and applied per supplier's recommendation.
- .2 Petrolatum tape systems shall be comprised of three components; paste, mastic and tape and meet the requirements of AWWA C217. Mastic must contain polystyrene beads and paste and tape must be of the same manufacturer as mastic to ensure compatibility. The three components provided shall be manufactured under ISO 9001 standards to ensure consistency of quality of products and substantiating documentation is to be provided upon request.
- .3 All Cast iron (CI) and Ductile Iron (DI) fittings must be installed with a 14.5kg (32lbs) high purity magnesium anode. Anode must be attached to fitting using a CADWELD and coated with mastic (Handy Cap IP). Anodes and installation must meet the requirements of OPSS 442 and be approved by the Contract Administrator.

3.0 Execution

3.1 Transporting, Unloading and Storing Pipe

- .1 The Manufacturer's recommendations govern.
- .2 Take delivery of pipes and fittings at designated storage area or near to trench. Do not impede traffic.
- .3 Remove from site and replace all pipes, specials, fittings and gaskets that are unsound or damaged.
- .4 Unload pipe using mechanical equipment.
- .5 Place materials in safe storage.
- .6 Follow pipe manufacturer's handling and storage recommendations.

3.2 Trenching and Backfilling

- .1 Do trenching and backfilling to Section 02200 and OPSS 410.

3.3 Pipe Bedding

- .1 Granular materials greater than 19mm in size shall not be used for pipe bedding.
- .2 For pipe installed in wet soils stone bedding shall be utilized complete with a geotextile filter cloth wrap.
- .3 Place bedding materials to OPSD 802.010 and 802.030 for all U/G piping unless indicated otherwise on the contract drawings.
- .4 Shape bed true to line and grade, free from sags and high points.
- .5 Shape bedding to cylindrical surface with radius conforming to pipe in accordance with pipe manufacturer's recommendations.
- .6 Place bedding materials simultaneously on each side to spring line of pipe.
- .7 Compact full width of bed to 98% maximum dry density in accordance with Standard Proctor Density.
- .8 Keep pipe joints clear of bedding materials to permit jointing. After jointing is completed, place bedding materials as specified.
- .9 Support pipe on grade and alignment with concrete blocks having minimum compressive strength of 15 MPa when placing concrete bedding.
- .10 Concrete bedding may be placed in two lifts provided:
 - .1 Level of first is not higher than 75mm above bottom of pipe.
 - .2 First lift is cured 24 hours minimum before placing second.
- .11 Prevent movement of pipe during placement of concrete bedding.
- .12 Place bond breaking agent between concrete bedding and sheathing.

3.4 Installation of Gravity Pipes

- .1 Manufacturer's standards govern.
- .2 The Contractor shall supply all labour, equipment and materials required to construct sewers of diameters and in locations indicated on the Contract Drawings.

- .3 The lump sum price shall include excavation, select native backfill, granular bedding, fittings, dewatering, disposal of excess excavation, maintenance of flow, trench liners (if required), utility support, deflection and infiltration / exfiltration testing and traffic control complete as required.

3.5 Installing Forcemain

- .1 The Contractor shall supply all labour, equipment and materials required to install forcemain as shown on the Contract Drawings.
- .2 The lump sum price for forcemain installation shall include, but not be limited to, excavation including disposal of excess material, supply and placement of granular bedding, fittings, and select native backfill, dewatering as required, thrust restraints, corrosion protection as required and all labour, materials, and equipment necessary to install the forcemain. Provide cathodic protection of new forcemain in accordance with manufacturers requirements.
- .3 All suppliers of pipe shall provide an additional visual check of all product before it leaves their facility to certify that it is free of impairments such as cracks, gouges, and chips etc. Reports of all certification checks shall accompany all shipments and be presented to the Engineer.
- .4 The Contractor shall review reports provided by suppliers and visually verify the pipe when received on site to confirm that it is free of impairments such as cracks, gouges, chips etc. Note: Do not install any pipe with noted impairments.
- .5 The Contractor shall provide at least 48 hours notice to all homeowners, businesses, and institutions affected by any disruption including hydro, water, and access etc.
- .6 The Contractor shall exercise caution when working adjacent to existing utilities and shall minimize the length of open trench.
- .7 PVC forcemain pipe shall have minimum and maximum insertion lines on the spigot of every pipe in order to control the homing characteristics. When properly inserted the bell edge should line up between the two insertion lines. If there are no insertion lines on short pieces of pipe the Contractor will be required to mark the pipe by hand. Note: Factory-made assembly lines on the pipe do not indicate correct assembly to fittings.

3.6 Placing Cover Material

- .1 Manufacturers Standards govern.
- .2 Place cover materials from pipe bedding to 300mm above top of pipe and/or according to details indicated on drawings.
- .3 Place cover materials in uniform layers not exceeding 300 mm lift. Compact each layer to 95% maximum dry density in accordance with Standard Proctor Density.
- .4 Provide 300 mm layer of cover material above pipe before using mechanical compactor on top of pipe.

3.7 Cutting of Pipe

- .1 Manufacturers Standards govern.
- .2 Whenever cutting of pipe is required, cut pipes as recommended by pipe manufacturer.
- .3 Method of cutting and cutting equipment to be subject to approval of Engineer.

3.8 Shutting Down or Charging Mains

- .1 During progress of work or at any other time do not shut down, charge any pipes or operate valves unless permission is granted by Engineer.

3.9 Connection to Structures

- .1 Manufacturers Standards govern.
- .2 Provide flexible self restrained couplings within 500mm of outside face of structure as described herein and/or as shown on the drawings.

3.10 Cleaning

- .1 Clean and flush sewers and other underground pipelines.
- .2 Clean all manholes and catch basins of debris.

3.11 Forcemain Commissioning (Pressure Test)

- .1 Forcemains and all other related appurtenances will be commissioned as part of the Contractor's overall commissioning plan. The commissioning will be scheduled so that the forcemain and all other appurtenances can come into service immediately on commissioning of the Sewage Pump Station as directed by the Contract Administrator.
- .2 All work shall be completed in accordance with the Southwest Middlesex Design Standards. In addition, Operations staff from Southwest Middlesex must be present during the commissioning process.
- .3 The Contractor shall supply all labour, material and equipment required to swab and pressure test the new forcemain.

End of Section

15060 Process Piping Systems

1.0 GENERAL

1.1 Summary

- .1 Section includes design, supply, fabrication, installation, testing, cleaning and placing into operation of process piping systems including couplings, connections, expansion pieces, ancillary systems, and fittings.
- .2 Comply with Division 1.
- .3 Conform to Section 15050.
- .4 Conform to Section 11050.
- .5 Air piping connected to/from instruments and instrument control panels and/or packaged equipment supplied under this or other Divisions is provided under this Section. Piping for instruments and instrument control panels may not all be shown on drawings. Vent piping for instruments and instrument control panels may not all be shown on Drawings. Provide piping for instruments and instrument control panels under this Section.
- .6 Note that additional provisions, beyond those listed herein, will be required to make the process piping system compliant with seismic design and Post Disaster level of service. The Constructor will be responsible for the design and supply of materials to make the piping system compliant with Post Disaster Design level of service.

1.2 Products Supplied Under Other Sections

- .1 Products installed under this Section and supplied under other Sections.

1.3 Co-ordination

- .1 Coordinate removal of existing process piping systems and installation of new process piping systems with Engineer to minimize interference with Plant Operation.
- .2 Prepare and make application to TSSA as required for piping systems:
 - . 1 Air Piping.
 - . 2 Hazardous Material Piping.
- .3 Co-ordinate work of this Section with other trades, prior to construction, to locate pipe sleeves in cast-in-place concrete.
- .4 Co-ordinate location of pipe sleeves, prior to construction of masonry building elements.

1.4 Related Sections

- | | | |
|----|------------------------------|---------------|
| .1 | Underground Piping | Section 02600 |
| .2 | Plumbing and Drainage Piping | Section 15400 |

.3 Mechanical Insulation Section 15250

1.5 Submittals

- .1 Submit shop drawings, manuals, parts lists, etc. in accordance with Sections 01300 and 01730.
- .2 Shop drawings
 - . 1 Piping systems transporting compressed air with service that requires TSSA registration and inspection.
 - . 2 Piping systems over 75 mm diameter.
 - . 3 Flexible connectors.
 - . 4 Wall seals.
 - . 5 Expansion couplings.
- .3 Test reports and certificates
 - . 1 Submit test reports and certificates in accordance with Section 15050.
- .4 Installation, operation and maintenance manuals
 - . 1 Include material under this Section in Manuals.
- .5 Spare parts
 - . 1 Submit list of recommended spare parts, where applicable.

1.6 Definitions

- .1 Yard piping: Buried piping external to structures, buildings, and tanks up to spool piece in wall.
- .2 Test pressure: hydrostatic or air pressure used to determine system compliance.
- .3 Working pressure: typical operating pressure of piping system.
- .4 Design temperature: temperature range that piping system is to be designed for.
- .5 Tunnels, galleries, buildings: Within an environment controlled enclosure where temperature is maintained above 5°C.
- .6 Exposed above ground: Outside or within an enclosure which is not environmentally controlled so that temperature is maintained above 5°C.
- .7 Underground or buried: Placed in soil and not tied to structures.
- .8 Below structures: Below concrete slabs such as tanks, channels, buildings, galleries, pipe chases, and other similar items; but not including roadways or walkway structures.
- .9 Submerged: Regularly or occasionally submerged in liquid inside tanks and/or channels and

wet wells and within 3.0 m above maximum water level of open tankage. Includes pipe and appurtenances within manholes, vaults, chambers, and similar items.

1.7 Quality Assurance

- .1 In accordance with Section 15050.
- .2 Welding procedure for stainless steel:
 - .1 Follow welding procedure for stainless steel in Section 15050 and Division 1.
 - .2 10% of welded joints to be 100% X-rayed to ASTM B31.3 (normal fluid service) for following stainless steel piping systems:
 - .1 Piping systems 150 mm and larger.

1.8 Product Delivery, Storage and Handling

- .1 Deliver, store and handle piping and accessories in accordance with Section 15050.

2.0 PRODUCTS

2.1 Materials

- .1 Supply pipes in size and class specified in Contract Documents. Where pipe size is not specified, provide pipe required by Ontario Plumbing Code (minimum 12 mm diameter).
- .2 Supply pipe material as specified. Refer to Section 15250 for insulation requirements.
- .3 Supply fittings suitable for and compatible with class and type of pipe with which they will be used.
- .4 Process piping data sheets
 - .1 Piping materials and fittings: comply with Data Sheets' included in this Section. Data Sheets are referred to on Drawings in the Line Identification Number. Line Identification Number is made up of following components:

(Nominal diameter) (Service) - (Line Number) - (Pipe Material Code)
i.e. 300 - TW - 706 - SS is equivalent to: 300 mm dia. -Treated Water - Line 706
Stainless Steel
Line Number: Y; YYY is the sequential line number.

2.2 General

- .1 Refer to Drawings for piping systems specified in this Section.
- .2 Pipe sizes shown are nominal sizes in mm. Actual pipe dimensions are in accordance with commercially available products, unless otherwise specified.
- .3 Provide new pipe materials free from defects conforming to specified reference standard.
- .4 Comply with new reference standard superseding specified standard.

- .5 Note that additional piping specification tables are provided herein that are not included in base design contract and may be used if changes are either proposed or required, however.
- .6 **Locating Buried Pipe:** The location of plastic pipelines should be accurately recorded at the time of installation. A copper or galvanized wire shall be spiralled around, taped to or laid alongside or just above the pipe during installation to permit the use of a locating device. Termination box to be installed where accessible next to chambers to locate pipes.

TABLE 15060-1:

ABBR	SERVICE	PIPE MAT.	DATA SHEET NO.	PRIMARY JOINT	WORKING PRESS. kPa	TEST PRESS. kPa	TEST MEDIA	TEST DURATION (hours)	DESIGN TEMP. °C	ALLOWABLE LEAKAGE	REMARKS
RWW	Raw Sewage Discharge	SS	SS1/SS2	W/FL/VIC	234	1050	Water	4	0-40	0	Plant
RWW	Raw Sewage	PVC	PVC2	BS	234	1050	Water	4	0-40	0	Buried
RWW	Raw Sewage - Temporary Pipe	PVC	PVC3	BS	234	1050	Water	4	0-40	0	Plant/Outside
RWW	Raw Sewage – emergency truck loading	SS	SS1	W/FL	234	1050	Water	4	0-40	0	Plant
DRN	Drain	PVC	PVC3	SW/FL	Gravity	Leakage	Water	4	0-40	0	Plant/Buried
VT	Vent	SS	SS1	W/FL	Gravity	Leakage	Water	4	0-40	0	Plant/Outside

Note:

1. Refer to following page for legend.

Legend for Table 15060-1: Primary Joints.

ABBREVIATION	DESCRIPTION
BELL	Bell
BF	Butt Fused
BS	Bell and Spigot
BV	Beveled End
BW	Butt Welded
C	Coupling
Comp	Compression
FL	Flanged
GRV	Grooved
LAP	Lap
LUG	Lug
MJ	Mechanical Joint
PSW	Plastic Socket Female
PPL	Plastic Plain
PL	Plain End, Socket Male
S	Soldered
SCR	Screwed
SO	Slip On
SPIG	Spigot
SW	Socketweld Female
TAP	Tap
TC	ChemFlare - Flared Teflon PFA tubing
THDM	Threaded Male
THDF	Threaded Female
TJ	Tyton Joint
U	Union
VIC	Victaulic
W	Welded
WF	Wafer

2.3 Polyvinyl Chloride (PVC) (Buried): Data Sheet No. PVC2

Data Sheet No. **PVC2**

ITEM	SIZES (mm)	GENERAL DESCRIPTION
Pipe	100 - 600	Polyvinyl Chloride (PVC) pipe 100 mm diameter to 600 mm diameter shall conform to AWWA C905 Class 165, DR25 (minimum) as determined by the Design Engineer, to be certified by the Canadian Standards Association to CSA Standard B137.2 and have Cast Iron O.D. dimensions. Forcemain installations should be white in colour.
Fittings	100 - 600	Fabricated fittings to CSA B137.3 or ductile iron conforming to C153 minimum Class of 350. All fittings to be in accordance with the Municipality of Southwest Middlesex Standards.
Joints	100 - 600	Integral bell and spigot ends with stiffened wall section and formed groove for rubber gasket.
Installation	All	.1 Lay and join pipe to CSA B182.11 and per manufacturer's instructions. .2 Install pipe with bell ends facing upgrade. .3 Install gaskets as recommended by manufacturer. .4 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned. .5 Align pipes carefully before joining. .6 Maintain pipe joints free from mud, silt, gravel and other foreign material. .7 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted. .8 Complete each joint before laying next length of pipe. .9 Minimize joint deflection to manufacturer's recommendations. .10 Apply pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

2.4 Polyvinyl Chloride (PVC): Data Sheet No. PVC3

Data Sheet No. **PVC3**

ITEM	SIZES (mm)	GENERAL DESCRIPTION
Pipe	≤ 300	Schedule 80 rigid PVC Type 1, Grade 1, Class 12454-B conforming to ANSI/ASTM D1785 and CSA B137.3. Cut pipe in accordance with pipe manufacturer's instructions
Fittings	12 - 300	Schedule 80 PVC solvent weld socket type Class 12454-B, PVC Type 1 conforming to ANSI/ASTM D-2467
Unions	12 - 65	Schedule 80 PVC conforming to ANSI/ASTM D2467, Class 12454-B, PVC Type 1 with Buna-N O-Ring seal. [For CLS services use Viton or EPDM O-rings.]
Joints	≤ 300	Solvent weld to ANSI/ASTM D2467 and ANSI/ASTM D2564. Solvent cement compatible with chlorinated water at 4,000 mg/L at 15°C. Solvent weld supplied by pipe manufacturer suitable for type of pipe.
Flanges	80 - 300	Schedule 80 PVC Type 1, Grade 1, ANSI B16.5 Class 150 Flange conforming to ANSI/ASTM D2467, Class 12454-B
Bolts	All	ASTM A-307 Grade B zinc chromate plated carbon steel heavy hexagonal head bolts, epoxy coated
Nuts	All	ASTM A-563 Grade A zinc chromate plated carbon steel heavy hexagonal head nuts, epoxy coated
Gaskets	All	3 mm thick full-faced premium grade EPDM for [SBS, CLS] services. 3mm thick full-faced, premium grade Teflon encapsulated EPDM for [SH ₁] services. 3 mm thick full-faced premium grade Neoprene for other services.
Buried Piping	All	Solvent welded joints.
Piping	All	Piping system to withstand pressures to 1050 kPa and temperatures from -30°C to 82°C, unless otherwise specified.

2.5 Type 304L (ASTM A778) Stainless Steel – SS

Data Sheet No. SS1

ITEM	SIZES (mm)	GENERAL DESCRIPTION
Pipe	80 to 900	Schedule 10S Type 304L stainless steel conforming to ASTM A778 and ANSI B36.19, seamless or welded, pickled.
Fittings	80 - 900	Schedule 10S Type 304L stainless steel, butt-welded, smooth flow long radius elbows, caps and reducers conforming to ASTM A774 and ANSI B16.9.
Branches	In piping 80 - 900	Schedule 10S Type 304L stainless steel, butt welded, smooth flow tees, conforming to ASTM A774, with weldolets, threaded couplings conforming to ASTM A182, Class 3000, 304L stainless steel.
Stub-End	80 to 900	Schedule 10S Type 304L stainless steel stub-end, butt-welded, conforming to ASTM A774.
Flanges	80 - 600	Type 304L stainless steel, ANSI B16.5, Class 150, weld neck, flanges bored for Schedule 10S pipe conforming to ASTM A778. Schedule 10S Type 304L stainless steel stub-end conforming to ASTM A774 with lap joint flange drilled to ANSI B16.5 Class 150, hot-dip galvanized in T2 thickness or AWWA Class "D" rated flange.
Blind Flanges	80 - 600	Schedule 10S Type 304L stainless steel, conforming to ASTM A774, drilled to ANSI B16.5 Class 150.
Bolts	All	Type 304L stainless steel ASTM A-193/193M Grade B8M heavy hexagonal machine bolts, scale free, shiny stainless steel finish.
Nuts	All	Type 304L stainless steel ASTM A194/194M, B8M hexagonal nuts, scale free, shiny stainless steel finish.
Gaskets	All	3 mm thick full-faced premium grade Neoprene.
Welding	All	In accordance with Section 15051.
Piping	All	Piping system to withstand pressures to 1050 kPa and temperatures from -30°C to 82°C, unless otherwise specified in Table 1.

2.6 Type 304L (ASTM A778) Stainless Steel – SS (Victaulic Joints)

Data Sheet No. **SS2**

ITEM	SIZES (mm)	GENERAL DESCRIPTION
Pipe	80 - 900	Schedule 10S Type 304L stainless steel conforming to ASTM A778 and ANSI B36.19, seamless or welded, pickled. Groove pipe ends to rigid radius groove conforming to ANSI/AWWA C-606.
Pipe Design	All	To CSA B242 for radius grooved and shoulder type mechanical pipe couplings.
Fittings	80 - 900	Schedule 10S Type 304L stainless steel, long radius elbows, caps and reducers conforming to ASTM A774 Grade WP and ANSI B16.9. Groove ends conforming to ANSI/AWWA C-606.
Branches	In piping 80 to 600	Schedule 10S Type 304L stainless steel butt welded smooth flow tees conforming to ASTM A774 with re-pad to B31 or weldolets conforming to ASTM A-182 Grade F316L Groove ends to rigid radius groove conforming to ANSI/AWWA C-606.
Flanges	80 to 900	Type 304L stainless steel ANSI B16.5 Class 150 weld neck Flanges, bored for Schedule 10S pipe, conforming to ASTM A182. Schedule 10S Type 304L stainless steel stub-end collar conforming to ASTM A774 with backing ring flange, drilled to ANSI B16.5 Class 150, hot-dip galvanized in T2 thickness or AWWA Class "D" rated flange.
Blind Flanges	80 - 600	Schedule 10S Type 304L stainless steel, conforming to ASTM A774, drilled to ANSI B16.5 Class 150.
Joints	80 to 900	Joints to be welded, flanged or Victaulic Roll-Groove (Style #77 for flexible, Style #89/W89 for rigid rated to 300psi). Contact Victaulic for applicable psi ratings of flexible joints. All welds to be full penetration and all welders to be certified by the TSSA.
Couplings at building expansion joints	80 - 300 350 - 600	Victaulic Style 77 on flexible radius grooved pipe. Victaulic Style W77 on flexible advanced grooved pipe.
Couplings (General)	80 - 300 350 - 600	Victaulic Style 89 on rigid radius grooved pipe. Victaulic Style W89 on rigid advanced grooved pipe.
Identification	All	Differential rigid joint from flexible joint by color code identification.
Bolts	All	Type 304L stainless steel ASTM A194/194M, B8M hexagonal nuts, scale free, shiny stainless steel finish.
Nuts	All	Type 304L stainless steel ASTM A194/194M, B8M hexagonal nuts, scale free, shiny stainless steel finish.
Gaskets	All	3 mm thick full-faced premium grade Neoprene
Welding	All	In accordance with Section 15051.
Piping	All	Piping system to withstand pressures to 1050 kPa and temperatures from -30°C to 82°C, unless otherwise specified in Table 1.

2.7 Welding Materials

- .1 Use welding materials conforming to CSA W48.1.
- .2 Provide electrodes compatible with material welded that deposit metal with strength and corrosion resistance properties equivalent to base metal.

2.8 Flange/Coupling Spacing

- .1 Refer to Section 15050 for additional flange, union, and coupling requirements in piping systems not specified in this Section or shown on drawings.

2.9 Flexible Couplings

- .1 Provide flexible couplings as follows:
 - . 1 Flexible sleeve type couplings:
 - .1 Type: cylindrical centre ring, two follower rings, two resilient gaskets, and connecting bolts.
 - .2 Acceptable manufacturers:
 - .1 Dresser Style 38.
 - .2 Robar 1408.
 - . 2 Flanged flexible sleeve type couplings:
 - .1 Type: Flanged cylindrical centre ring, companion flange, one follower ring, resilient gasket, and connecting bolts.
 - .2 Acceptable manufacturers:
 - .1 Dresser Style 128.
 - .2 Robar 7808.
 - . 3 Transition flexible sleeve type couplings:
 - .1 Type: Stainless Steel to PVC pipe couplings to be restrained flexible style MULTI/JOINT® 3007 style or approved equal. All bolts, washers nuts shall be wrapped in Denso Tape, paste mastic and tape or approved equal.
 - .2 Acceptable manufacturers:
 - .1 Georg Fischer.
 - .2 Approved Equal.
 - . 4 Centre ring: steel, shop coated for corrosion protection.

- . 5 Gaskets: fabricated of material suitable to service conditions.
- . 6 Submerged, buried or below structure applications: use stainless steel bolts, nuts and washers.
- . 7 Provide necessary amount and appropriate size of restraining rods and gussets as recommended by manufacturer.
- . 8 Type 1 - Restrained; use flexible sleeve-type coupling with restraining rods, and gussets welded to pipe. Provide sufficient restraint to resist pressure equal to twice system test pressure.
- . 9 Do not use Type I flexible couplings in pipe systems which undergo thermal expansion and contraction; do not use these couplings at structural joints.

2.10 Steel Supports

- .1 Hollow structural steel or aluminium supports for piping, where indicated on Drawings or as required, are provided under Division 5. Provide roller supports and accessories for piping in accordance with Section 15050, 15060 Clause 1.1, 15070 and drawing details.

2.11 Instrument Vent Lines

- .1 Services: All.
- .2 Vent lines, for instruments supplied under Division 16 and installed under this Section, are generally not indicated on Drawings.
- .3 Installation: in accordance with manufacturer's requirements and to CAN/CGA-B105 for digester gas systems.
- .4 Vent line material for instruments: Schedule 40S Type 316L stainless steel tubing. Data Sheet SS5.

2.12 Wet Well & Chamber Vents

- .1 Fit wet well vents with bug screens and provide screwed or flanged ends to attach odour control valves, and portable ventilation equipment.
- .2 Fit chamber vent with ends compatible with portable ventilation equipment.

2.13 Drain Points

- .1 Services: All.
- .2 Horizontal pipes: 25 mm drain point with Schedule 40S Type 316L stainless steel NPS pipe, manual ball valve, and nipple. Valves are supplied under Section 15100.
- .3 Locations:
 - . 1 Install drain point on bottom of horizontal pipe at low points in process piping system.

- . 2 Where indicated on Drawings. Drawings may not indicate all required drain point locations.

2.14 Magnetic Meter Spool Pieces

- .1 Provide make up spool pieces of same material as piping system for following piping systems:

Services	Diameter (mm)	Quantity
RWW	150	1 – Magnetic Flowmeter

2.15 Quick Disconnects

- .1 Quick disconnects:
 - . 1 Designed to not disconnect under pressure.
- .2 Air services:
 - . 1 Dust caps with quick disconnect.
 - . 2 Manufacturers: Swage Lok Full Flow QF Series, Tomco THK.
 - . 3 Size: 12 mm diameter.
- .3 Water services:
 - . 1 For ≤ 50 mm diameter: Camlock, four lug, malleable iron, female NPT supplied by Dixon Airking.
 - . 2 For 80mm to 100mm diameter: quick-acting, dual clip supplied by Dixon or Rite-Pro.
- .4 Chemical services:
 - . 1 Manufacturers: Bay Seal, Dixon Boss Lock, PT Couplings.

2.16 Grooved Pipe Couplings

- .1 Provide following grooved pipe couplings for specified piping system in Table 15060-1:
 - . 1 Manufacturer's: Victaulic Company.
 - . 2 Materials: ASTM A-47, Grade 32510 or 35108.
 - . 3 Design: CSA B242 for radius grooved and shoulder type mechanical piping couplings.

- . 4 Method: Rigid Joint method on HDPE, ductile iron, steel, carbon steel, galvanized carbon steel, and stainless steel piping systems.
- . 5 Pipe ends: Grooved to ANSI/AWWA C-606 and manufacturer's recommendations to make connections rigid.
- . 6 Differentiate Rigid Joint from Victaulic Flexible Joint by colour code identification.
- . 7 Style 31 Victaulic couplings on flexible radius grooved ductile iron pipe when pipe crosses structural expansion joints.

2.17 Pipe Couplings

- .1 Connect new pipes to existing pipes where flanged connections are not possible with:
 - . 1 Services: All.
 - . 2 Bolts: Type 316 stainless steel ASTM A-193 Grade B8A.
 - . 3 Nuts: Type 316 stainless steel ASTM A-194 Grade B.
 - . 4 Coupling materials: Ductile iron ASTM A-536.
 - . 5 Other: Coupling suitable for connecting new pipe to existing cast iron, ductile iron, stainless steel or carbon steel pipes. Groove existing pipe end to make connection rigid.
 - . 6 Manufacturers: Victaulic Pipe Company.
 - . 7 Model: Victaulic Coupling Style 89, W89, W07.

2.18 Puddle Flanges

- .1 Use minimum 6.35mm thick steel plate as puddle flange material with diameters as follows:

PIPE DIAMETER	PUDDLE FLANGE DIAMETER
75 mm to 300 mm	Pipe diameter plus 50 mm
350 mm to 550 mm	Pipe diameter plus 100 mm
600 mm and larger	Pipe diameter plus 150 mm

- . 1 Bolts: Type 316 stainless steel ASTM A-193 Grade B8A.
- . 2 Nuts: Type 316 stainless steel ASTM A-194 Grade B.

2.19 Wall Seals

- .1 Services: All.
- .2 Type: wall penetration seals, non-insulating.

- .3 Sealing element: EPDM rubber.
- .4 Bolts, nuts, washers and pressure plates: Type 304 stainless steel.
- .5 Pressure rating: 1050 kPa static head.
- .6 Temperature rating: 40°C.
- .7 Pipe size: as indicated on Drawings.
- .8 Number required: on one side of wall.
- .9 Manufacturers: Link-seal.

2.20 Gaskets

- .1 Flat-faced type: use full-face gaskets.
- .2 Raised-faced type: use ring type gaskets.
- .3 Gaskets conforming to ASTM B16.21.
- .4 Provide gaskets for flanged connections suitable for specified temperature and pressure ranges and for corrosive properties of fluid in pipeline.
- .5 Gasket material
 - . 1 EPDM: ethylene-propylene-diene-terpolymer 70 durometer.
 - . 2 Neoprene: neoprene (black) 70 durometer.
 - . 3 Nitrile: nitrile (Buna N).
 - . 4 SBR: styrene-butadiene (red).
 - . 5 Natural rubber: natural rubber.
 - . 6 Compressed synthetic fibres (Kevlar): ASTM F104 (F712400), and neoprene binder: 1.7 MPa (ASTM F152) 0.2 mL/h leakage fuel A (ASTM F37).
- .6 Minimum gasket thickness for full-faced gaskets, unless otherwise specified:
 - . 1 <150mm pipe diameter: 1.6mm thick.
 - . 2 ≥150mm pipe diameter: 3.0mm thick.
- .7 Minimum gasket thickness for raised-faced gaskets, unless otherwise specified:
 - . 1 <150mm pipe diameter: 1.6mm thick.
 - . 2 ≥150mm pipe diameter: 3.0mm thick.
- .8 Grooved joint gasket material: recommended by coupling manufacturer.

2.21 Galvanizing

- .1 Hot dip zinc coat galvanized to CSA G164 with minimum coating of 550 g/m³ where piping is specified to be galvanized.

3.0 EXECUTION

3.1 Finishes

- .1 Prepare surfaces and shop prime ferrous piping and appurtenances in accordance with Section 09900.
- .2 Do not paint stainless steel.

3.2 Preparation

- .1 Prepare piping to Section 15050.

3.3 Examination

- .1 Report construction defects in writing to Engineer before proceeding with work that will affect work of this Section. Proceed after conditions are acceptable to Engineer.

3.4 Sleeves

- .1 Install pipe sleeves to Section 15050.

3.5 Insulation

- .1 Piping is insulated under Sections 02600 and 15250, as applicable.

3.6 Connecting Dissimilar Piping Systems

- .1 Provide dielectric fittings and/or adapting flanges and couplings to connect dissimilar metals such as steel and stainless steel in accordance with Section 15050.

3.7 Expansion Joints

- .1 Accurately align pipelines to receive expansion joints before installing joint.
- .2 Do not stretch, compress or offset joint to fit piping.
- .3 Align and install expansion joint in accordance with EJMA standards and with manufacturer's written instruction; properly guide and anchor expansion joints. No lateral movement is permitted on compensator expansion joints.
- .4 On rubber expansion joints, check bolt tightness, and tighten where necessary one week after commissioning.

3.8 Pipe Installation

- .1 Install piping systems in accordance with Section 15050.

- .2 Additional installation requirements for chemical piping systems:
 - . 1 Maximum union spacing: 7 metre intervals and in each room.
 - . 2 Design: allow for thermal expansion in long lengths of PVC pipe.
 - . 3 Install piping, where possible, to permit drainage back to low point in building. Provide additional valves for drainage.
 - . 4 Provide tees and screwed drain plugs at low and high points in piping or vents and drainage.
 - . 5 Maximum vertical piping supports: 1.5 m with supports with broad smooth surfaces.
 - . 6 Align and support piping to avoid excessive stresses.

3.9 Cleaning

- .1 Pipe cleaning: In accordance with Section 15050 and Division 1.
- .2 Replace equipment damaged during initial operating period due to foreign material not removed from piping systems.
- .3 Clean piping systems of slag and foreign material by blowing with clean compressed air before connecting piping to valves, meters, instruments, and equipment.
- .4 Additional cleaning requirements for air piping systems: .
 - . 1 Clean piping system free of dust, dirt and debris after successful pressure testing of piping system.
 - . 2 Clean pipe in sections so that air velocity in each pipe section being cleaned is minimum 8 m/sec.

3.10 Field Tests

- .1 Test piping systems in accordance with Section 15050, ANSI B31.1-137.3, 137.4 as applicable and Table 1 specified under this Section.
- .2 Valves, provided under Section 15100, under this Section as integral part of piping field tests.

3.11 Yard Piping

- .1 Installation of yard piping: In accordance with Section 02600.

3.12 Protection

- .1 Protect installed work from dust, contamination and damage prior to acceptance by the Engineer.

3.13 Existing Pipe Cleaning

- .1 Flush existing pipe, scheduled to be reused where connected to new piping, free of waste material. Clean existing pipe with high-pressure pipeline washing equipment.
- .2 Provide required fittings, temporary pipe connections and other similar items for high pressure wash cleaning.
- .3 Submit cleaning procedures to Engineer for review well in advance of work.

End of Section

15100 Process Valves

1.0 General

1.1 Summary

- .1 Section includes supply, installation, testing, training, cleaning and placing into operation of process valves and accessories.
- .2 Note that additional provisions, beyond those listed herein, will be required to make the process valve supports compliant with seismic design and Post Disaster level of service required by the Municipality of Middlesex Centre Chief Building Officer. The Constructor will be responsible for the design and supply of materials to make the support frames compliant with Post Disaster Design level of service.

1.2 Related Sections

- | | | |
|----|------------------|-------------------------------|
| .1 | Section 15050 | Mechanical General Provisions |
| .2 | Section 02600 | Underground Piping |
| .3 | Section 11050 | Process General Provisions |
| .4 | Division 1 | General Requirements |
| .5 | Division 16 | Electrical |
| .6 | Section 16 05 81 | Motors and Actuators |

1.3 Submittals

- .1 Submit shop drawings, manuals, parts lists, etc. in accordance with Sections 01300 and 01730.
- .2 Shop drawings
 - .1 Manufacturer's product data including catalogue cuts for specified submittals.
 - .2 Manufacturer's installation instructions for specified submittals.
 - .3 Drawings showing details, dimensions, materials of construction, head loss characteristics through valve, operating torque, valve end configurations, and standards for specified submittals.
 - .4 Valves: 25 mm in diameter and larger.
 - .5 Electrical wiring and control diagrams.
- .3 Test reports and certificates
 - .1 Certified shop test results of valves where specified.
- .4 Installation, operation and maintenance manuals
 - .1 Include material under this Section in Manual in accordance with Section 01300 and 01730.
- .5 Spare parts
 - .1 Submit spare parts list in accordance with Section 01300.

1.4 Quality Assurance

.1 The most current edition of the following standards is to apply to this contract:

ANSI B2.4	Standard Hose Coupling Screw Threads.
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.
ANSI B16.10	Standard for Face-to-Face and End-to-End Dimensions of Ferrous Valves.
ANSI/ASME B1.20.1	General Purpose Pipe Threads (inch).
ANSI/ASME B31.1	Power Piping.
ASTM A 36	Specification for Structural Steel.
ASTM A 48	Specification for Gray Iron Castings.
ASTM A 126	Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
ASTM A 395	Specification for Ferritic Ductile Iron Pressure Retaining Castings for Use at Elevated Temperatures.
ASTM A 536	Specification for Ductile Iron Castings.
ASTM B 61	Specification for Steam or Valve Bronze Castings.
ASTM B 62	Specification for Composition Bronze or Ounce Metal Castings.
ASTM B98	Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
ASTM B 148	Specification for Aluminum-Bronze Castings.
ASTM B 274	Specification for Copper-Base Alloy Centrifugal Castings.
ASTM B 584	Specification for Copper Alloy Sand Castings for General Applications.
ASTM D 638	Test Method for Tensile Properties of Plastic.
ASTM D 1784	Specification for Polyvinyl Chloride (PVC) and CPVC Plastic Pipe Schedules 40, 80 and 120.
ASTM D 4101	Specification for Propylene Plastic Injection and Extrusion Materials.
ANSI/AWWA C500	Gate Valves for Water and Sewage Systems.
ANSI/AWWA C502	Dry-Barrel Fire Hydrants.
ANSI/AWWA C503	Wet-Barrel Fire Hydrants.
ANSI/AWWA C504	Standard for Rubber-Seated Butterfly Valves.
ANSI/AWWA C506	Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.
ANSI/AWWA C507	Ball Valves 150 mm through 1200 mm.
AWWA C508	Swing-Check Valves for Waterworks Service, 50 mm through 600 mm.

- | | | |
|--|----------------|---|
| | ANSI/AWWA C509 | Standard Specification for Resilient-Seated Gate Valves for Water and Sewage Systems. |
| | AWWA C550 | Protective Interior Coating for Valves and Hydrants. |
| | SSPC-SP-2 | Hand Tool Cleaning. |
| | SSPC-SP-5 | White Metal Blast Cleaning. |
- .2 All other applicable standards used in the Municipal Infrastructure construction industry at the time of tender.
- 1.5 Field Quality Control**
- .1 Confirm face to face dimensions of valves and dimensions of valve operators with valve manufacturer.
- .2 Plumbing valves not included in valve schedule, confirm all valve schedules with drawings.
- 1.6 Product Delivery, Storage and Handling**
- .1 Deliver, store and handle valves and accessories in accordance with Section 15050.
- 1.7 Site Services of Manufacturer**
- .1 Arrange for manufacturer's representative to visit site to inspect, start-up, and field adjust:
- .1 Motorized valve actuators and valves.
- 1.8 Training**
- .1 Train Owner's staff in accordance with Section 01650 for:
- .1 Motorized valve actuators: minimum 4 hours on 2 separate days.
- 2.0 PRODUCTS**
- 2.1 General**
- .1 Provide valves of same type, size range, and service from single manufacturer.
- .2 Provide new, unused valves.
- .3 Provide valve materials free from defects or flaws with true alignment and bores.
- .4 Provide valves of same size as pipe run they are to be installed in, unless otherwise indicated.
- .5 Clearly mark valve bodies in raised lettering to indicate valve type, rating, and direction of flow. Conform to MSS SP-25. **Do not engrave valve numbers on bodies.** Numbering to use external tags applied after installation.
- .6 All other valves are to be supplied and installed by the Contractor unless otherwise specifically indicated.
- 2.2 Valve Actuators - General**
- .1 Motorized valves actuators (not applicable)
- .1 In accordance with Section 16 05 81.

- .2 Valve supplier to provide, and be responsible for, actuator, valve and controls.
- .3 Provide motorized actuated valves where indicated on Drawings and as specified in this section.
- .4 All motorized valves to have safety guards included, c/w safety locks.
- .5 Mount actuator on valve and test in shop.

2.3 Manual Valves

- .1 General
 - .1 Valve supplier to provide both valve and actuator.
- .2 Valve boxes
 - .1 Manufacturers: Canada Valve and Hydrants and BIBBY.
- .3 Levers
 - .1 Handle type with locking device, unless otherwise specified.
 - .2 Quarter turn lever operator's perpendicular to pipe when valve is closed.
 - .3 Ball valves: Two position lever operators.
 - .4 Butterfly valves: 10 position latching levers except where used to balance air flow. Infinite position screw down levers where used to balance air flow.
 - .5 Maximum pull at end of lever arm of 300 N where one side of valve is at test pressure and one side is at atmospheric pressure. Provide gear operator when greater than this force is required to operate valve with lever.
 - .6 Conform to following dimensions:

Nominal Valve Size (mm)	Minimum Length of Lever (mm)
6	80
12	80
20	100
40	150
50	150
65	150
80	175
100	225
150	250
200	300
250	450
300	450

- .4 Key operations
 - .1 In accordance with Section 15050.
 - .2 Fit the valves for key operation with 50 mm cast iron or ductile iron square operating nut.
- .5 Valve keys
 - .1 Valve keys: approximately 1000 mm long for valves with square operating nuts.
 - .2 Provide extensions where required to actuate valves.
- .6 Floor stands
 - .1 Neatly designed floor stands.

- .2 Valve position indication and handwheel as specified under this Section.
- .7 Manual gear operators
 - .1 Design: Gearing maximum force of 45 Nm required to unseat valve.
 - .2 Material: Hardened steel gears with bronze pinion shafts operating in bronze bearings.
 - .3 Type: worm gear equipped with handwheel and visual indicator of valve position.
 - .4 Adjustable mechanical stop-limiting device to prevent over travel of disc/ball in open and closed positions. Self-locking type designed to hold valve in any intermediate position between fully open and fully closed.
 - .5 Grease lubricated.
 - .6 Sealed with long life lubricant for submerged services.
 - .7 Gear ratios: minimum AWWA C-500, Table 7.
 - .8 Butterfly valve gearing: AWWA C-504, unless otherwise specified.
 - .9 Enclosed gear cases.

.8 Handwheel

- .1 Handwheel diameters conforming to:

Nominal Valve Size (mm)	Minimum Hand Wheel Diameter (mm)
12	50
20	50
25	60
40	75
50	85
65	105
80	200
100	250
150	300
200	350
250	400
300	450
350	450
400	550
450	600
500	600
600	600

- .2 Maximum rim pull on handwheel of 300 N when one side of valve is at test pressure and other side is at atmospheric pressure. Provide gear operator where shaft mounted handwheel requires greater than this force to operate.
- .3 Material: Cast Iron ASTM A-126 Class B or Ductile Iron ASTM A-536.
- .4 Type: spoked handwheel.
- .5 Direction of opening in raised letters cast on rim.
- .9 Extension stems and guides
 - .1 Material: Solid, tubular naval bronze, hardened Type 410 stainless steel, or Type 304 or 316 stainless steel.
 - .2 Guides: Cast iron with bronze or galvanized steel with Type 304 stainless steel bushings.

- .3 Bolts, nuts and washers: Type 316 stainless steel, designed to support extension stem.
 - .4 50 mm square operating nut on floor stand as specified.
 - .5 50 mm square operating nut in floor boxes with threaded cast iron covers and slotted, flush heads.
 - .6 Minimum 1000 mm long steel valve key for each valve type.
- .10 Torque tubes
- .1 Material: Schedule 80 heavy steel. Hot dip galvanize after fabrication.
 - .2 Ends: Flanged, 316 Stainless Steel.
 - .3 Install valve operator type as specified.
 - .4 Internal extension stem: Tubular or solid Type 304 or 316 stainless steel with bronze bushings to operator.
 - .5 Designs which allow for stagnant water to form are unacceptable.
 - .6 Provide stainless steel tag indicating maximum allowable torque.
- .11 Chain wheels
- .1 Chain operators are not necessarily shown on drawings.
 - .2 Provide chain operators for valves where valve centerline is minimum 2000 mm above finished floor elevation or platforms.
 - .3 Chain: Smooth welded link style of corrosion resistant material. Endless rust proof type chain terminating 1000 mm from finished floor.
 - .4 Install hooks at appropriate locations for chain tie-up.
 - .5 Chain wheel operators supplied by original valve manufacturer.
 - .6 Clamp-on style chain wheels with twisted-link chain are not acceptable.

2.4 Air-Vacuum and Air Release Valves

- .1 **Air and Vacuum Valves:** Air and vacuum valves shall be capable of venting large quantities of air while pipelines are being filled, and allowing air to re-enter while pipelines are being drained. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of high-strength material indicated in the specific data sheets. The float, seat, and moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise indicated.
- .2 **Air-Release Valves:** Air-release valves shall vent accumulating air while system is in service under pressure and be of the size indicated. Valves shall meet the same general requirements as indicated for air and vacuum valves except that the vacuum feature will not be required. Valves shall be designed for a minimum water-working pressure of 150 psi, unless otherwise indicated.
- .3 **Combination Air Valves:** Combination air valves shall combine the characteristics of air and vacuum valves and air release valves by exhausting accumulated air in systems under pressure and releasing or re-admitting large quantities of air while a system is being filled or drained, respectively. Valves shall have the same general requirements as indicated for air and vacuum valves.
- .4 **Sewage Air Release Valves:** Sewage air release valves shall vent accumulating gases during system operation. Valves shall have long float stems and bodies to minimize clogging. The same general requirements shall apply as indicated for air and vacuum valves. Each sewage air release valve shall be furnished with the following backwash accessories, fully assembled on the valve:
 - .1 Inlet shut-off valve.
 - .2 Blow-off valve.
 - .3 Clear water inlet valve.
 - .4 Rubber supply hose.
 - .5 Quick disconnect couplings.

2.5 Detailed Valve Specification Sheet: Air/Vacuum Release Valves
Type ARV01

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING			
			PRESSURE (kPa)	TEMP. (°C)		
Combination Air Valve with Surge Suppression	ARV	Liquid/Wastewater	1050	120		
TYPICAL SERVICE						
RAW SEWAGE						
VALVE MATERIALS			VALVE DESCRIPTION			
ITEM	MATERIAL	Reference Document				
Body	ASTM A351 Grade CF8M stainless steel	Size Range		25mm-100mm		
Orifice	Type 316 SS	Style		Refer to notes		
Float	Type 316 SS	Connections		Threaded		
Coating	Fusion Bonded Epoxy (inside and out) to NSF 61	Internal Parts		Type 316SS or better		
Orifice size and venting capacity	1/8" ; venting capacity 2% of maximum flow 120L/s in the pumping station	Additional Items		Refer to notes		
NOTES						
<ol style="list-style-type: none"> .1 Supply and install all combination air valves, size and location, as shown on the drawings. Valves shall be specifically designed and manufactured for wastewater. .2 Valve shall be extended body, single chamber design. .3 The valve shall have a built-in anti-surge device with relief openings designed to automatically prevent the development of hydraulic transients during start-up and pressure surges. .4 Tag numbers and description/service on all valves. .5 Furnish with backwash accessories. .6 Resilient seats shall be Buna-N®. .7 Air valve bodies shall be coated with an exterior-grade, UV-resistant coating recommended by the manufacturer to resist dirt and grease marks during installation and maintenance. .8 The valve shall have a full port orifice, a double guided plug, and an adjustable threaded orifice button. The 1 in. (25 mm) body shall be globe style to increase float clearance and reduce clogging. The plug shall be protected against direct water impact by an internal baffle and an extended float stem. The plug shall have a precision orifice drilled through the center stem. The float shall include a sensitivity skirt to minimize spillage. .9 Valve designs employing hinges, levers, or ball type floats are specifically prohibited. .10 Valves shall be manufactured and tested in accordance with AWWA C512 and rated for maximum working pressures of 1034kPa (150 psi). 						

.11 A Regulated Exhaust Device (RED) shall be provided and shall be mounted on the outlet of the Wastewater Combination Air Valve, allow free air flow in and out of the valve, close upon rapid air exhaust, and control the air exhaust rate to reduce pressure surges. The material of the body shall be consistent with the Wastewater Combination Air Valve.

ACCEPTABLE PRODUCTS			
Valmatic (801SS)(design basis)	Approved equal		

Direct Buried Air Release Valve

- .1 The Contractor shall supply and install an automatic air/vacuum release valve model H-Tec Model 986-04, 150psi (or approved equal) for underground installation.
- .2 The Contractor shall provide a 200mm x 50mm saddle and tap at each of the high points along the forcemain. The piping from the forcemain to the offset location of the air release valve to enable the valve to be located inside the permanent easement. The contract form of tender does note two units and the drawings currently show only one unit. The second unit has been included in the event that some of the storm sewer crossing create an additional high point in the alignment. If the second unit is not installed it will be turned over as a spare unit to the operating authority.
- .3 The connection to the ARI valve shall be made to a 75mm blind flange on the bottom of the unit to the offset piping. Offset piping to be 50mm PEX pipe connected to a 50mm x 75mm MJ x FL 90 degree bend.
- .4 The unit shall be installed as per the manufacturer specification for an offset installation.
- .5 The air release valve shall be protected by installing a 300mm precast donut complete with standard manhole frame and cover as detailed on the contract drawings.

2.6 Detailed Valve Specification Sheet: Ball Valves
Type BLV01

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING			
			PRESSURE (kPa)	TEMP. (°C)		
Ball Valve	BLV	Liquid	1050	60		
TYPICAL SERVICE						
DRN						
VALVE MATERIALS			VALVE DESCRIPTION			
ITEM	MATERIAL		Reference Document			
Body	PVC Type I, Grade 1, Cell classification 12454-A, Min. 'A' designation for chemical resistance to ASTM D-1784.		Size Range		6mm to 100mm	
Ball	PVC Type I, Grade 1, Cell classification 12454-A, Min. 'A' designation for chemical resistance to ASTM D-1784.		Style		PVC, Three Piece Factory Construction, Full Port.	
Corner	PVC Type I, Grade 1, Cell classification 12454-A, Min. 'A' designation for chemical resistance to ASTM D-1784.		Valve Ends		Solvent Weld SCH 80PVC Socket Ends, ASTM D2467, Flanged ANSI B16.5 Class 150.	
Stem	PVC Type I, Grade 1, Cell classification 12454-A, Min. 'A' designation for chemical resistance to ASTM D-1784.		Operator		Manual Levers.	
Seat	Teflon PTFE.		Actuator		Note 1, Note 2.	
Seals	EPDM		Additional Items		Note 3, Note 4, Note 5.	
NOTES						
.1 Motorized: Provide motorized actuators for valves, where shown on drawings, in accordance with requirements of this Section 15100, (Clause 2.0, 2.2). .2 Refer to Division 16, Section 16 05 81. .3 Tag numbers and description/service on all valves. .4 Valves installed in the vertical position with flow upward. .5 Built in unions for valve assembly, seal carriers designed to be serviced in from both ends allowing valves to hold rated pressure in both directions when union not removed for maintenance, ball shall be vented for chlorine applications. .6 For Alum and Caustic service, valve ends shall be chemflare.						
ACCEPTABLE PRODUCTS						
Chemline, Series 21	Hayward		Praher		Series 54	

Approved equal			
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Type BLV02

GENERAL					
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING		
			PRESSURE (kPa)	TEMP. (°C)	
Ball Valve	BLV	Liquid/Air	1050	40	
TYPICAL SERVICE					
DRN, VENT VALVES, ARV, Instrument Isolation					
VALVE MATERIALS			VALVE DESCRIPTION		
ITEM	MATERIAL		Reference Document		
Body	Type 316SS ASTM A-351, Grade CF8M.		Size Range		100mm and Smaller
Ball	Type 316SS ASTM A-351.		Style		Three Piece Ball Valve, Valve Rating ANSI Class 150.
Packing	Reinforced PTFE.		Valve Ends		Threaded ANSI B2.1.
Stem	Type 316SS ASTM A-351.		Operator		Note 1.
Seat	Reinforced PTFE (Durafill)		Additional Items		Note 2, Note 3, Note 4.
Pattern	Compact				
NOTES					
.1 Manual: Type 304SS lever handle with locking device. .2 Full port, grounded bottom loaded stem, blow-out proof stem, provide stainless steel plug on all vent valves. .3 Tag numbers and description/service on all valves. .4 Valves installed in the vertical position with flow upward.					
ACCEPTABLE PRODUCTS					
PMP A-301	Or Approved Equal				

**2.7 Detailed Valve Specification Sheet: Check Valves
 Type CHV02**

GENERAL					
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING		
			PRESSURE (kPa)	TEMP. (°C)	
End of Pipe	DBV	Liquid	1050	-	
TYPICAL SERVICE					
RAW SEWAGE, DRN					
VALVE MATERIALS			VALVE DESCRIPTION		
ITEM	MATERIAL		Reference Document		
Body	100% Elastomer (Neoprene).		Size Range		50mm to 900mm
Retaining Rings	304SS		Style		Curved Bill, Rating ANSI Class 125/150#.
Fasteners	304SS		Valve Ends		Flanged ANSI B16.1, Class 150.
			Additional Items		Note 1.
NOTES					
.1 Tag numbers and description/service on all valves.					
ACCEPTABLE PRODUCTS					
Tideflex/Red Valve	EVR Products (Base Design)		Cla-Val		

Type SCV03

GENERAL					
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING		
			PRESSURE (kPa)	TEMP. (°C)	
Swing Check Valve	SCV	Liquid/Wastewater	1050	40	
TYPICAL SERVICE					
RAW SEWAGE					
VALVE MATERIALS			VALVE DESCRIPTION		
ITEM	MATERIAL		Reference Document		
Body	Ductile Iron ASTM A-536 or Cast Iron ASTM A-126, Class B.		Size Range		50mm to 1050mm
Cover	Ductile Iron ASTM A-536 or Cast Iron ASTM A-126, Class B.		Style		Swing Flex Check, AWWA C-508 with Spring Return.
Disc	Buna-N® w/Alloy Steel & Nylon Reinforcement, or EPDM.		Valve Ends		Cast Iron Flanged ANSI B16.1, Class 125.
			Additional Items		Note 1 to 6.
NOTES					
.1 Full flow body, domed access cover, full size access port for removal of disk, one piece disc construction. .2 Valve backflow actuator to be included (hold open device). .3 Valve to include surge protector, backflush device, and mechanical position indicator. .4 Tag numbers and description/service on all valves. .5 Valves installed in the vertical position with flow upward. .6 The seat and internal body shall be coated with a two-part liquid epoxy suitable for use in both potable water and wastewater applications.					
ACCEPTABLE PRODUCTS					
Pratt RD series		Approved Equal			

2.8 Detailed Valve Specification Sheet: Gate valves
Type GTV03

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING			
			PRESSURE (kPa)	TEMP. (°C)		
Gate Valve	GTV	Liquid	1725/80 to 300mm & 1380/350 to 600mm	40		
TYPICAL SERVICE						
RAW SEWAGE						
VALVE MATERIALS			VALVE DESCRIPTION			
ITEM	MATERIAL	Reference Document				
Body	Cast Iron ASTM A-126, Class B.	Size Range		80mm to 900mm		
Seat	Bronze	Style		AWWA C-509, fully guided solid wedge disc.		
Stem	Bronze	Valve Ends		Flanged ANSI B16.1, Class 125. Buried: restrained MJ.		
Extension Stems	Type 304SS, where required.	Operator		Note 2, Note 3.		
		Additional Items		Note 1, Note 4, Note 5.		
NOTES						
.1 Valves to close by turning stem in clockwise direction; c/w rising stem; positive backseat for re-packing under pressure. .2 Manual: enclosed gear operator with 300mm diameter cast iron handwheel. Conform to AWWA C-504, Class 25B. .3 Manual (buried): operating stem, sliding type valve box, provide extensions as required to operate valve with key provided. .4 Tag numbers and description/service on all valves. .5 Valves installed in the vertical position with flow upward. .6 Exposed gate valves shall be installed with a means of removing the complete valve assembly without dismantling the valve or operator.						
ACCEPTABLE PRODUCTS						
AVK	Mueller	Clow	McAvity			

2.9 Detailed Valve Specification Sheet: Knife Gate valves
Type KNV01

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING			
			PRESSURE (kPa)	TEMP. (°C)		
Knife Gate Valve	KNV	Liquid/Wastewater	1050	40		
TYPICAL SERVICE						
RAW SEWAGE						
VALVE MATERIALS			VALVE DESCRIPTION			
ITEM	MATERIAL		Reference Document			
Body	Cast 316SS, Grade CF8M c/w Packing Gland.		Size Range		100mm to 750mm	
Blade (Gate)	316SS Low-Friction Blade (Gate) with Rounded Edges.		Style		Wafer Type	
Seat	EPDM or Nitrile Material.		Valve Ends		Wafer Type Fully Lugged, Flanged ANSI B16.5, Class 150, TAPPI and MSS-SP-81, Face to Face dimension.	
Topworks	Note 1.		Operator		Note 3, Note 4.	
Packing	Note 2.		Actuator		Note 5.	
			Additional Items		Notes 6 and 7.	
NOTES						
<p>.1 Topworks: Stainless steel yoke and stem; aluminum-bronze or brass stem-nut; non-rising stem for motorized or gear operated valves; yoke pillars/beams to be of stainless steel or anodized aluminum with stainless steel tie rods; non-lubricated yoke bearings for ease of operation.</p> <p>.2 Packing: Braided, Teflon impregnated with resilient core; stainless steel packing gland with peripheral access to gland adjusting nuts; minimum of 4 gland bolts to ensure uniform packing load. CWP non-shock working pressure. Valve rating: drip tight shut-off for full pressure rating of 1050 kPa in either direction.</p> <p>.3 Valves shall be handwheel operated (with spinner knob on valves 16" and smaller). Provide other types of operation such as 2" square nut, chainwheels as required and/or specified. Bevel gear operated.</p> <p>.4 All manually operated knife gate valves shall be bidirectional, non-rising stem, manual and wheel operator. Extension stem and valve box shall be provided where indicated in the drawings.</p> <p>.5 Motorized: Provide motorized actuators for valves, where shown on drawings, in accordance with requirements of this Section 15100, (Clause 2.0, 2.2) and as noted below. All motorized knife gate valves to have safety guards include, c/w safety locks. Refer to Division 16, Section 16 05 81.</p> <p>.6 Tag numbers and description/service on all valves.</p> <p>.7 Exposed knife gate valves shall be installed with a means of removing the complete valve assembly without dismantling the valve or operator.</p>						
ACCEPTABLE PRODUCTS						

.1 The Reviewed and Non-Reviewed Alternate Manufacturers will be reviewed after the award of the contract as per Section 01035 of this specification document. .2 The naming of a manufacturer in this specification is not an indication that the manufacturer's standard equipment is acceptable in lieu of the specified component features. Naming is only an indication that the manufacturer may have the capability of engineering and supplying a system as specified.			
Orbinox Series 22 (BT) (Base Design)	Dezurik	Stafsjo	Trueline

2.10 Valve Assignments

- .1 In addition to the above, the following table provides general information regarding valving assignments for this project, including general details for valves not previously noted but shown on drawings and required to be provided and installed by the Contractor.

Number	TYPE OF EQUIPMENT	VALVE TAG DRAWINGS	VALVE TYPE SPECS	DIAMETER (mm)	Description/Function
1	Air Valves	ARV-101	ARV01		
2	Ball Valves	BLV-101	BLV02	12	Pressure gauge isolation
3	Ball Valves	BLV-102	BLV02	50	Air valve isolation
4	Ball Valves	BLV-103	BLV02	80	Drainage
5	Ball Valve	BLV-104	BLV02	80	Drainage
6	Check Valves	CHV-101	SCV03	150	
7	Check Valves	CHV-102	SCV03	150	
8	Gate Valves	GTV-101	GTV03	150	
9	Knife Gate Valves	KNV-101	KNV01	150	
10	Knife Gate Valves	KNV-102	KNV01	150	
11	Knife Gate Valves	KNV-103	KNV01	150	
12	Knife Gate Valves	KNV-104	KNV01	150	
13	Knife Gate Valves	KNV-105	KNV01	150	
14	Knife Gate Valves	KNV-106	KNV01	150	
15	Knife Gate Valves	KNV-107	KNV01	150	
16	Odour Control Valve	NA	Wager Model 1800	100	Provide one for installation on wet well vent
17	Duckbill Valve	DBV-101	CHV02	80	Duckbill to prevent backup from wet well and mitigate gas migration

2.11 Carbon Filter

- .1 Flanged type activated carbon filters with additional permanganate media to be applied to each wet well vent for odour control.
 .2 Approved Manufacturer: Robert H. Wager Co. Model 1800

3.0 EXECUTION

3.1 Preparation

- .1 Valve and piping arrangement indicated in Drawings is based on typical dimensions for specified valves. Make modifications in piping to allow for discrepancies between dimensions where shown and those supplied for work.
- .2 Prior to installation of valves, field measure and check equipment locations, pipe alignments, and structural installation. Ensure that valve location and orientation provides suitable access to valve operators.
- .3 Inform Engineer and initiate necessary piping modifications at no cost to Owner, where conflicts are identified.

3.2 Installation

- .1 Install valves as indicated on Drawings, in accordance with Section 15050 and manufacturer's installation instructions.
- .2 Install valves at locations indicated on Drawings.
- .3 Install valves in conjunction with piping specified in Section 15060.
- .4 In horizontal pipe runs, mount valves with vertical operating shaft with actuator at top, unless otherwise indicated. (Not applicable for locations where space does not permit and for butterfly valves and trunnion ball valves.) Do not install valve with operator shaft pointing down, unless otherwise indicated in Contract Documents.
- .5 Unless otherwise specified, install single seated ball valves and knife gate valves with seat downstream. Install valves at tank connections with seat from tank. Install valves on pump discharge and suction lines with seat adjacent to pump.
- .6 Install gate valves in closed position.
- .7 Modify pipe dimensions to suit supplied valves, if face to face dimensions or other details are different from those shown on Drawings or specified.
- .8 Install butterfly valves in piping to provide sufficient room to access seat adjustment screws in removable section of piping.
- .9 Install valves with centreline of valve shaft where indicated on Drawings.
- .10 Install butterfly valves and trunnion ball valves with shaft in horizontal orientation.
- .11 Do not over torque bolts to correct for misalignment when joining valves to pipe or fittings.
- .12 Support valves in position using temporary supports until valves are fixed in place.
- .13 Install valves which are bubble tight in one direction to seal in direction opposite to normal flow unless otherwise noted or directed by Engineer.
- .14 Protect valves installed below grade with shrink sleeve or polyethylene sheath attached to pipe with tape wrap.
- .15 Install valves to provide sufficient access for operation, removal and maintenance and to prevent interferences between valve operators, structural members, equipment, walkways and hand railing and other similar items.
- .16 Adjust valve installation if there are interferences between valve or stem and surrounding area.
- .17 Do not route slings, chains, cables, or ropes through valve ports or attached to hand wheels to hoist valve in place.

- .18 Do not rest valves on operating shafts, hand wheels, actuators, cylinders or other parts prone to damage.
- .19 Install plug valves intended for throttling service to close to the upstream side.

3.3 Valve Extensions

- .1 Install valve stem extensions where necessary to provide clearance from insulation.

3.4 Valve Leakage

- .1 Shop test valves to AWWA standards, latest edition.

3.5 Field Tests

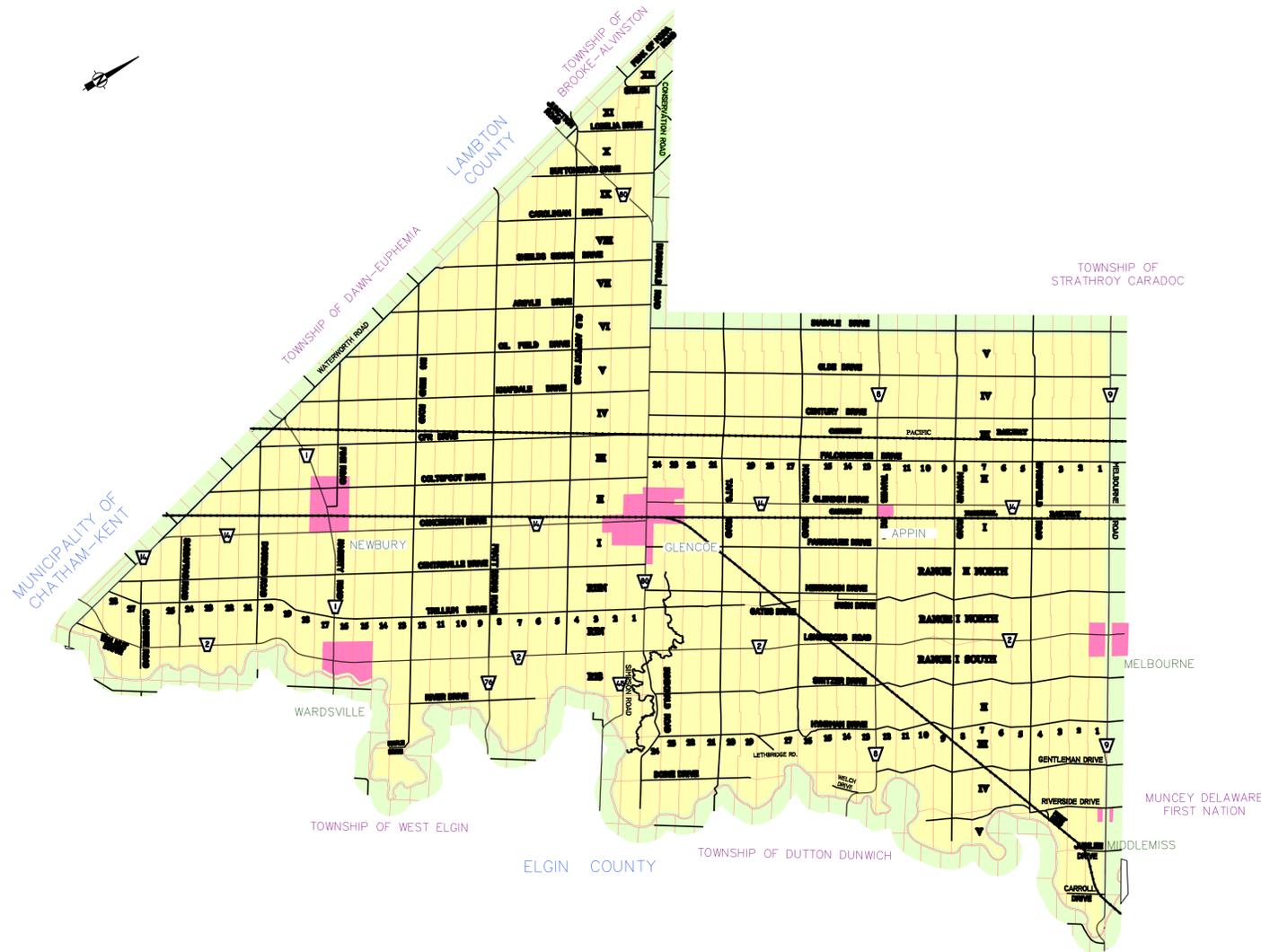
- .1 Test valves and operators as integral component of piping system specified with Section 15050 and Section 15060.

End of Section

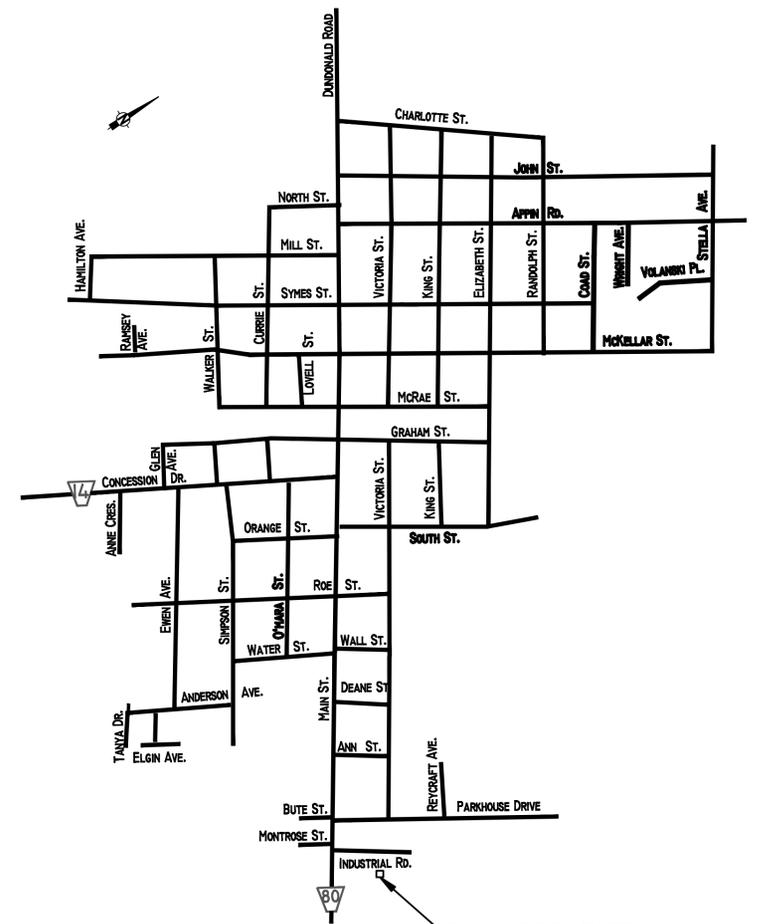
MUNICIPALITY OF SOUTHWEST MIDDLESEX VILLAGE OF GLENCOE INDUSTRIAL PARK SANITARY PUMP STATION

LIST OF DRAWING SHEETS

1. SITE PLAN
2. WET WELL DETAILS
3. BY-PASS DETAILS
4. FORCEMAIN PLAN & PROFILE
5. MISCELLANEOUS DETAILS
6. ELECTRICAL DETAILS
7. ELECTRICAL SERVICE



MAP OF SOUTHWEST MIDDLESEX



MAP OF GLENCOE

SCALES
PLOTTED SIZE - 600mm X 915mm
NTS
PLOTTED SIZE - 280mm X 430mm
NTS

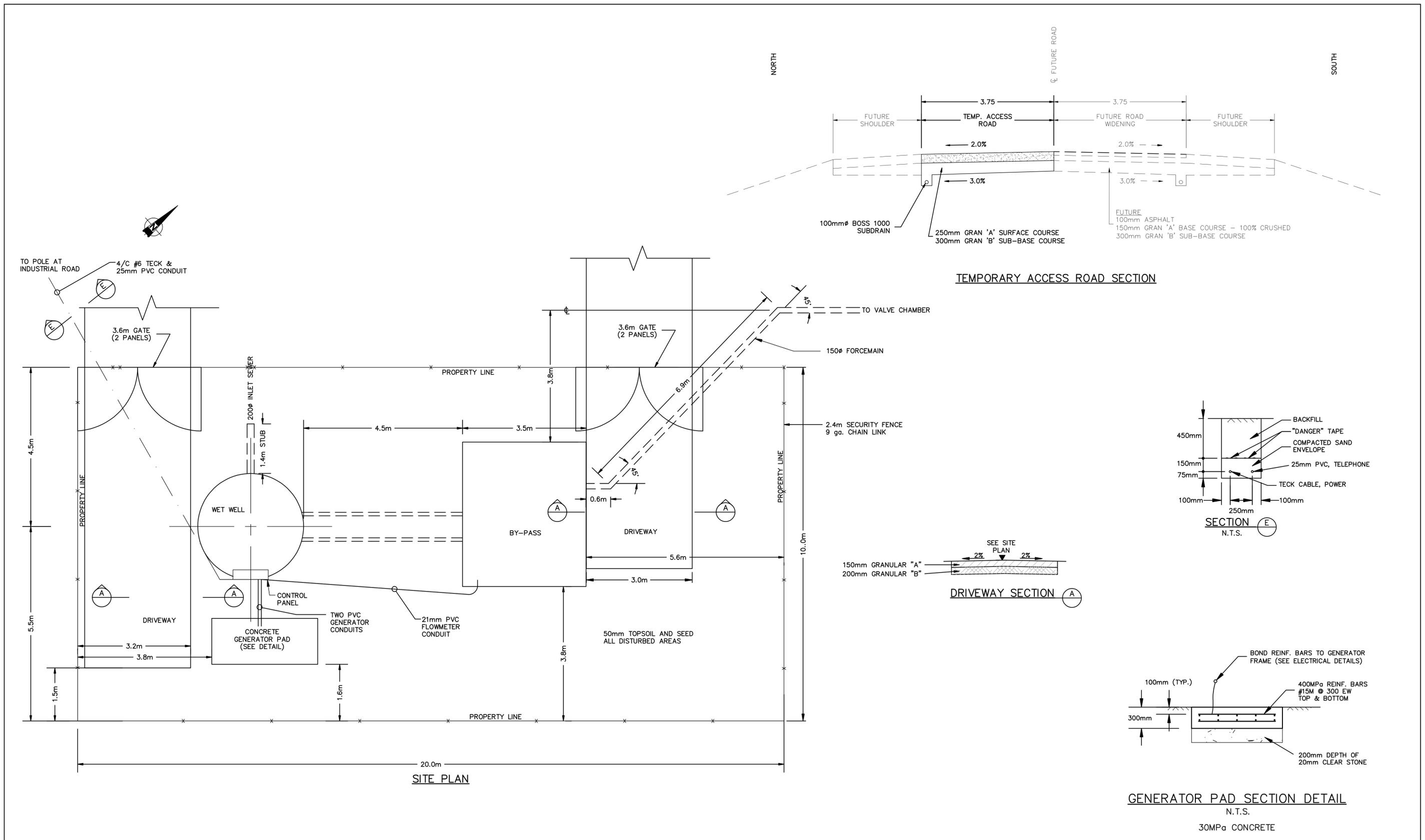
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PROJECT No. 10351.00

No.	REVISIONS	DATE	BY	DATE
E	RECORD DRAWING	10.01.20	M.D.	DESIGN MDK
D	FOR CONSTRUCTION	09.03.06	MDK	DRAWN dbs
C	FOR TENDER	09.01.27	MDK	CHECKED
B	FOR APPROVAL	08.10.16	MDK	APPROVED
				DATE 2008.09.17

PROJECT NO.	10351.00
SHEET NO.	COVER
OF	7



SCALES
 PLOTTED SIZE - 600mm X 915mm
 HORZ 1 : 50
 VERT 1 : 50
 PLOTTED SIZE - 280mm X 430mm
 HORZ 1 : 100
 VERT 1 : 100



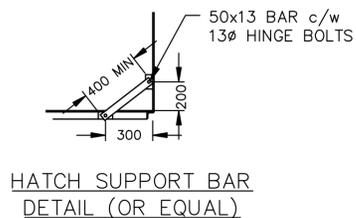
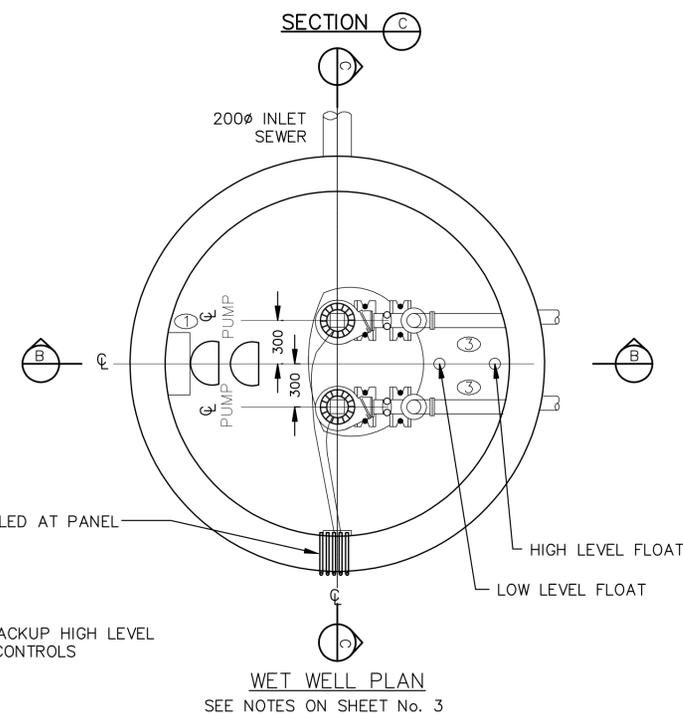
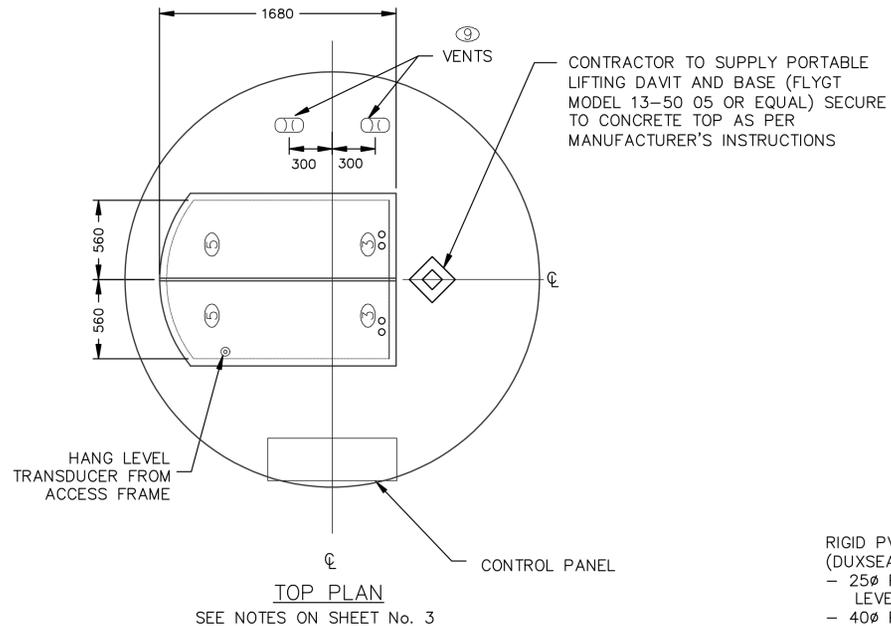
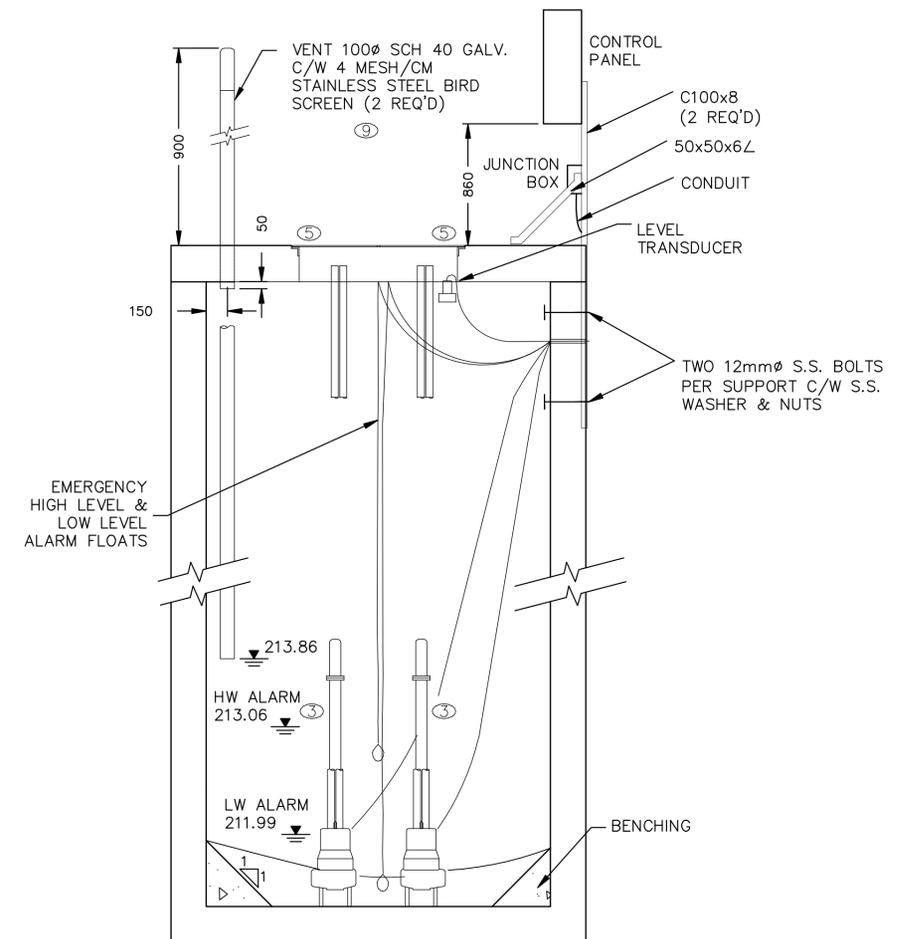
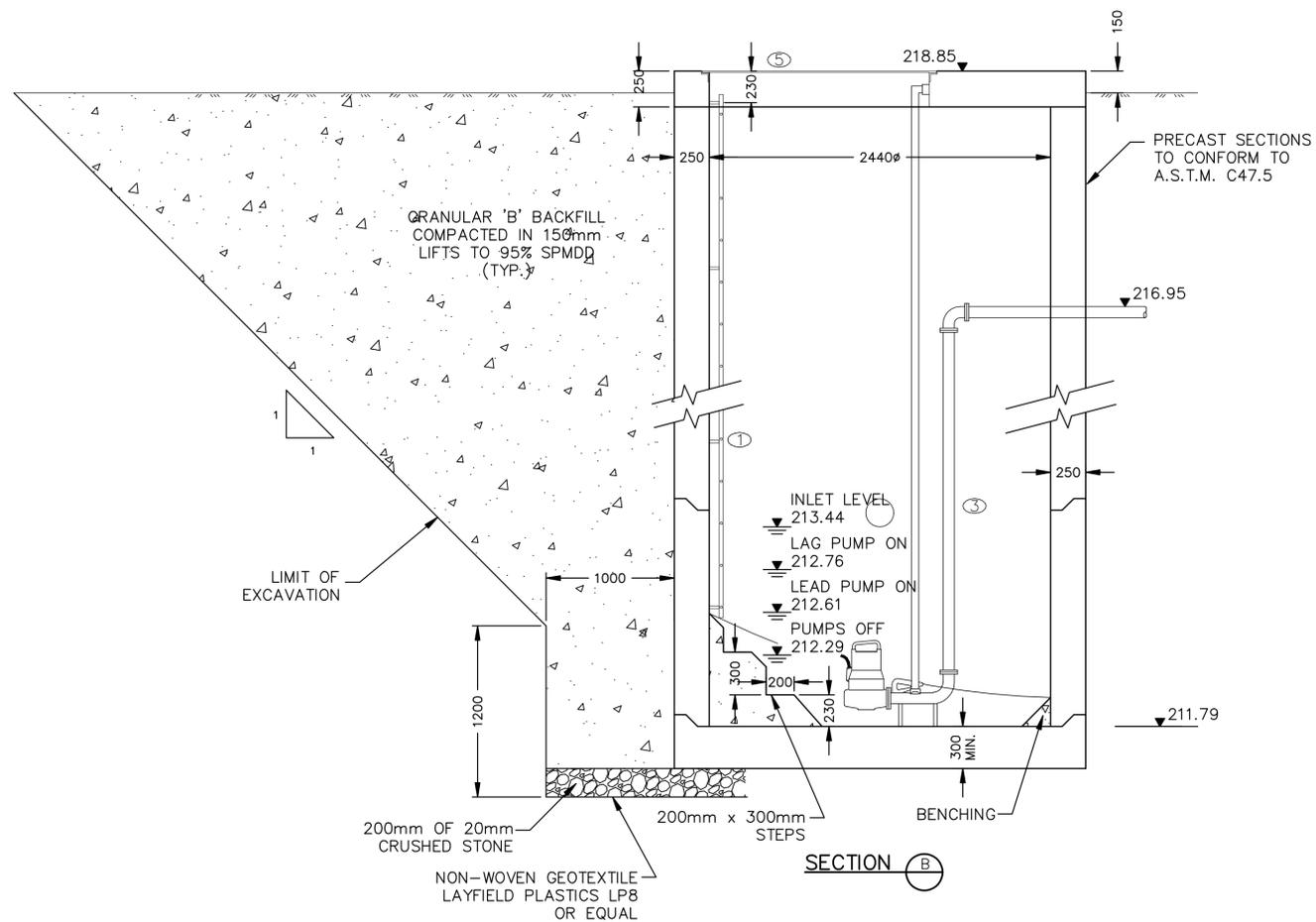
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 PROJECT No. 10351.00

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C	ELECTRICAL SUPPLY	08.12.04	M.K.	APPROVED	
No.	REVISIONS	DATE	BY	DATE	2008.08.25

**SOUTHWEST MIDDLESEX (GLENCOE)
 INDUSTRIAL PARK SANITARY PUMP STATION
 SITE PLAN**

PROJECT NO.	10351.00
SHEET NO.	1
OF	7



SCALES
 PLOTTED SIZE - 600mm X 915mm
 HORZ 1 : 25
 VERT 1 : 25
 PLOTTED SIZE - 280mm X 430mm
 HORZ 1 : 50
 VERT 1 : 50



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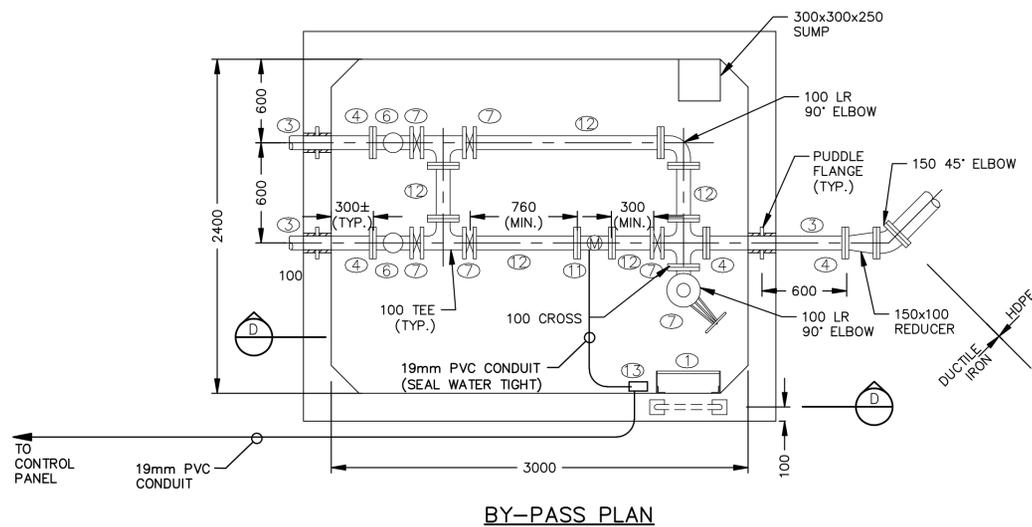
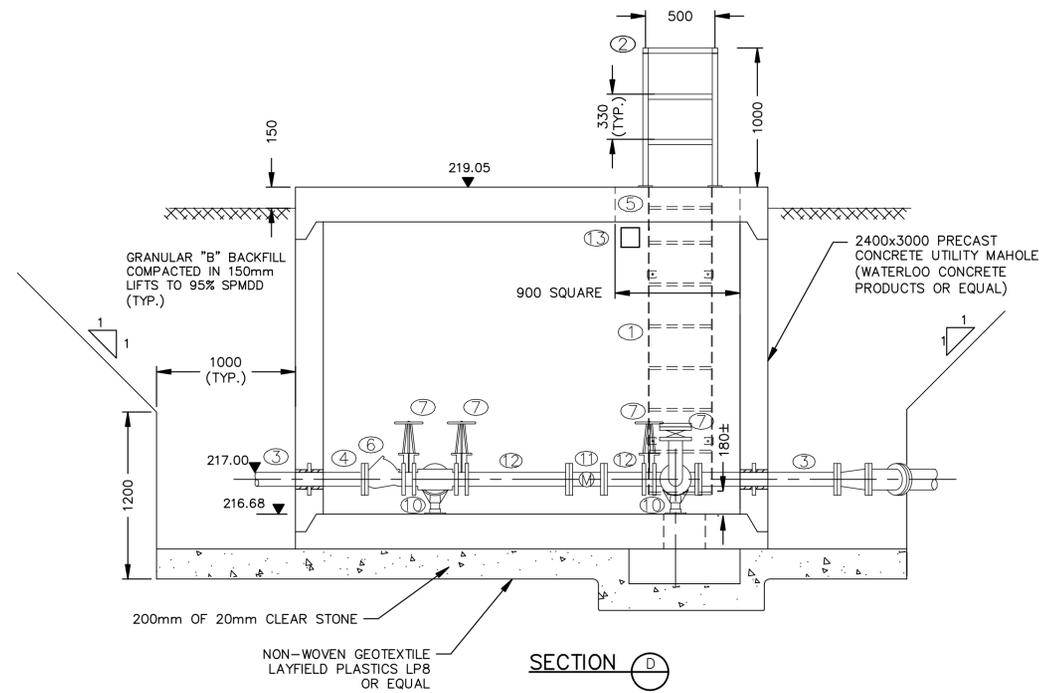


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C	FOR TENDER	09.01.27	M.K.	CHECKED
B	FOR APPROVAL	08.10.16	M.K.	APPROVED
				DATE 2008.08.25

**SOUTHWEST MIDDLESEX (GLENCOE)
 INDUSTRIAL PARK SANITARY PUMP STATION
 WET WELL DETAILS**

PROJECT NO.	10351.00
SHEET NO.	2
OF	7



NOTES:
MISCELLANEOUS

- ① ACCESS LADDER
- ② SAFETY RAILS
- ③ FORCEMAIN PIPE
- ④ 100 "UNIFLANGES"
- ⑤ HATCH COVERS & FRAMES
- ⑥ 100 BALL CHECK VALVE
- ⑦ 100 KNIFE GATE VALVES
- ⑧ PAINTING
- ⑨ 100 VENTS
- ⑩ PIPE SADDLE
- ⑪ FLOW METER
- ⑫ SPOOL PIECE
- ⑬ SWITCH

PUMPSTATION & BYPASS TO BE INSTALLED TO O.P.S.S. 407 & 902.
 GALVANIZED MEANS HOT DIPPED GALVANIZED.
 ALL BLOCKOUTS TO BE GROUTED WITH EXPANDING GROUT.
 ALL SHOP DRAWINGS TO BE REVIEWED BY ENGINEER.
 WHERE ALUMINUM CONTACTS CONCRETE, IT SHALL BE PAINTED WITH TWO (2) COATS OF ALKALI-RESISTANT PAINT IN ACCORDANCE WITH C.G.S.B. SPEC. 31-GP-3M.
 ALUMINUM AND STEEL TO BE INSULATED FROM EACH OTHER BY USING FIBRE WASHERS OR A SIMILARLY APPROVED DEVICE.
 ALL ALUMINUM CONSTRUCTION; 300mm C-C OF RUNGS FROM 1.5m ABOVE BY-PASS CHAMBER & WET-WELL TO BOTTOM; STAINLESS STEEL ANCHORS (MIN. 12mm ϕ).
 38mm ϕ ANODIZED ALUMINUM SCH 40 PIPE; 100mm SQUARE, 10mm THICK ALUMINUM BASE PLATES; 2-12mm STAINLESS STEEL ANCHORS AT EACH PLATE.
 CLASS S2 DUCTILE IRON PIPE WITH CLASS 125 CAST IRON FITTINGS & FLANGES TO B16.1 TO BE USED INSIDE WET WELL, BETWEEN WET WELL AND BY-PASS CHAMBER AND INSIDE BY-PASS CHAMBER.
 (OR APPROVED EQUAL)
 ALUMINUM FULL OPENING WITH LOCKABLE LID (3 REQ'D.); HEAVY DUTY STAINLESS STEEL HINGES CONSTRUCTED SUCH THAT LIDS WILL BE REMOVABLE ONLY WHEN OPEN; SUPPORT BAR; FLUSH MOUNTED HANDLE; 10mm CHECKER PLATE LID; ALUMINUM FRAME AND ANCHORS.
 CAST IRON BODY, CLASS 125FF FLANGED, BALL - METAL CORE WITH NITRILE RUBBER COATING.
 316 STAINLESS STEEL BODY AND GATE; STAINLESS STEEL STEM; LUG BODY DRILLED TO ANSI 125 lb. DIMENSIONS; EPDM SEAT; HANDWHEEL AS INDICATED; "DeZURIK" OR EQUAL.
 PAINT ALL EXPOSED PIPES, VALVES, FITTINGS & SUPPORT BEAMS AS FOLLOWS:
 COMMERCIAL SAND-BLAST TO SSPC-PC-7; TWO (2) COATS HIGH BUILD EPOXY PAINT - 12 MIL EACH (CARBOMASTIC 14 OR EQUAL).
 GALVANIZED STEEL SCH. 40 COMPLETE WITH BIRD SCREENS
 FOUR MESH/CM STAINLESS STEEL (2 REQ'D).
 ADJUSTABLE SUPPORT (GRINNELL FIG. 264 OR EQUAL) C/W 150x150x10 BASE PLATE.
 100mm MAGNETIC FLOWMETER C/W CHAMBER EXTERIOR READOUT & 316L SS FLANGES (KOBOLD PMG OR APPROVED EQUAL).
 CLASS S2 DUCTILE IRON PIPE C/W UNIFLANGES EACH END.
 15A, 120V DISCONNECT SWITCH IN NEMA 12 ENCLOSURE.

SCALES
 PLOTTED SIZE - 600mm X 915mm
 HORZ 1 : 25
 VERT 1 : 25
 PLOTTED SIZE - 280mm X 430mm
 HORZ 1 : 50
 VERT 1 : 50



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 SURVEYORS . MAPPERS

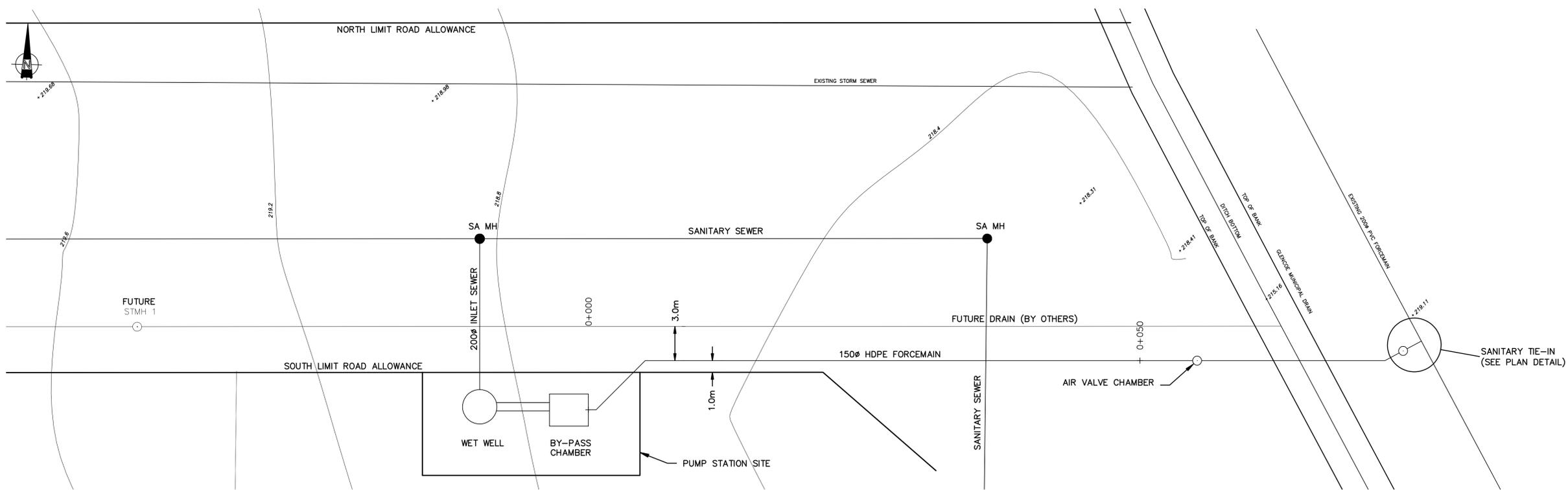


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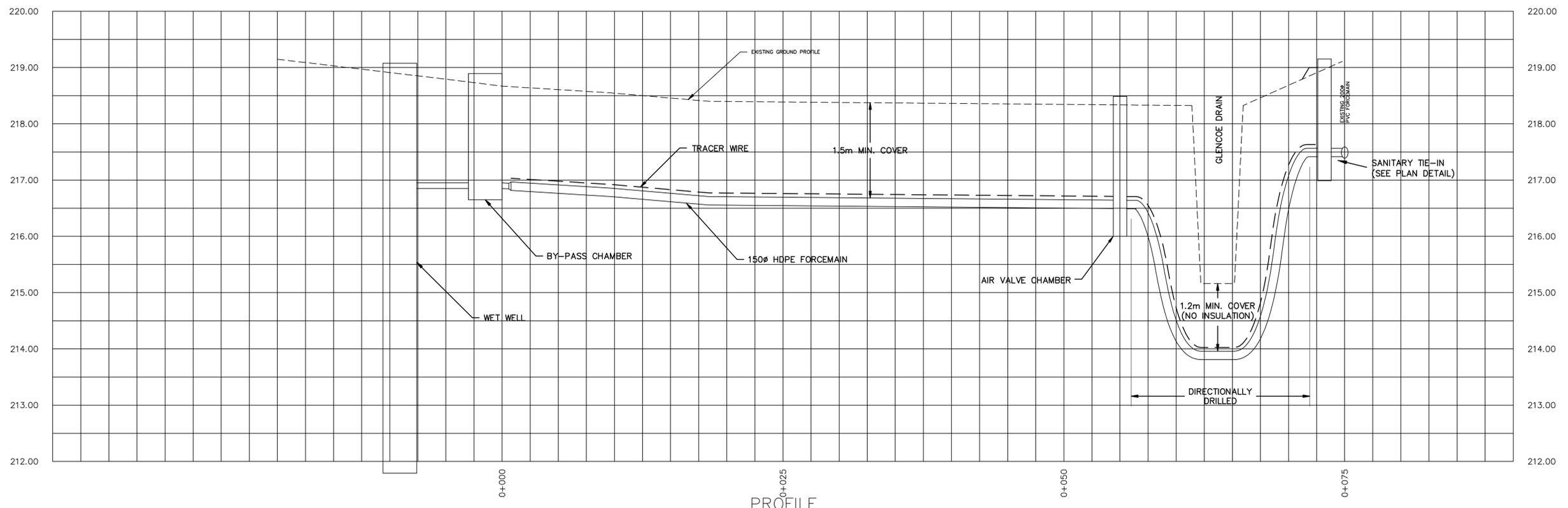
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C	FOR TENDER	09.01.27	M.K.	CHECKED
B	FOR APPROVAL	08.11.06	M.K.	APPROVED
No.	REVISIONS	DATE	BY	DATE
				2008.08.25

**SOUTHWEST MIDDLESEX (GLENCOE)
 INDUSTRIAL PARK SANITARY PUMP STATION
 BY-PASS DETAILS**

PROJECT NO.	10351.00
SHEET NO.	3
OF	7



PLAN



PROFILE

SCALES
 PLOTTED SIZE - 600mm X 915mm
 HORZ 1 : 200
 VERT 1 : 40
 PLOTTED SIZE - 280mm X 430mm
 HORZ 1 : 400
 VERT 1 : 80



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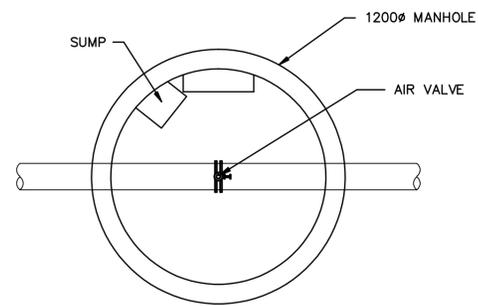


PROJECT No. 10351.00

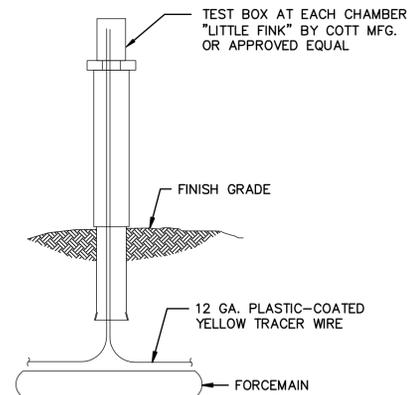
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B	FOR APPROVAL	08.10.16	M.K.	APPROVED	
No.	REVISIONS	DATE	BY	DATE	2008.09.16

**SOUTHWEST MIDDLESEX (GLENCOE)
 INDUSTRIAL PARK SANITARY PUMPSTATION
 FORCEMAIN PLAN & PROFILE**

PROJECT NO.	10351.00
SHEET NO.	4
OF	7

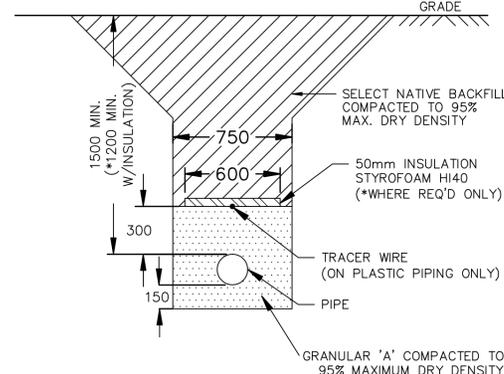


PLAN



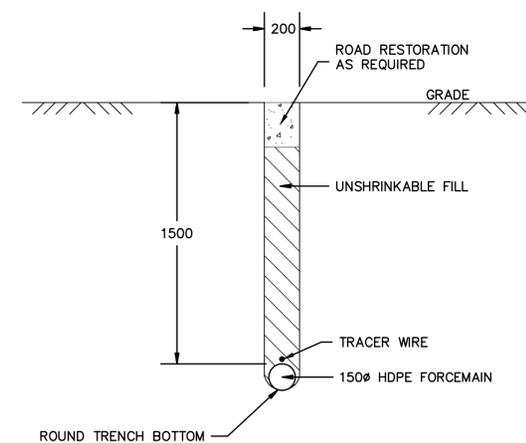
PROFILE AT TEST BOX (TYP.)

N.T.S.

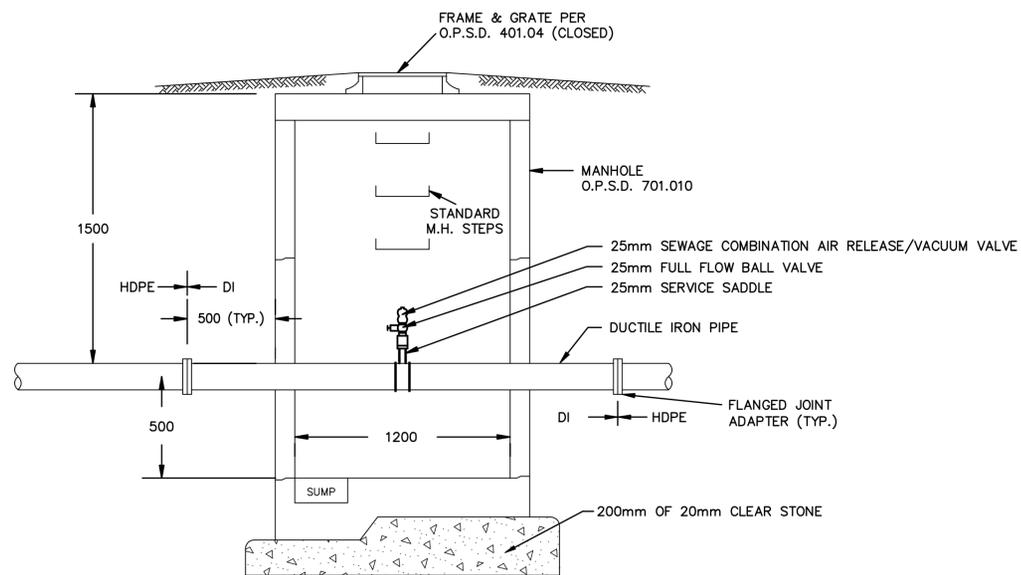


TYPICAL PIPING TRENCH SECTION
& INSULATION DETAIL

N.T.S.

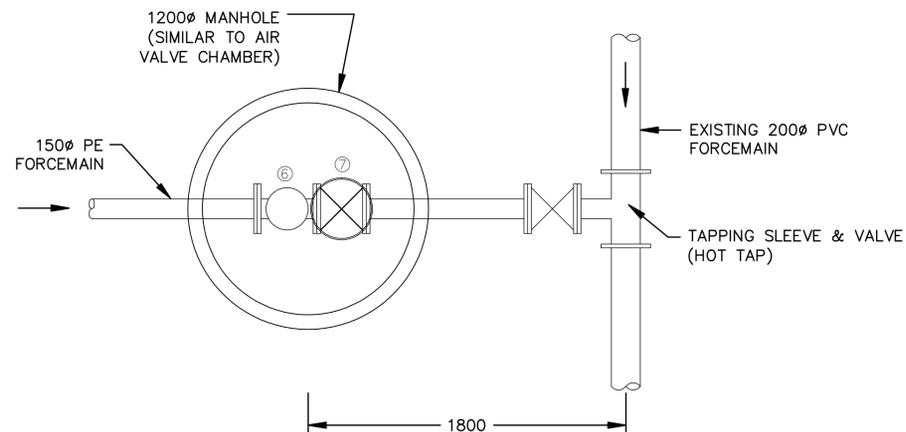


TYPICAL FORCEMAIN SECTION
BY TRENCHER IN ROAD



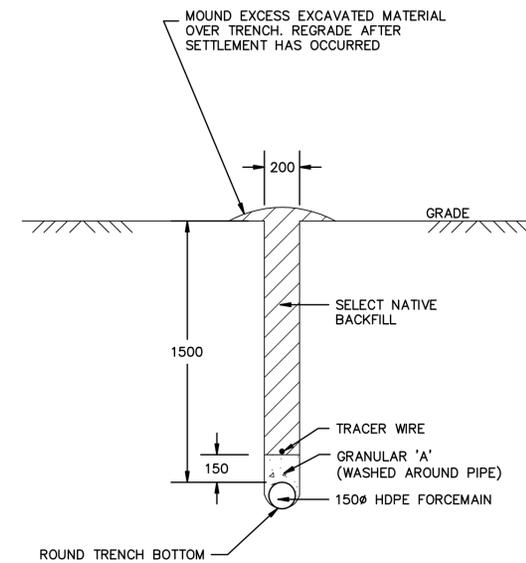
SECTION

AIR VALVE CHAMBER



SANITARY TIE-IN PLAN

SEE NOTES ON SHEET No. 3



TYPICAL FORCEMAIN SECTION
BY TRENCHER

SCALES
PLOTTED SIZE - 600mm X 915mm
HORZ 1 : 20
VERT 1 : 20
PLOTTED SIZE - 280mm X 430mm
HORZ 1 : 40
VERT 1 : 40



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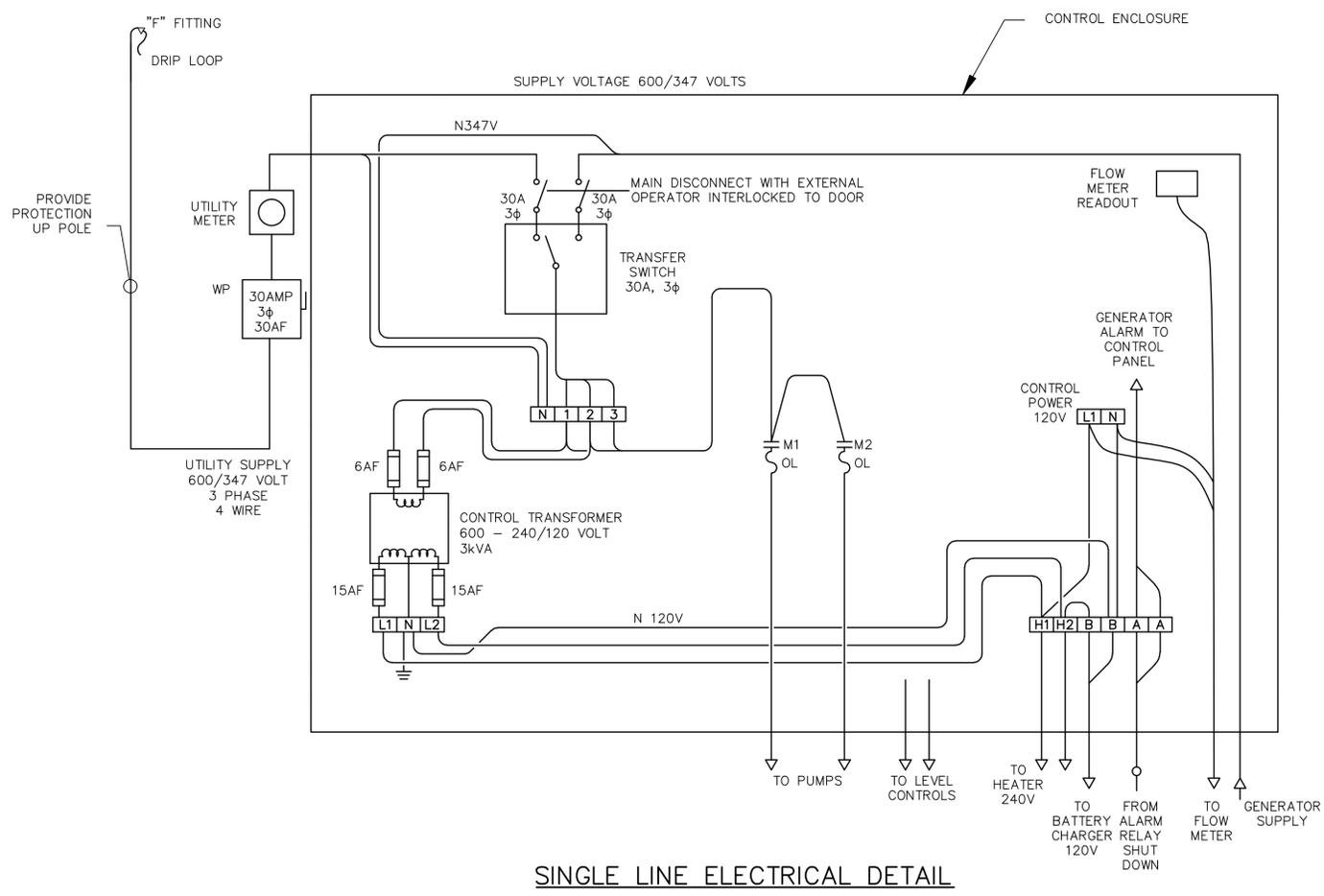
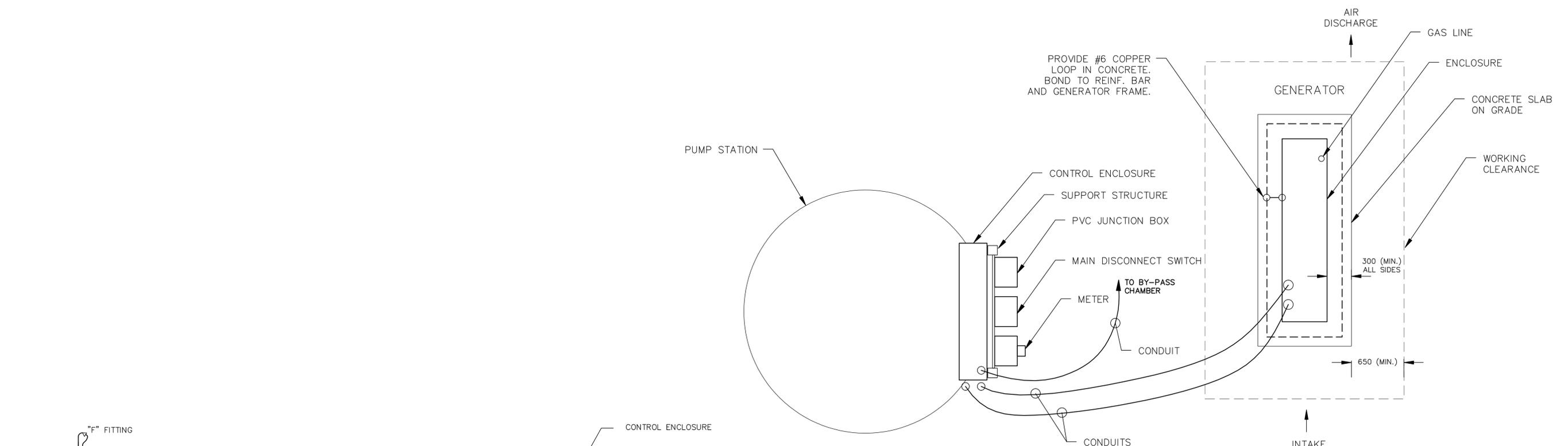


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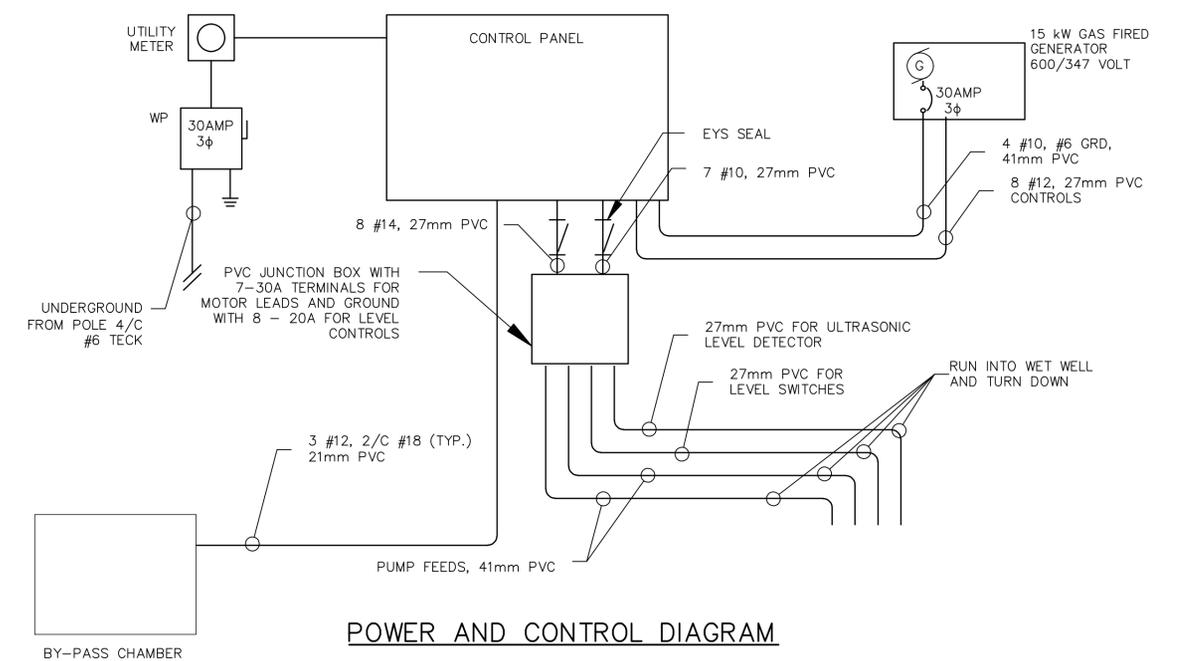
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C	FOR TENDER	09.01.27	M.K.	CHECKED	
B	FOR APPROVAL	08.10.16	M.K.	APPROVED	
No.	REVISIONS	DATE	BY	DATE	2008.08.25

SOUTHWEST MIDDLESEX (GLENCOE)
INDUSTRIAL PARK SANITARY PUMP STATION
MISCELLANEOUS DETAILS

PROJECT NO.	10351.00
SHEET NO.	5
OF	7

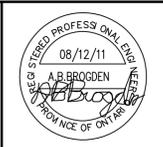


SINGLE LINE ELECTRICAL DETAIL



POWER AND CONTROL DIAGRAM

SCALES
 PLOTTED SIZE - 600mm x 915mm
 N.T.S.
 PLOTTED SIZE - 280mm x 430mm
 N.T.S.



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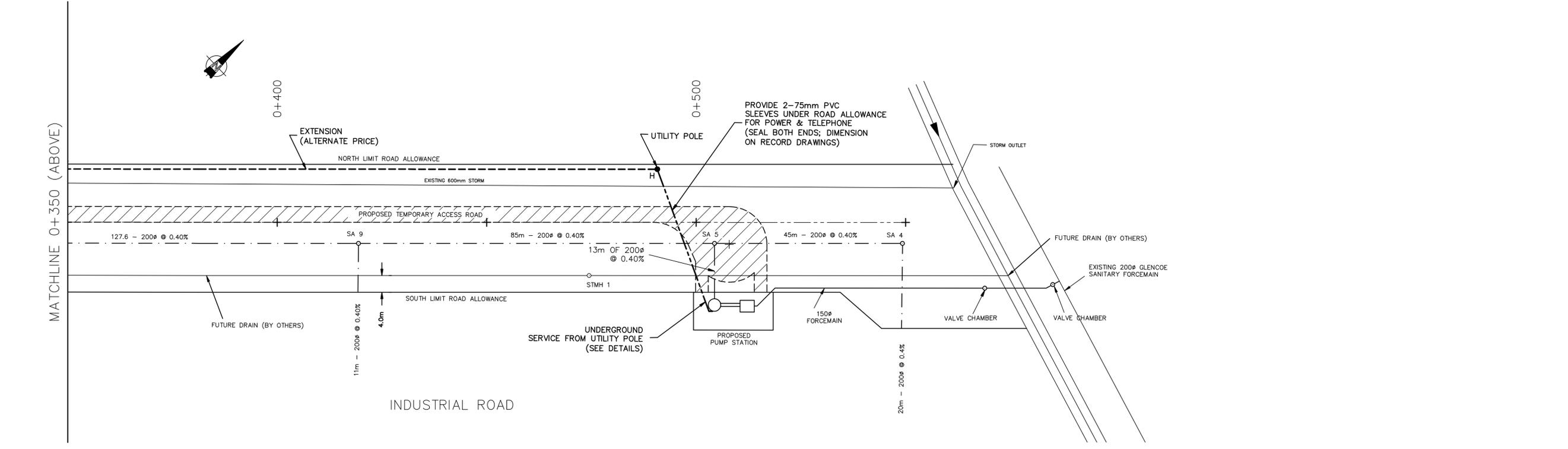
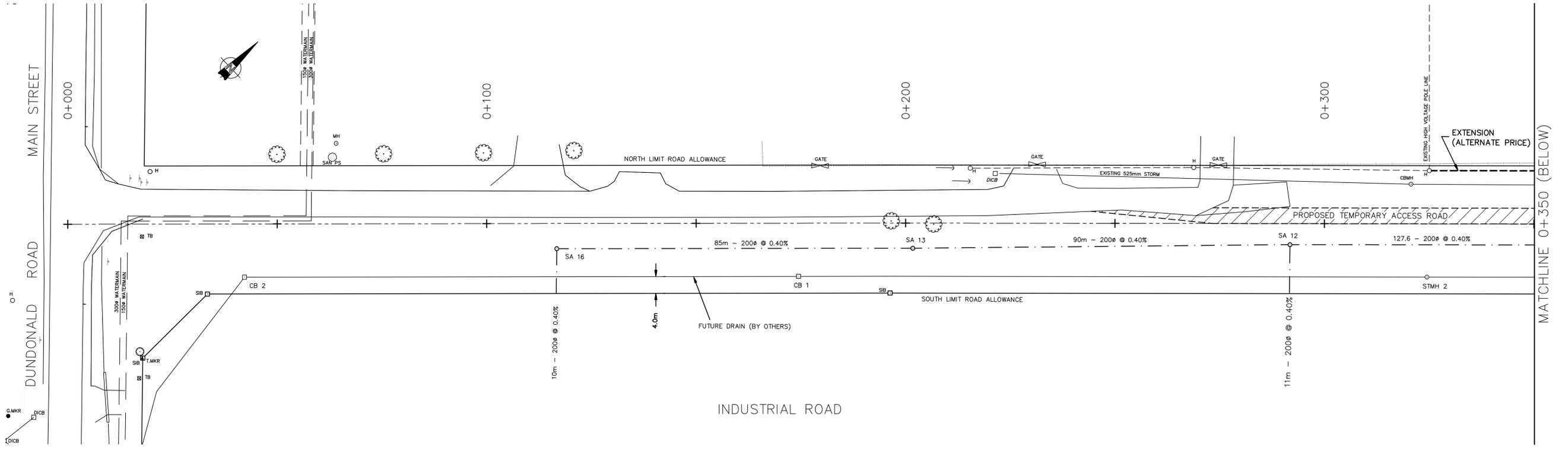


PROJECT No. 10351.00

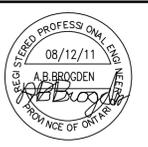
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D	FOR TENDER	09.01.27	M.K.	CHECKED
C	ELECTRICAL SUPPLY	08.11.25	M.K.	APPROVED
				DATE 2008.08.25

**SOUTHWEST MIDDLESEX (GLENCOE)
 INDUSTRIAL PARK SANITARY PUMP STATION
 ELECTRICAL DETAILS**

PROJECT NO.	10351.00
SHEET NO.	6
OF	7



SCALES
 PLOTTED SIZE - 600mm X 915mm
 HORZ 1 : 500
 VERT 1 : 50
 PLOTTED SIZE - 280mm X 430mm
 HORZ 1 : 1000
 VERT 1 : 100



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PROJECT No. 10351.00

D	RECORD DRAWING	10.01.20	M.D.	DESIGN	ABB
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B	FOR TENDER	09.01.27	MK	CHECKED	
A	PRELIMINARY	08.11.25	MK	APPROVED	
No.	REVISIONS	DATE	BY	DATE	2008.11.25

SOUTHWEST MIDDLESEX (GLENCOE)
INDUSTRIAL PARK SANITARY PUMP STATION
ELECTRICAL SERVICE

PROJECT NO.	10351.00
SHEET NO.	7
OF	7

DIVISION 7
**THERMAL AND MOISTURE
PROTECTION**

Division 7 Thermal and Moisture Protection - Index

07110 Bituminous Membrane Waterproofing

End of Section

07110 Bituminous Membrane Waterproofing

1.0 GENERAL

- 1.1 Description
 - .1 Requirements for supply and installation of waterproofing for below grade exterior wall surfaces of dry pits and occupied areas, and water containing basins, channels and tanks.
 - .2 Include all materials, labour, appliances, scaffolds, equipment, plant and tools necessary for proper completion of work.
- 1.2 Related Work Specified Elsewhere
 - .1 Section 03300 -Cast-in-Place Concrete.
- 1.3 Submittals
 - .1 Submit the material manufacturer's preparation application and maintenance instructions in accordance with Section 01300.
- 1.4 Delivery, Storage, and Handling
 - .1 Deliver and store materials in their original packaging and bearing the manufacturer's name and product.
 - .2 Store and protect materials as per manufacturer's written recommendations

2.0 PRODUCTS

- 2.1 Materials
 - .1 For Vertical Applications (Walls):
 - .1 Mel-Rol Waterproofing Membrane (W. R. Meadows of Canada)
 - .1 Waterproofing Membrane: Mel-Rol waterproofing membrane
 - .2 Primer: Mel-Prime primer
 - .3 Flashing and Reinforcement: Mel-Rol elastomeric mastic and Mel-Rol Liquid Membrane.

3.0 EXECUTION

3.1 Installation

- .1 Repair all defects to concrete surfaces including form-tie holes, honeycombing, etc.
- .2 Install waterproofing membrane in strict accordance with manufacturer's written specifications.
- .3 For Vertical Application (Walls)
 - .1 "Mel-Rol" Waterproofing System
 - .1 Concrete to receive the membrane should be cured for a minimum of seven (7) days; be clean, dry, smooth and free of voids. Repair spalled areas, fill all voids and remove all sharp protrusions.
 - .2 Apply the membrane in dry, fair weather when the air and surface temperatures are above 0°C. Do not apply to frozen concrete.
 - .3 Prior to application, prime all surfaces with the applicable primer. To avoid excess pickup of airborne dust, treat only what can be covered in one working day. Uncovered, primed surfaces must be re-primed the next day.
 - .4 All inside and outside corners must be smooth, free of voids and sharp edges repaired. Form a fillet of liquid membrane and cover with a 300 mm wide strip of membrane centered on the corner prior to covering with the membrane.
 - .5 For all control joints and cracks, apply a 300 mm wide reinforcing strip of waterproofing membrane centered over the joint/crack.
 - .6 Position the membrane from low to high point so all laps will shed water. Stagger end laps and overlap all seams at least 6.4 mm.
 - .7 Once positioned, the membrane should immediately be firmly hand-rubbed onto the surface, followed by a pressure-applied roll-pressing of the complete surface to assure positive adhesion.
 - .8 All protrusions should be sealed with two layers of membrane applied at least 150 mm in all directions.
 - .9 All vertical and horizontal membrane terminations shall receive an edge dressing of Elastomeric Mastic.
 - .10 A thorough inspection should be made before covering and all necessary repairs made immediately. Tears and inadequate overlaps should be covered with membrane, slit fishmouths and patch. Seal edges of all patches with mastic. Where possible, horizontal applications should be flood-tested for 24 hours. All leaks should be marked and repaired when membrane dries.
 - .11 Protect waterproofing system from damage of backfilling with protection boards. Protection board not required only where perimeter insulation is used.

End of Section