ADDENDUM 4

PART 1 GENERAL

The following changes are effective immediately and shall be incorporated into the Contract Documents.

PART 2 INFORMATION/CLARIFICATION

2.1 AQUA AEROBIC INFORMATION SESSION

.1 Further to the Q&A questions provided during the February 13th presentation by AASI, AASI provides the attached AquaNereda Basin Internals Installation Hours Estimate. This is provided for information only and the Owner does not assume any responsibility for the accuracy of the estimate provided.

2.2 TENDER CLOSING DATE

.1 Amend the Tender Closing time to:

2:00 PM, local time, on April 1st, 2025

Questions will be received until end of day March 20th, 2025 and shall be sent in writing. The Town reserves the right to distribute any and all questions (anonymously) and answers pertaining to this tender by addenda. The final addendum, if applicable, will be issued on March 25th, 2025.

PART 3 SPECIAL PROVISIONS

3.1 DIVISION 01

.1 Amend the Specification 01 21 00 Allowances as per the attached.

.1 Modify Item 2.9.3 "Include ~~**$10,000**~~ **$50,000 excluding HST for two (2) offices (desks and bookshelves) and Lunchroom furniture (table, chairs) and equipment (printers, fridge and microwave)** not currently identified in the contract documentation."

.2

3.2 DIVISION 03

.1 **Add** the attached Section 03 35 46 Concrete Topical Treatment:

.1 Contractor to seal concrete surfaces as per Room Finish General Note #3 on A5003.

3.3 DIVISION 09

.1 Delete Section 09 67 10 Epoxy Coating from Contract Documents.

3.4 DIVISION 13

.1 **Amend** Section 13 80 00 Chemical Resistance Coating:

.1 Part 2.2 Material

.1 **Delete** Type 1 chemically resistant coating.

.2 **Add** Type 3 and Type 4 chemically resistant coatings.

3.5 DIVISION 44

.1 Section 44 07 76 – Chemical Metering System and Storage

.1 **REMOVE** 2.2.8 and **REPLACE** with " .8 Acceptable suppliers are as follows: Grundfos by SPD Sales, ProMinent by SCG Process, or approved equal."

3.6 DIVISION 25

.1 Specification 25 05 02

.1 **Amend** Item 1.1, as follows

.1 **Add** Item 1.1.2.2

.1 Capital Controls and Instrumentation Inc.
1333 Michael St. Unit 03
Ottawa, ON, K1B 3M9
C/O: Brad Lavallée, brad.lavallee@capitalcontrols.ca
Tel: 613-248-1999

.2 Specification 25 10 02 Pressure Elements

.1 **Amend** the Instrumentation Data Sheets, Process Connection **Annular Seal to include** Red Valve Series 48**, Winters D81 Annular Seal**.

3.7 DIVISION 28

.1 Specification 28 31 00.01 – Fire Alarm System

.1 **Add Item 1.9 Security System Vendor**

.1 Contractor shall solicit the services of the Owner' Security System Maintenance Contractor:
R & M Security Solutions
305 River Valley Road, Quinte West, ON, K0K 3E0,
Canada

3.8 DIVISION 44

.1 Specification 44 05 50 Process Piping

.1 **Amend** the 44 05 50 Process Piping as per the attached.

.2 **Amend** Section 2.2.20 Knife Gate Valve

.1 **Modify** "Standard of Acceptance: Trueline, Dezurik/KCB, **Orbinox**, *,F1 (Lug Style), S1, TBP, S1, EPDM;

.3 **Amend** Section 2.2.21 Duckbill Check Valves

.1 Modify Item 2.2.21.3 "Valve to have ~~**curved bill**~~ **straight-bill**".

.2 Modify Item 2.2.21.4 "Manufacturer shall have a minimum of 10 years experience in the design and manufacture of a flat-bottom, curved bill **and straight-bill** check valve**s**".

.3 **Modify** Item 2.2.21.5 "Acceptable Manufacturer: Tideflex, **EVR, Onyx**

.4 **Amend** Section 2.2.23

.1 **Modify "**Standard of acceptance: DeZurik/APCO or Val-Matic, **Pratt**, **GA**"

.5 **Amend** Item 2.3.3.7

.1 **Modify** "Standard of Acceptance: Straub Grip L (SS 316 L) restrained coupling with SS 316 insert, **Arpol FIX Pro restrained Coupling complete with SS 316 insert as necessary**."

.6 **Add** Item 2.9.**6 Thrust Restraints**.

.7 **Amend** Item 2.10.4.2 "Refer to ~~**Section 11170 – Pipeline Pressure and Leakage Testing**~~ **44 01 27 Field Pressure Testing of Process Piping** to comply with the pressure requirements.**"**

.8 **Amend 2.12 Flexible Connectors and Dual Pipe Couplings**

.1 **Add** Items 2.12**.3 For Flexible Connection of Standard Length**

.2 **Add** Items 2.12**.4 For Flexible Connection requiring short lengths**

.3 **Add** Items 2.12**.5 Expansion Joints**

.4 **Add** Items 2.12**.6 Teflon Bellows**

.5 **Add** Items 2.12**.7 Metal Bellows**

.9 **Add 2.14 Quick Connect**

.10 **Add 2.15 Flexible Hose**

.11 **Add 2.16 Pressure Relief Valve**

.12 **Add 2.17 Electric Solenoid Valves**

.13 **Add 2.18 Pressure Reducing Regulator**

.14 **Add 2.19 Low Pressure Control Valve**

.15 **Add 2.20 Single Braided Standard Pressure Hose**

.16 **Add 2.21 Pipe Sleeves**

.17 **Add 2.22 Miscellaneous Specialties**

.18 **Add Restrained Joints and Valves**

.19 **Add Valve Boxes**

.20 **Add Yard Hydrants**

PART 4 DRAWINGS

4.1 CIVIL

.1 Drawing C0202

.1 **Amend Drawing C0202** to notate the HWS & HWR piping as follows:

.1 New Hot Water Supply & Return lines. (Refer to Div. 20 for Details).

.2 Connect New 100mm Ø Hot Water Supply pipe to pipe installed by Div. 20 Using Approved Coupling. Inv. = +/- 79.00m

.3 Connect New 100mm Ø Hot Water Return pipe to pipe installed by Div. 20 using Approved Coupling. Inv. = +/- 79.00m

.2 Drawing C0203

.1 **Amend** Drawing C0203 to change the HWS & HWR piping size to match the Mechanical drawing, as follows:

.1 Connect New ~~**80**~~ **75**mm Ø Hot Water Supply pipe to pipe installed by Div. 20 Using Approved Coupling. Inv. = 77.50m

.2 Connect New ~~**80**~~ **75** mm Ø Hot Water Return pipe to pipe installed by Div. 20 using Approved Coupling. Inv. = 77.50m

4.2 ARCHITECTURAL

.1 Refer to A0003 Overall Site Plan and Building Life Safety Plans (A1001, A3001, & A4001) for fire rated walls and enclosed drawing A5003 Door Schedule:

.1 All doors and frames in a 2-hour rated wall must have a 1.5 hour fire-protection rating.

.2 All doors and frames in a 1-hour rated wall must have a 45 minute fire-protection rating.

.3 All doors and frames in a 45 minute rated wall must have a 45 minute fire-protection rating.

.2 Refer to enclosed drawing A5003 Door Schedule:

.1 Contractor to provide HM door panel material for Door D-1112A.

.3 Refer to Keynote 3 and Keynote 18 on enclosed drawings A1402 & A1403 for all men's and women's shower stalls:

.1 Contractor to provide fold down shower seat as per Accessory Legend on A0005.

.4 Refer to Keynotes 1, 3, & 10 on enclosed drawing A1401 for mechanical hood.

.1 Contractor to provide mechanical hood per Mechanical specification.

.2 Prefinished enclosure for fume hood deleted.

.3 Valence attached to upper cabinets deleted.

.5 Contractor to provide roof anchors as per drawing A1105 Headworks Building Roof Plan, enclosed drawing A4103 Tertiary / UV Building Roof Plan, and Specification 11 81 29 Facility Fall Protection.

4.3 PROCESS

.1 **Amend** Drawing P003 to indicate the Specification for the Septage Receiving Pipe to be 150-SEP-SS3.

PART 5 QUESTIONS AND ANSWERS

5.1

.1 **Q: Please confirm what type of concrete should be used for all the exterior slabs, sidewalks etc. The 8 mixes that are specified in section 03 30 00 are not typical exterior grades of concrete. Should there be a 32 C-1 and C-2 mix.**

A: Use C-1 mix for the generator pad. Use C-2 mix for the sidewalks.

.2 **Q: Room and Door Schedules Drawing A5003 - Overhead Door No D-3103B shows material as HM. Doors D-1201C and D-3201B show material as SS. Please clarify what material is HM exactly and whether or not SS stands for stainless steel or sheet steel as noted in Spec Section 083300.2.4.1.**

A: For Typical Abbreviations of Building Components (ie: stainless steel), refer to sheet A0001 GENERAL NOTES, SYMBOLS, & ABBREVITIONS.
For exact material of hollow metal (HM) doors, refer to Section 081100 Metal Doors and Frames, Part 2.1 Materials.

.3 **Q: Reference Room Finish Schedule Drawing A5003, Spec Section 096710 Epoxy Coating and 138000 Chemical Resistance Coating. Floor Finishes in Operations Building Rooms 3106 and 3201 call for CHEM Type 3 floor and CHEM Type 4 base finishes. These are not identified in either specification. Please clarify.**

A: Please refer to amended drawings for clarification regarding the floor and base finishes specification. Chemically resistant floor and base finishes have been specified in the Dosing Tank area and WAS Thickener Room to protect against splash and spills as they would occur during maintenance / servicing in those locations.

.4 **Q: Reference Room Finish Schedule Drawing A5003, Room Finish General Note #3. Please confirm that it is the intent that a sealer is to be applied to the underside of all exposed precast hollow core slabs and precast Ts for the EXPOSED CONCRETE locations where noted in the finish schedule.**

A: Yes, this is the intent of Room Finish General Note #3 on A5003. Please refer to the attached Section 03 35 46 Concrete Topical Treatment for interior exposed concrete ceiling finishes.

.5 **Q: Is there a spec for the flanged and non-flanged flex/expansion spools shown in various locations such as pump discharges?**

A: Refer to Specification Section 44 05 50 Process Piping Item 2.12 for Elastomer and Metallic Expansion/Flexible Joints for Pump, Blowers, Compressors and other vibrating equipment. Note that the specification is revised as part of this Addendum.

.6 **Q: Can you please confirm the closing date, the website notes March 13th but the tender documents are noting March 20th.**

A: The closing date is currently March 20th at 2pm as per Addendum 2. We will ensure the advertisements are aligned.

.7 **Q: Will the Owner entertain removing the half load restrictions on deliveries during the half load season. This project will have hundreds of deliveries which a number will fall in the half load months, especially concrete. Will there be any lenience on this, as this will add huge costs to the project.**

A: Refer to the response provided to question 13 of Addendum 2. The Town will provide project specific permit to remove the half load restrictions. The permitted construction route will be Hessford Street to Water Street. However, the owner will work with the successful contractor permitting access and an acceptable Haul route.

.8 **Q: Please provide the AASI AGS Presentation to all bidders.**

A: The presentation link has been provided to all attendees. Please notify the Bids&Tenders site if the access with the Sharepoint link emailed to each participant was not functional.

.9 **Q: Drawing A1402 shows lockers and wood benches in the men's and women's washrooms, however, the relevant specifications have not been provided. Please provide the specifications.**

A: Refer to the drawings amended via this addendum and the specifications provided in Addendum 2.

.10 **Q: The GRD Schedule on Drawing M1101 shows different sizing compared to the tags on the drawing, please advise which is the intended sizing.**

A: As per the legend on drawing M0001, the schedule shows the diffuser size, the balancing tag indicates the neck size.

.11 **Q: On the Fan Schedule on Drawing M0001, the Fan EF-7 is not shown on the Mechanical Drawings, please confirm location.**

A: Correct, EF7 is no longer in scope of work.

.12 **Q: Please provide a basis of design for Fan EF-11.**

A: 100 cfm @ 0.5" e.s.p., explosion proof, Pennbarry FX10S

.13 **Q: Please provide sizing for the duct servicing through the Corridor & L1 (1050x1050) Louvre on Drawing M3102.**

A: 600x300 mm

.14 **Q: Spec. 23 25 00 calls for filtration on the Heating Water system but the drawing shows pumps on separate branches to individual area of the building (process heat exchangers, operations building, headworks bldg., etc) the way this is drawn we would recommend filtration over each set of pumps for a total of 5- can you confirm this?**

A: Filtration on each set of circulation pumps.

.15 **Q: Drawing M1103 shows fixture S3, but there it is not listed in the Fixture schedule. Please provide details for this fixture.**

A: Fixture S3 is part of furniture, contractor to provide connections.

.16 **Q: Please provide a specification for the fluid heaters shown on Fluid Heater Schedule on drawing M0001.**

A: Basis of design is indicated.

.17 **Q: Please clarify the manufacturer for the Domestic Water Heaters, as the specification indicates only Rheem and the M0001 Drawing Schedule indicates A.O. Smith.**

A: Water heaters to be as per schedules.

.18 **Q: On Drawing M1101, please clarify the tag for the unit heater near C-3.**

A: As per M1106, it's UH4.

.19 **Q: On the Pump Schedule on Drawing M0001, the Zoeller units are not listed as acceptable within the specifications, please specify acceptable units.**

A: Sump pump to be as per schedule.

.20 **Q: On Drawing M3104, the size of the DCW line differs between the plumbing plan view and the detail shown for the line connected to the Domestic Hot Water Heater (DHWT-2). Please specify correct sizing.**

A: Size as per plan view.

.21 **Q: Referencing Section 28 31 00.01 – 3.5. Please provide a list of monitoring firms that are approved by the owner.**

A: Refer to the response to Question 7, Addendum 2.

Owners approved vendor for this scope is:

R & M Security Solutions
305 River Valley Road, Quinte West, ON, K0K 3E0, Canada

.22 **Q: Referencing Section 01 51 00, can the successful contractor use the existing MCC located in the digester building for temporary power provided it is metered to comply with payment of the energy charges being covered by the contractor?**

A: Yes, temporary power may be provided from MCC#4 provided all necessary temporary provisions are provided.

.23 **Q: Specification section 44 04 50 Sluice, Channel and Weir Gates, 2.3 Heavy Duty Fabricated Slide Gate. There are only two named acceptable gate manufacturers: BNW and Fontaine. I request that Orbinox be added to this list. Orbinox is a Canadian manufacturer that was named and is supplying valves for the Town of Greater Napanee pumping station project that was recently awarded. Orbinox has supplied numerous slide gates and knife gate valves for municipalities throughout Ontario (and worldwide). References are readily available.**

A: Orbinox was listed as an acceptable gate manufacturer in Addendum 2.

.24 **Q: Specification section 44 04 50 Sluice, Channel and Weir Gates, 2.4 Weir Gates. There are only two named acceptable gate manufacturers: BNW and Fontaine. I request that Orbinox be added to this list. Orbinox is a Canadian manufacturer that was named and is supplying valves for the Town of Greater Napanee pumping station project that was recently awarded. Orbinox has supplied**

numerous slide gates and knife gate valves for municipalities throughout Ontario (and worldwide).

A: Orbinox was listed as an acceptable gate manufacturer in Addendum 2.

.25 **Q: Specification section 44 04 50 Sluice, Channel and Weir Gates, 2.5 Channel Gates. There are only two named acceptable gate manufacturers: BNW and Fontaine. I request that Orbinox be added to this list. Orbinox is a Canadian manufacturer that was named and is supplying valves for the Town of Greater Napanee pumping station project that was recently awarded. Orbinox has supplied numerous slide gates and knife gate valves for municipalities throughout Ontario (and worldwide).**

A: Orbinox was listed as an acceptable gate manufacturer in Addendum 2.

.26 **Q: Specification section 44 04 55 Stop Plate, 1.2.5 Quality Assurance. Item 5 states that "Gates supplied under this section shall be a Series 29 Stainless Steel Stop Plate as manufactured by Fontaine-Aquanox or approved equivalent. There is only one named manufacturer for a stainless-steel stop plate. For the sake of competition, I request that Orbinox be added to this list. Orbinox is a Canadian manufacturer that was named and is supplying valves for the Town of Greater Napanee pumping station project that was recently awarded. Orbinox has supplied numerous slide gates and knife gate valves for municipalities throughout Ontario (and worldwide)**

A: Orbinox was listed as an acceptable gate manufacturer in Addendum 2.

.27 **Q: Specification section 44 05 50, 2.2.20 Knife Gate Valve. This section names Trueline and Dezurik as acceptable manufacturers. I request that Orbinox be added to this list. Orbinox is a Canadian manufacturer that was named and is supplying valves for the Town of Greater Napanee pumping station project that was recently awarded. Orbinox has supplied numerous slide gates and knife gate valves for municipalities throughout Ontario (and worldwide).**

A: Orbinox has been added to the Standard of Acceptance via this addendum.

.28 **Q: Specification section 44 05 50, 2.2.21 Duckbill Check Valves. Item .5 states the only acceptable manufacturer is Tideflex. I request that EVR be added to the list of acceptable suppliers. Not only will this increase competition but EVR is an Ontario-based manufacture. Tideflex is an American company with no manufacturing in Canada. Given the current political and economic climate, I would hope that an Ontario manufacturer would at least be given the opportunity to compete for a public tender.**

A: EVR has been added to the Standard of Acceptance via this addendum.

.29 **Q: Specification section 44 05 50, 2.2.23 Air Release Valves. This section names DeZurik and Val-Matic as the only acceptable manufacturers. I request that Pratt be added to the list of acceptable manufacturers. Pratt's air release valve meets all of the specification requirements. Pratt, DeZurik and Val-Matic all make a very similar design of wastewater air release valve. The design has been available for many decades.**

A: Pratt and Golden Anderson have been added to the Standard of Acceptance via this addendum**.**

.30 **Q: On the Mechanical drawings there are control valves shown, however there is no specification within the Mechanical specs. Please clarify.**

A: Control valves are in the EMCS section 25 01 05.

.31 **Q: Drawings show Washroom Accessories. There is no Division 10 specification. Is this scope supplied and installed by the Owner (NIC)?**

A: The Division 10 Specifications were provided in Addendum 2.

.32 **There appears to be some duplication issues in the Form of Tender pricing structure where the total from Item 2.4 - Itemized Lump Sum Breakdown includes costs for Item 21 - Provisional Items, Item 22 - Preselected Items, and Item 23 (which should be Item 24 due to a numbering error) - Contingency. This total is then carried into Item 1 of 2.1 - Schedule of Items and Prices. However, Item 2.1 - Schedule of Items and Prices separately lists Total Price of Provisional Items, Total Price of Preselected Items, and Contingency Allowance, which leads to a double-counting issue since these amounts are already included in the lump sum breakdown of Item 1. Please clarify.**

A: The Itemized Lump Sum Breakdown will be further itemized in future addendum.

Q: Form of Tender, 2.4 – Itemized Lump Sum Breakdown:
a. Specifies Line Item 12 – Division 11 Laboratory Specialties. However, there is no Division 11 specification sections. Please clarify.
b. Contained within the specifications is Section 12 35 53 – Phenolic resin Laboratory Casework and Section 12 36 00 – Phenolic Countertop. There is no line item for Division 12. Assume these sections are to align with Division 11 Laboratory Specialties. Please clarify.
c. Contained within the specifications is Section 13 80 00 Chemi

al Resistance Coating. Please confirm where this cost is to be allocated as there is no line item for Division 13.

A: The Itemized Lump Sum Breakdown will be further itemized in future addendum.

.33 **Q: The OPSS Muni 100 from 2006 that is included in the project documents is outdated and does not align with the current Construction Act. Please provide an updated contract.**

A: Refer to Addendum 2, the 2006 version was replaced with the 2019 edition of OPSS Muni 100.

.34 **Q: Reference Addendum #1, Q/A. A question was submitted to request an additional site visit for the GC's and demolition subcontractors to go inside all of the existing structures that are to be demolished. With the current tender closing less than two weeks away, are you still intending to accommodate this request?**

A: Refer to Addendum #3.

.35 **Q: Can you please confirm the pipe sizes for the HWS and HWR lines as shown on drawing M0003. The civil drawings show different sizes. Also, there is no mention of the pipe material for theses lines. Please clarify.**

A: As per Addendum #3 Q&A 36 the specification for the buried HWS and HWR lines indicated on C0202 and C0203 are provided by Division 20, Section 23 21 13.04 2.1 indicate underground HWS/HWR pipes are to be PEX tubing. The drawings show the underground HWS/HWR PEX tubing to be 4''. Exterior underground pex piping is a pre-insulated system. Uponor WIPEX is available up to 4” in size. The Civil Drawing clarification are provided in the Specification/Drawing revisions herein, 100mm HWS/HWR will be provided from Area 3000 to 1000, and 75mm HWS/HWR will be provided from Area 3000 to Area 4000.

.36 **Q: Reference SPEC Section 03 30 00 item 2.3 Materials For Crack Injections. Please confirm that this item is not included in the contract.**

A: Crack injections to be used per section 03 30 00 clause 1.4.1.6 and clause 1.5.2.

.37 **Q: Drawing P0003 – Indicate Septage receiving Pipe as 150-SEP-SS1 where as Drawing P1301 indicate as 150-SEP-SS3. Please clarify.**

A: Amend P0003 indicate 150-SEP-SS3.

.38 **Q:**

.39 **Q: Drawing C0402 – Detail-3 – Biogas Pipe Transition Detail-1 Please provide Coupling Type or manufacturer for "New Stainless Steel Mechanical Coupler"**

A: Refer to Division 44, Specification 44 05 50 Process Piping, Item 2.3.3.7. All Biogas Piping installation will be completed by a TSSA approved technician.

.40 **Q: Reference addendum No. 2 Q&A 33 Fume Hoods. The specifications for the Fume Hood was not noted within the 'attached Mechanical specifications' Please provide specifications for fume hood.**

A: The Fume Hood specification was provided with Addendum #3 and the Architectural details are updated per this Addendum.

Q: Referencing Addendum 2, special provision 5.8 - Fire Alarm System Monitoring. In speaking with the named vendor, R&M Security Solutions, it was mentioned that they have also compiled a security package for this project. Please add R&M as an approved vendor for Section 28 31 00 – Intrusion Detection.

A: Refer to the amendments provided by the Addendum.

Contractor shall solicit the services of the Owner' Security System Maintenance Contractor:

R & M Security Solutions
305 River Valley Road, Quinte West, ON, K0K 3E0,Canada

.41 **Q: Spec Section 02 23 40 Part 3.2.2 calls for Vibration Monitoring in 8 locations until all underground work is completed. Will you accept remote monitoring in lieu of the specified weekly onsite visits?**

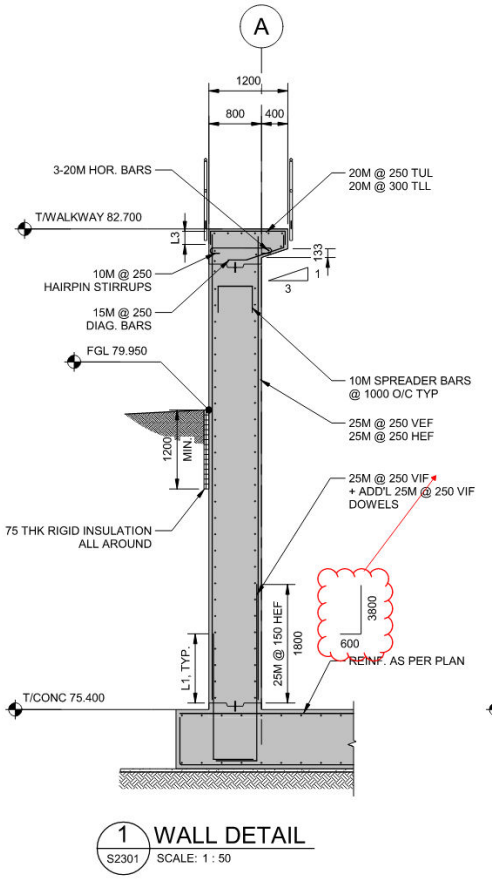
A: Remote monitoring is acceptable.

.42 **Q: Will stainless steel slip-on-flanges be acceptable?**

A: No, all flanging shall be as per Specification 44 05 50.

.43 **Q: Drawing S2302, Section 1 notes indicate 25M VEF, and just below that, it mentions 25M @ 250 VIF with additional dowels @ 250. I believe there may be an error in these notes. It seems to me that the first note should read 25M @ 250 VOF, and the lower notes should read 25M VIF plus additional dowels at 250. The current wording implies 25M at 125 spacing, which includes vertical plus dowels. Could you please clarify the actual rebar spacing?**

A: The lower note 25M@250 VIF Dowels associates with the required dowel geometry/lengths as marked. The regular bar spacing is 250 mm vertical bar spacing. With the additional dowels, the spacing will be 125 mm. For extent of additional dowel bars, refer to drawing S2402. See drawing & reference.



.44 **Q: Additionally, confirm if the detail shown on grid line A in Drawing S2302, section 1 applies to grid line F, or is this detail meant for all exterior walls (A, F, 2, and 3)?**

A: Section 1 rebar also applies to Grid F but mirrored. For Grid 3, refer to Section G/S2302. For Grid 2, refer to Section G/S2302 but mirrored and Section 5/S2302. For additional bars, refer to dwg S2402.

.45 **Q: Please confirm the pipe material for the buried HWS and HWR lines shown on C0202.**

A: As per Addendum #3 Q&A 36 the specification for the buried HWS and HWR lines indicated on C0202 and C0203 are provided by Division 20, Section 23 21 13.04 2.1 indicate underground HWS/HWR pipes are to be PEX tubing. The drawings show the underground HWS/HWR PEX tubing to be 4". Exterior underground pex piping is a pre-insulated system. Uponor WIPEX

is available up to 4" in size. The Civil Drawing clarification are provided in the Specification/Drawing revisions herein, 100mm HWS/HWR will be provided from Area 3000 to 1000, and 75mm HWS/HWR will be provided from Area 3000 to Area 4000.

END OF SECTION

CONCRETE TOPICAL TREATMENT

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 41 00 – Structural Precast Prestressed Concrete

.2 Section 03 30 00 – Cast-in-Place Concrete

.3 Section 07 92 00 - Joint Sealants

.4 Section 09 91 01 – Painting

1.2 REFERENCE STANDARDS

.1 South Coast Air Quality Management District (SCAQMD):

.1 SCAQMD Rule 1113-A2016, Architectural Coatings

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate application of broadcast slip-resistant aggregate with Section 03 30 00 – Cast-in-Place Concrete.

.2 Coordinate percentage of air entrainment in concrete to avoid incompatibility with concrete hardener in accordance with hardener manufacturer's recommendations.

.3 Coordinate maximum percentage of supplementary cementitious materials (SCMs) to avoid detrimental effects to floor hardener.

.4 Coordinate concrete curing compounds, concrete sealers, concrete densifiers, concrete moisture repellants, and concrete topical treatments to ensure compatibility with subsequently applied floor finishes and with minimum substrate conditions outlined in Section 09 91 00 – Painting.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittals.

.2 Product Data:

.1 Submit manufacturer's instructions, product literature and data sheets for concrete sealer. Include product characteristics, performance criteria, finish, and limitations.

.2 Submit WHMIS Safety Data Sheet (SDS).

1.5 CLOSEOUT SUBMITTALS

.1 Operation and Maintenance Data: Submit manufacturer's recommendations for cleaning and maintenance procedures.

1.6 QUALITY ASSURANCE

.1 Perform in accordance with Section 01 45 00 - Quality Control.

.2 Submit proposed quality control procedures a minimum of 4 weeks before starting concrete floor topical treatment work for review by Consultant on the following items:

.1 Hardening

.2 Slip-resistant finish

.3 Concrete sealing

.3 Qualifications:

.1 Installers: Workers experienced in concrete finishing methods similar in complexity to that required for this Project.

.4 Mock-Ups: Provide site mock-up for each concrete topical treatment in accordance with Section 01 45 00 - Quality Control:

.1 Build mock-up at the Project site, approximately 1 m by 1 m.

.2 Mock-up may form part of permanent structure when accepted by Consultant.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Perform in accordance with Section 01 61 00 - Common Product Requirements.

.2 Storage and Handling Requirements: Store materials in a clean, dry, low humidity, indoor area and in accordance with manufacturer's recommendations.

.3 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 11 - Cleaning.

1.8 SITE CONDITIONS

.1 Temporary Lighting: Minimum 1200 W light source, placed approximately 2.5 m above / below floor / ceiling surface, for each 40 m^2 of floor / ceiling being finished.

.2 Make work area watertight and protect against rain and detrimental weather conditions.

.3 Temperature and Humidity:

.1 Maintain a minimum 10°C ambient temperature from 7 days before installation to a minimum 48 hours after completion of work of this Section and maintain relative humidity at a maximum 40% during this same period.

.2 Maintain a minimum 10°C substrate temperature.

.4 Moisture: Ensure concrete substrate is within moisture limits prescribed by sealant manufacturer.

.5 Ventilation: Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.

.1 Coordinate with Owner to operate existing building ventilation system during installation of concrete topical treatments. Ventilate area of work with temporary supply and exhaust fans.

.2 Continuously ventilate during application and for a minimum 48 hours after application of concrete topical treatments.

PART 2 PRODUCTS

2.1 SEALING COMPOUNDS

.1 Surface Sealer: Acrylic carnuba wax, colour clear.

2.2 MIXES

.1 Mixing ratios in accordance with manufacturer’s written instructions.

PART 3 EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: Verify conditions of concrete slab and concrete substrates are acceptable for application of concrete topical treatments in accordance with manufacturer’s written instructions.

.1 Inspect substrates in presence of Departmental Representative.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.2 PREPARATION

.1 Clean and prepare concrete in accordance with manufacturer’s written instructions.

.2 Existing Concrete Slabs:

.1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.

.2 Use a strong solvent to remove existing surface coatings.

.3 Use protective clothing, eye protection, respiratory equipment, during stripping of surface coatings.

3.3 APPLICATION – CONCRETE SEALER

.1 Apply concrete finishing floor sealer in accordance with manufacturer's written instructions.

.2 After topical floor treatment has cured, apply sealant to control joints and joints at junction with vertical surfaces in accordance with Section 07 90 00 - Joint Sealants.

.1 Sealant: Type B.

3.4 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 00 - Cleaning, and as follows:

.1 Remove overspray promptly. Clean excess sealant from adjacent surfaces.

.2 Leave Work area clean at end of each day.

.3 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.4 Waste Management: Separate waste materials for [reuse] [and] [recycling] in accordance with Section 01 74 19 - Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect finished installation until concrete topical treatments have completely cured.

.2 Repair damage to adjacent materials caused by application of concrete topical treatments.

3.6 SCHEDULE

.1 Table: Floor Treatments Schedule Example

CONCRETE TOPICAL TREATMENT

Surface Sealer	Location
Type 1, to CAN/CGSB-25.20, water-based	1108 Lunch Room

END OF SECTION

CHEMICAL RESISTANCE COATING

PART 1 GENERAL

1.1 GENERAL

.1 The Contractor shall supply labour, materials and equipment for the complete installation of the chemically resistant coating on all interior concrete surfaces as listed on the drawings. General floor coating shall form a covered 150 mm curb along all walls and cover all maintenance pads in all rooms. Protective coating in the chemical containment areas shall be finished from finished floor to top of all containment walls and curbs height as shown on drawings.

1.2 SUBMITTALS

.1 Production Data: Submit manufacturer's technical data, installation instructions and general recommendations for each resin system required.

.2 Samples: Submit, for verification purposes, 300 mm x 300 mm square samples of each type of resin system required, applied to rigid backing, in colour and finish indicated.

1.3 QUALITY ASSURANCE

.1 Single Source Responsibility: Obtain primary protective resins including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than 10 years of successful experience in manufacturing the principle materials described in this section. Contractor must have completed at least five (5) projects of similar size and complexity. Provide secondary materials only of type and from source recommended by manufacturer of primary materials.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver material to job site. Contractor will check material for completeness and shipping damage prior to job start.

.2 Store material in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 16º and 32ºC (60º and 90ºF).

1.5 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM D16-14 - Standard Terminology Relating to Paint, Related Coatings, Materials and Applications

.2 ASTM D4259-88 (2012) - Standard Practice for Abrading Concrete

.3 ASTM D4263-83 (2012) - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method

.4 ASTM F1869-11 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

.2 International Concrete Repair Institute (ICRI)

.1 Guideline No. 310.R-2013: Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

.3 Society for Protective Coatings (SSPC)

.1 SSPC-TR 5/ICRI Technical Guideline 03741/NACE 02203 - Design, Installation, and Maintenance of Protective Polymer Flooring Systems for Concrete

.2 SSPC-Guide 20 - Procedures for Applying Thick Film Coatings and Surfacings Over Concrete Floors

.3 SSPC-TU 2/NACE 6G197 - Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment

.4 SSPC SP13/NACE No. 6 - Surface Preparation of Concrete

.5 References herein are as detailed in Systems and Specifications SSPC Painting

.6 Manual, Volume 2, published by the Society for Protective Coatings (formerly the Steel Structures Painting Council), 40 24th Street 6th Floor, Pittsburgh, PA, 15222-4656 (www.sspc.org).

.4 NACE International (NACE)

.1 NACE SP0892-2007 - Coatings and Linings over Concrete for Chemical Immersion and Containment Service

.2 References herein are as published by NACE International (the National Association of Corrosion Engineers), Technical Practices Committee, 1440 South Creek Drive, Houston, Texas, 77084-4906 (www.nace.org).

1.6 DEFINITIONS

.1 Dry Film Thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000 inch)

PART 2 PRODUCTS

2.1 MANUFACTURER

.1 Carboline, 95 Sunray Street, Whitby, ON, Canada L1N 9C9, (647)-226-5275, email: pescudero@carboline.com, URL: www.carboline.com

.2 PPG, 8200 Keele Street, Concord, ON, Canada L4K 2A5, (416)-522-4196, email: kevin.boichuk@ppg.com, URL: www,ppg.com

.3 Tnemec Company, Missouri, USA, (905)-339-8386, email: dwalker@tnemec.com, URL: www.tnemec.com.

.4 Sika Canada Inc., 6915 Davand Drive, Mississauga, ON, Canada, (416)-573-7223, email: dolenc.greg@ca.sika.com, URL: www.sika.ca

2.2 MATERIALS

.1 Products

.1 Type 3 – Chemically resistant coating for interior floors, to protect against splash and spill:

.1 Coating Systems for:

.1 Alum 45-55%

.2 Ferrous Chloride 18-32%

.3 Ferric Chloride 39-47%

.2 Acceptable Systems:

.1 Stoncor: Stonclad HT + HT4

.2 PPG: Amercoat 240

.3 Tnemec: Series 237SC/280

.4 Sika: Sikafloor 82 EpoCem with Sikagard CRV10

.2 Type 4 – Chemically resistant coating for interior walls, to protect against splash and spill:

.1 Coating Systems for:

.1 Alum 45-55%

.2 Ferrous Chloride 18-32%

.3 Ferric Chloride 39-47%

.2 Acceptable Systems:

.1 Stoncor: Stonglaze VSR

.2 PPG: Amercoat 240

.3 Tnemec: Series 237SC/280

.4 Sika: Sikagard 75 EpoCem with Sikagard CRV 10

.2 Colour

.1 Floor and wall coatings, concrete curbs and pads shall be colour Stonhard GS4-6003 Silver Grey or Tnemec 31GR Silver Gray or Sika Agate Gray RAL 7038 or approved equal.

.2 Lining system colour to be manufacturer's standard gray

PART 3 EXECUTION

3.1 EXECUTION

.1 Concrete substrate must be properly cured for a minimum of 30 days. A calcium chloride test in accordance ASTM F1869 is required to determine acceptable moisture content of any horizontal concrete surfaces. All vertical concrete surfaces shall be tested in accordance with ASTM D4263.

.2 Temperature: Utilities, including electric, water, heat (air temperature between 16º and 32ºC) and finished lightning to be supplied by General Contractor. Maintain ambient temperature of not less than 18ºC and a floor temperature of not less than 16ºC from seven (7) days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40 percent during same period.

.3 Moisture: Ensure substrate is within moisture limits prescribed by the coating or lining manufacturer.

.4 Safety: Comply with requirement of Workplace Hazardous Material Information Systems (WHMIS) regarding the use, handling, storage and disposal of hazardous materials.

.5 Job area to be free of other trades during and, for a period of 24 hours, after coating and lining installation.

.6 Protection of finished surfaces from damage by subsequent trades is the responsibility of the General Contractor.

.7 Manufacturer's representative must be on the job site at start of installation.

3.2 PREPARATION

.1 Substrate: Concrete surfaces shall be prepared to CSP 4 to 6. by mechanical means such as a shot blast (blastrac) machine or sand blasting for removal of bond inhibiting materials such as curing components and laitance. Work to be completed in accordance with SSPC SP13/NACE No. 6 and ICRI Guideline 310.2R-201303732. In no case shall acid etching be utilized as the surface preparation method.

.2 All coating surfaces shall be dried, brushed and vacuumed before primer is applied.

.3 A manufacturer's representative shall visit the site, arranged by the Contractor, and review the substrate preparation before any product is applied. The representative shall confirm in writing that the area is suitably prepared. This written confirmation is required to be submitted to the engineer before product is applied.

3.3 TYPE 1: LINING APPLICATION

.1 Control Joint and Crack Treatment: All shrinkage cracks and control joints to be treated with a flexible reinforced system such as Stonhard Stonproof CT5 or Tnemec Series 206 or Sika Sikaflex 2C NS or SL in accordance with SSPC TU 2/NACE 6G197 Technology Update Report Figure 7. Bidder shall estimate 10 percent of surface area for such treatment and provide a linear foot price for additions and deletions.

.2 Key In: Create key in terminations at all lining terminations as shown in Figure 8 of the SSPC TU2/NACE 6G197 Technology Update Report.

.3 Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates. Coordinate timing of primer application with application of troweled mortar to ensure optimum adhesion between resinous lining materials and substrate

.4 Mortar: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate. Hand trowel apply mixed material over freshly primed substrate

.5 Engineering Fabric: Embed fabric into mortar material with strict adherence to manufacturer's installation procedures

.6 Saturant: Uniformly roll the saturant into the fiberglass fabric as recommended in manufacturer's application procedures

.7 Topcoat: Remove any surface irregularities. Mix and apply resin finish topcoat with strict adherence to manufacturer's installation procedures.

3.4 CURING, PROTECTION AND CLEANING

.1 Cure flooring and lining materials in compliance with manufacturer’s directions, taking care to prevent contamination during stages of application and prior to completion of curing process. Close area of application for a minimum of 24 hours.

.2 Protect resinous systems from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer’s recommendations for protective materials and method of application. General Contractor is responsible for protection and cleaning of surface after final coats.

END OF SECTION

PART 1 GENERAL

1.1 REGULATORY REQUIREMENTS

.1 All equipment shall be listed by Underwriters' Laboratory of Canada (ULC).

.2 All components of the system shall be the product of a single manufacturer.

.3 The system and installation shall conform to the latest edition of the Ontario Building Code (OBC) and the Ontario Electrical Safety Code (OESC).

.4 The system shall be installed in accordance with CAN/ULC-S524-14, and shall be subject to the approval of the local Authority Having Jurisdiction.

.5 Fire Alarm System to be verified to CAN/ULC-S537-13

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittals

.2 Section 01 78 00 – Closeout Submittals

.3 Section 01 91 13 – Commissioning Requirements

.4 Section 26 05 00 – Common Work Requirements Electrical

.5 Section 26 90 00 – Wiring of Equipment Supplied by Others

1.3 SUBMITTALS

.1 Submit pdf shop drawings in accordance with 01 33 00 – Submittal Procedures.

.2 Shop drawings must be submitted and approved by project Engineer before any equipment is shipped to site.

.3 Shop drawings to consist of the following:

- .1 Project title page with project name, Engineer, contractor, and equipment manufacturers.
- .2 Project detailed equipment list
- .3 Project verification requirements
- .4 System/device data sheets and typical wiring schematics
- .5 Graphic annunciators detailed construction drawings.
- .6 Main fire alarm control panel.
- .7 Fire alarm transponder panel (if applicable).

.4 Provide ‘as-built’ drawings upon completion showing all devices c/w addresses including line isolator and conduit runs.

1.4 OPERATION AND MAINTENANCE MANUALS

.1 Operation and maintenance manuals to consist of the following:

.1 Operation and maintenance instructions for the complete fire alarm system to permit effective operation and maintenance.

.2 Recommended spare parts list with parts catalogue numbers.

.3 Copy of approved shop drawings.

1.5 MAINTENANCE

.1 Provide one year's free maintenance with two inspections by manufacturer during the year. Inspection tests to conform to CAN/ULC-S537-13.

1.6 TRAINING

.1 Provide on-site lectures and demonstrations by fire alarm equipment manufacturer, to train operational personnel in use and maintenance of the fire alarm system. Two separate lectures a minimum of 2 hours each. Coordinate training schedule with Owner.

1.7 QUALIFICATIONS OF MANUFACTURERS

.1 Manufacturers bidding this project must provide a Letter of Compliance, indicating they have met the specifications and system operation exactly.

1.8 SYSTEM DESCRIPTION

.1 Existing conventional fire alarm system to be replaced with new addressable system. New system to be extended to buildings on site, as per the contract drawings.

.2 Provide a supervised, micro-processor based, zoned, non-coded, single-stage, addressable fire alarm system, utilizing automatic/manual devices, wired in DCLA style 6 configuration, and operating at 24 VDC nominal voltage from a rectified 120 VAC power supply.

.3 Any circuit wiring leaving or entering a building shall be provided with a combination choke, MOV, and gas-discharge transient protector. Any circuit servicing a Class 1, Div. 2 area shall be isolated using intrinsically safe barriers.

.4 System shall notify the fire department of an alarm condition by way of a signal to a central monitoring station conforming to CAN/ULC-S561.

1.9 SECURITY SYSTEM VENDOR

.1 **Contractor shall solicit the services of the Owner' Security System Maintenance Contractor:**

R & M Security Solutions

305 River Valley Road, Quinte West, ON, K0K 3E0, Canada

PART 2 PRODUCTS

2.1 MATERIALS

.1 Equipment and devices: ULC listed and labelled; standard product of single manufacturer. Addressable type unless otherwise noted.

.2 Power supply: to CAN/ULC-S524 and OBC requirements.

.3 Audible signal devices: to ULC-S525.

.4 Control unit: to CAN/ULC-S527.

.5 Manual fire alarm stations: to ULC-S528.

.6 Smoke detectors: to CAN/ULC-S529.

.7 Thermal detectors: to ULC-S530.

2.2 SYSTEM OPERATION – SINGLE STAGE

.1 Single stage operation. Operation of any alarm initiating device:

- .1 Cause on electronic latch to lock-in the alarm state at the control panel.
- .2 Cause audible signal devices to sound throughout entire building.
- .3 Transmit signal to remote monitoring station via telephone line to CAN/ULC S561.
- .4 Cause zone of alarm signal to be indicated on fire alarm control panel and remote annunciator panel.
- .5 Automatically record the time, date and zone of alarm at the control panel.
- .6 Cause fire doors and smoke control doors if normally held open, to close automatically.
- .7 Fire alarm system shall automatically shut down the A/C systems and fans which are fitted with duct smoke detectors or otherwise indicated. Provide relay as required.
- .8 Fire alarm system shall recall elevator in the event of fire detection in the elevator machine room.

.2 Supervisory Device Activation

- .1 Actuation of and supervisory device shall:
  - .1 Cause on electronic latch to lock-in the supervisory state at the control panel.
  - .2 Indicate the respective supervisory zone at the control panel.

.3 Automatically record the event by time and date at the control panel.

.4 Cause a distinctive audible signal at the control panel.

.5 Activate a common supervisory sequence.

.3 Resetting System:

.1 Resetting the alarm or supervisory device and the system shall:

.1 Be automatically recorded at the control panel.

.2 Return all other system indications/functions back to normal.

.4 Trouble Activation:

.1 The system shall continuously monitor the system devices and wiring. Any trouble on the system shall:

.1 Indicate the circuit/device in trouble on the control panel.

.2 Automatically record the time, date and device in trouble.

.3 Activate the “system trouble” indication, buzzer and the common trouble sequence. Acknowledging the trouble condition shall silence the audible indication, whereas the visual indication shall remain until the trouble is cleared and the system is back to normal.

2.3 CONTROL PANEL

.1 DCLA System style in accordance with CAN-ULC-S524. Minimum of one loop per floor and one spare loop capacity.

.2 Each device individually addressed unless otherwise noted.

.3 Non-coded.

.4 Enclosure: CSA Enclosure 1, c/w lockable concealed hinged door, full viewing window, flush lock and 2 keys, wall mounted, max. 750 mm width.

.5 Central Processing Unit (CPU):

.1 The CPU is to monitor and control the entire system and allow control of all systems components connected to the system. The CPU shall be of modular design.

.2 The Central Processing Unit (CPU) shall be complete with forty (40) character alphanumeric display and keypad. All components shall be fully operational while the system is operating on the standby batteries.

.3 Basically all events are to be logged automatically in the system for future review.

.4 The CPU electronics shall be microprocessor-based. Basic life safety software shall be retained in erasable programmable read only memory (EPROM) and executed from random access memory (RAM) to allow password protected field editing. The CPU shall have the capacity to

monitor the number of addressable points required for this project plus 25% spare capacity.

.5 The CPU must incorporate circuitry to continuously monitor the communications and data processing cycles of the microprocessor. On CPU failure, an audible and visual trouble signal shall initiate and provide a remote trouble at Fire Department Control panel.

.6 The CPU shall be equipped with software routines to provide event initiated programs (EIP) whereby the receipt of an alarm or supervisory trouble condition may be programmed to operate any or all of the system's control points. EIP actions for life safety functions shall be retained in the non-volatile PROM memory for reliability. The CPU shall also be retained in the non-volatile PROM memory for reliability. The CPU shall also be capable of reprogramming these EIP functions in the field and retaining the changes in the RAM memory until a new set of PROM are programmed.

.7 The control unit shall be able to process and evaluate incoming signals from addressable devices such as automatic detectors, manual pull station, supervisory valves, etc., via DCLA style link.

.8 The control unit shall be able to handle the following maximum number of addressable links and field-programmable zones:

.1 Up to four addressable links per control unit.

.2 Up to 100 detection devices per line. Maximum initial loading to be no more than 80.

.9 Provide operating power for the detection devices through a regular two-wire line.

.10 Each addressable line module is to have its own microprocessor based circuit, working independently from the central processor board located in the control unit and independently from each other.

.11 All addressable circuits shall be monitored against open circuits and ground faults. Should a malfunction occur in any circuit, this must result in an indication of a trouble condition of this address location at the Control Panel while all other addresses continue operating normally.

.12 Should a detection device respond with either an alarm or trouble condition, its location must be displayed along with its user text of 40 characters. For maintenance purposes. The panel shall have the ability to display the address information of the device in alarm/trouble condition.

.13 Auxiliary relays: plug-in type, dust cover, supervised against unauthorized removal by common trouble circuit and c/w individual bypass switch.

.1 Contacts: 2 A, 120 V ac, for functions such as release of door holders or initiation of fan shut down. Provide also 2 N.O. and 2 N.C. contacts for security system monitoring of 'trouble' and 'alarm' connections to Control panel.

.2 Contact terminal size capable of accepting 22-12 AWG wire.

.14 The system shall be capable of logging and storing 300 events in an alarm log and300 events in a trouble log. These events shall be stored in a battery

protected random access memory. Each recorded event shall include the time and date of that event's occurrence.

.1 The following Historical Alarm log events shall be stored:

.1 Alarms.

.2 Alarm acknowledgement.

.3 Trouble acknowledgement.

.4 Supervisory acknowledgement.

.5 Alarm verification tallies.

.6 Trouble Historical log cleared.

.15 Provide a general evacuation switch in the control panel to provide the fire department the option of causing a general alarm.

.6 General System Operation:

.1 Reset of the alarm system and return of the control panel to normal operation will be accomplished as follows:

.1 Resetting the fire alarm system shall not be possible until all the alarm zones have been reset or properly cleared after the Code required time delay.

.2 A supervisory input signal initiated by the actuation of a standpipe supervised valve shall cause:

.1 An audible trouble signal shall sound only at the control panel until acknowledged by authorized personnel.

.2 A latched-type visual indication of the location of the supervisory zone on the control panel.

.3 Print out of the time, date and the trouble zone on the printers.

.4 An open circuit fault on a supervisory circuit shall result in a specific trouble indication.

.5 Manual pull station, heat detectors, or flow switches will immediately cause the system to activate and report an alarm condition without verification requirement.

.3 The system will be programmable on site as outlined below:

.1 The fire alarm system shall allow for on-site loading or editing of the fire alarm programs as required to accommodate and facilitate expandability, building parameter changes or changes as required by the authority having jurisdiction.

.2 Fire alarm programs shall be written in an equation format comparable to ladder logic equations. The equations shall consist of input and output statements providing selective input/output control functions based on binary logic (and, or, not, timing) and other specially coded operational commands.

.3 Programming or editing a forty (40) character description label shall be made possible for any system monitor or control point. Extension of messages for any system point or group of points shall be field programmable.

.4 Assigning the same control point more than one level of control priority indifferent equations shall be possible to allow for automatic and/or manual override functions.

.5 The following conditions shall exist when disabling any part of the system.

.1 When a point has been disabled from the system it shall not disable the supervisory circuit for that zone. Tampering with the wiring of the disabled circuit shall initiate a point trouble condition at the Control Panel CPU.

.2 For an alarm received from any other monitor circuit which has not been disabled, the system shall operate as programmed.

.3 Whenever an initiating circuit has been disabled or disconnected a trouble condition shall be initiated and its location displayed at the main CPU and the monitoring control centre.

.6 All on-site programming or editing changes to the fire alarm system shall be password protected.

2.4 POWER SUPPLY

.1 The Control Panel is to contain the power supply for the entire system. 120 VAC, 60 Hz input, 24 VDC output from rectifier to operate alarm and signal circuits, with standby power of gel cell battery minimum expected life of four years, sized in accordance with OBC.

.2 The power supply unit must contain suitable over-voltage protection to prevent any malfunction or damage which might occur from line power surges.

.3 Upon loss of mains power, the power supply unit must contain suitable over-voltage protection to prevent any malfunction or damage which might occur from line power surges.

.4 When battery voltage drops below 22V, a fault indication is to be provided to indicate a battery fault condition.

.5 A visible and audible signal is to be generated to indicate that the control unit is operating under emergency power.

.6 The master fault indicator on the control unit is to be illuminated until power has been returned.

.7 When the AC power is restored, the control unit must automatically revert to normal operation without requiring any manual restarting procedures.

.8 Battery Charger shall be designed to suit the characteristics of the battery providing automatic boost charge facility when the battery bank potential falls

below acceptable voltage for maintaining a working system and return to float charge when the battery bank reaches maximum acceptable voltage.

.9 Automatic equalizing type battery charger must be rated to recharge to at least 70% within 12 hours, and to operate from 120V, 60 Hz, single phase input.

2.5 MANUAL PULL STATIONS

.1 All manual stations shall be addressable.

.2 Manual alarm stations: pull lever, break glass, wall mounted flush type, non-coded single pole normally open contact for single stage.

2.6 AUTOMATIC ALARM INITIATING DEVICES

.1 All automatic initiating devices to be addressable.

.2 Heat detectors, combination fixed temperature and rate of rise, non-restorable fixed temperature element, self-restoring rate of rise, fixed temperature 57°C, rate of rise 8.3°C per minute. Low profile type.

.3 Heat detector base to be compatible with smoke detectors.

.4 Smoke detector: ionization type

.1 Plug-in type.

.2 Wire-in base assembly with integral continuously lit red LED, when in alarm mode. Flashing or alarm pulsating is not acceptable.

.3 Base compatible with heat detectors.

.4 Low profile type.

.5 Duct type smoke detectors; ionization type addressable c/w remote indicating lamp.

.6 All devices to be low profile type.

2.7 ADDRESSIBLE INTERFACE MODULES

.1 Provide addressable interface modules to interface non-addressable devices to the addressable loop including kitchen fire suppression system.

.2 Actuated as a distinct and separate address for each supervisory device.

2.8 AUDIBLE/VISUAL SIGNAL DEVICES

.1 Red Flush Mount Housing

.2 Horns and Horn/Strobes with field adjustable Hi/Lo dB setting.

.3 Strobes and Horn/Strobes with field adjustable 15/30/75/110cd strobe output.

.4 Equivalent to Edwards Genesis Series Horns and Strobes.

.5 Provide protective wire cages in arena setting.

2.9 GRAPHIC ZONE MAP

.1 Provide a graphic zone map indicating the name and extents of each zone for installation adjacent to the main control panel and remote annunciator panel.

.2 Floor plan, graphic style at: 1:200 scale, include:

.1 Building Outline
.2 Entrance and exit locations.
.3 “You are here” indications.
.4 Zone Boundaries.
.5 North Arrow.
.6 Stairwells
.7 Elevators

.3 Construct graphic in black on white non-fade medium. (Do not use ink as it will fade).

.4 Address (Zone) wording to correspond to panel annunciator wording.

.5 Upper case mechanically printed lettering. Sized for each reading.

.6 Building orientation to suit exact building layout when viewed from front.

.7 Building outline and zone boundaries to be distinguished by line thicknesses, line types, etc.

.8 Set in polished metallic frame with mark resistant Lexan overall cover.

.9 Suitable for screw fixing to wall.

.10 Submit PDF copy of graphic drawing for Engineer's approval prior to manufacturing.

2.10 SPARE PARTS

.1 Provide the following spare parts:

.1 5 glass rods for pull stations

2.11 SYSTEM MANUFACTURES

.1 Acceptable manufacturers:

.1 Edwards
.2 Simplex

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install systems in accordance with CAN-ULC-S524.

.2 Install main control panel and connect to ac power supply, ac dc standby power. Install unit so that alphanumeric display is between 1500 mm and 1700 mm A.F.F.

.3 Locate and install manual alarm stations and connect to the addressable loop.

.4 Locate and install detectors and connect them to the addressable loop. Do not mount detectors within 1 m of air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors.

.5 Connect addressable loops to main control panel.

.6 Locate and install horns and strobes and connect to signaling circuits.

.7 Connect signaling circuits to main control panel. Alternate signal circuits within floor space (i.e. circuit 'A' device adjacent to circuit 'B' device)

.8 Locate and wire door releasing devices.

.9 Install all wiring for fire alarm system monitoring, control and communication circuits in conduit. Minimum conduit size shall be 21 mm. All wiring must be clear of shorts, opens and grounds on completion of installation. All wires must be clearly identified at all termination points.

.10 Ensure wire and cable are copper conductors with insulation rated at 300 V minimum, as follows:

.1 Fire alarm addressable circuits shall be #18 AWG twisted shielded pair. Maximum allowable length of run (wire distance) must not exceed 762 m.

.2 Signal circuit: 300 V 105°C PVC insulated copper conductors. Minimum conductor size #12 AWG. Voltage drop must not exceed the maximum permissible value recommended by the manufacturer.

.3 All wiring to be in conduit, unless otherwise specified on Contract Drawings.

.11 Ground panel and conduits.

.12 Provide connection to security system for remote monitoring of 'alarm' and 'trouble'.

.13 All Fire Alarm devices shall have both the device and its base labelled with p-touch to indicate building (if in a campus), floor, column line, device type. i.e. device labelled as T2-5-G3-SD would indicate tower 2, floor 5, column G3, smoke detector. This description should also be indicated at the annunciator and control panel.

.14 All fire alarm work is to be logged in at the main security station by the contractor, and shall indicate the location of the work, a description of the work, and the name of the contractor performing the work.

.15 The installation contractor shall notify the building owner of verification times, so the owner can include their maintenance contractor in review.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC S536.

.2 Fire alarm system:

.1 Test each device and alarm circuit to ensure manual stations, thermal and smoke detectors transmit alarm to control panel and actuate general alarm ancillary devices.

.2 Test to demonstrate correct operation of each interlock device, auxiliary device, and by-pass switches.

.3 Check annunciator panels to ensure zones are shown correctly.

.4 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of trouble signals and the capability for providing a subsequent alarm during any imposed single circuit fault condition (open, ground).

.5 Perform the system verification and certification per Clause 3.3 "Verification and Certification".

3.3 CERTIFICATION AND VERIFICATION

.1 Verify system to "CAN-ULC-S537".

.2 Verification is the responsibility of the manufacturer for testing the wiring in relation to field devices operation.

.3 To avoid unnecessary alarms during testing, the system's program shall be capable of being temporarily disabled to disconnect only the audible signals that are being tested. Re-enable the zones after the testing is performed at the end of the day.

.4 Inspect and test wiring to every device to verify the removal of the device or breaking the wire will cause a trouble condition at the Control Panel.

.5 Inspect all equipment installed as part of the system for visible damage or tampering which may be a potential problem with its intended operation.

.6 Activate each manual initiating device to verify and ensure their proper operation.

.7 Test each self-restoring heat detector utilizing a heat source to test the device operation.

.8 Test each ionization smoke detector. Detector operation shall be tested by introducing "smoke" into the detector head.

.9 Test all audible signals for proper operation. Tests shall be made to determine that the signal is audible throughout the area and above the normal ambient noise level.

.10 Verify all field wiring and terminate on a single conductor per terminals basis.

.11 Test system annunciators to ensure proper operation correct zoning and visibility of window inscriptions. All lamps and indicators shall be tested for proper operation.

.12 Test all control equipment for proper operation. Inspect and test all cable terminals, plug connectors, plug-in modules circuitry, lamp sockets and controls to confirm that their mechanical and electrical connections and mounting are acceptable to confirm their electrical supervision.

.13 Test ancillary equipment connections. Inspect such equipment to ensure that faults and malfunctions will not interfere with the alarm system.

.14 Test the following control functions for proper supervision, operation and annunciation.

.1 The Central station connection.

.15 Only make changes to the system program or zone identifications as approved by authorized personnel.

.16 Notify and demonstrate the complete system to Owner's representative and Building Inspection's representatives only after testing and verification performances has been completed and all deficiencies rectified. In their presence, demonstrate the proper functioning of the system. Have system manufacturer's certified technician present.

.17 Upon completion of the inspection and when all of the above conditions have been performed and complied with, the manufacturer shall issue to the Owner's representative the following:

.1 A copy of the inspection report identifying the location of each device and certifying the test results of each device.

.2 A certificate of verification confirming that the inspection has been completed and outlining the conditions upon which such an inspection and certification have been rendered.

.3 Proof of liability insurance for the inspection.

.18 All costs involved in this inspection for both the manufacturer's and the Contractor's work shall be included in the overall tender price.

3.4 VERIFICATION RECORDS

.1 Complete accurate records of the verification shall be maintained with the following requirements but not limited to:

.1 Show the date on which each device and equipment has been verified.

.2 Show the date of all deficiencies encountered in the control system equipment, wiring and field devices.

.3 Show the date when the deficiencies have been corrected and re-verified.

.4 Show dB levels measured during verification.

3.5 MONITORING COMPANY

.1 Arrange and pay for remote monitoring by an authorized (ULC listed) firm (approved by the Owner) for transmission of signals over leased line. Include one year of monitoring. Owner to pay for leased line.

.1 Owners approved vendor for this scope is:

R & M Security Solutions

305 River Valley Road, Quinte West, ON, K0K 3E0,

Canada

3.6 INTEGRATED SYSTEMS TESTING

.1 Following are tests required to show system integration with other systems. Initiate a fire alarm via a manual pull station verify the following:

.1 Alarm initiated.

.2 Elevators return to ground level.

.3 Signal sent to central alarm facility.

.4 Signal sent to security system.

.5 Alarm annunciates at fire control panel.

.6 Fire shutters release & close.

.7 Audible devices are operating.

.2 Verify connections to elevators. Coordinate all wiring and functionality with elevator system provider.

.1 Simulate activate of ground floor lobby smoke detector and verify that elevator returns to alternate floor.

END OF SECTION

PROCESS PIPING

PART 1 GENERAL

1.1 SUMMARY

.1 This section includes design, supply, fabrication, installation, testing, cleaning and placing into operation process piping systems including couplings, connections, expansion pieces, ancillary systems, and fittings.

1.2 GENERAL CLAUSES

.1 Comply with Division 01.

.2 Unless there are more restrictive requirements in respective Sections, provisions of this Section apply.

.3 Ensure that control panels and/or components provided as part of packaged equipment conform to requirements of the Specifications, Division 25 through 28 and Drawings.

.4 For control and electrical elements, use this Section in conjunction with the Drawings for conformance to style, quality, and product demonstrated and selected. Provide instrumentation and control devices as detailed in the Specifications and shown on the Drawings, including the Electrical Divisions 25 through 28.

.5 All equipment and controls to be CSA compliant and identified as such.

.6 Comply with laws, ordinances, rules, regulations, codes, and orders of authorities having jurisdiction relating to work.

.7 It is the Contractor's responsibility to ascertain from each Supplier the extent of work required for the complete installation of each piece of equipment, and to ensure that each Supplier has full knowledge of the required duty of the equipment to be installed.

.8 Be fully acquainted with all work under this Contract. At no time will any claim be considered due to misunderstanding of the work involved.

.9 Immediately upon receipt of the Start Work Order, issue a Purchase Order or Sub-Contract for designated equipment. Submit a copy of the Purchase Order or agreement to the Contact Administrator. Failure to order equipment in a timely fashion will not be considered as a reason to extend the Contract schedule.

1.3 SYSTEM DESCRIPTION

.1 It is the intent of all Sections of these Specifications to specify a complete and operating system that will perform its intended function(s). All devices, fittings,

valves and other appurtenances required to perform this function shall be considered as part of the Specifications, even if not explicitly identified.

.2 Design requirements:

.1 Provide heavy-duty mechanical equipment designed for continuous operation.

.2 Maximum vibration velocity (measured at equipment bearings): 1 mm/s.

.3 Co-ordination requirements:

.1 Equipment, such as pressure switches, may be shown on Process, Mechanical and/or Instrumentation Drawings. They may also be shown on Electrical Drawings due to wiring requirements. Provide these devices under Division 25, 26, and 44, respectively. Equipment and devices are wired according to the Electrical Drawings and Specifications.

.2 Coordinate requirements of equipment supplied with piping, structural supports, ventilation/cooling, electrical service, instrumentation and control interface, and other ancillaries specified in other Divisions.

1.4 REFERENCES

.1 American Society of Mechanical Engineers/American National Standards Institute:

.1 ASME Boiler and Pressure Vessel Code - Section VIII: Division 1.

.2 ASME B31.1 - Power Piping.

.3 ASME B31.9 - Building Services Piping.

.4 ASME/ANSI B16.1- Gray Iron Pipe Flanges and Flanged Fittings: Classes 25,125, and 250.

.5 ASME/ ANSI B16.5- Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.

.6 ASME B31.1 and B31.3 - Power Piping and Process Piping SET (B31.1-2007 Including 2008 and 2009 Addenda, B31.3-2008).

.7 ASME B32.1 - Metal Products.

.8 ANSI S1.13 - American National Standard Methods for the Measurement of Sound Pressure Levels In Air.

.2 Anti-Friction Bearing Manufacturers Association (AFBMA)

.3 ASTM International.

.1 ASTM A194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.

.2 ASTM C411- Standard Test Method for Hot-Surface Performance of

.3 High-Temperature Thermal Insulation.

.4 ASTM C335- Standard Test Method for Steady-State Heat Transfer Properties of Pipe Insulation.

.4 Canadian General Standards Board:

.1 CGSB 51-GP-52 MA-Vapour Barrier Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.5 Canadian Standards Association:

.1 CSA S244 - Welded Aluminum Design and workmanship (Inert Gas Shielded Arc Processes).

.2 CSA W47.1 - Certification of Companies for Fusion Welding of Steel Structures.

.3 CSA W47.22-M - Certification of Companies for Fusion Welding of Aluminum.

.4 CSA W59-M - Welded Steel Construction (Metal Arch Welding).

.5 Safety in Welding, Cutting and Allied Processes to be in accordance with CAN/CSA-W117.2.

.6 CSA Z107.56- Procedures for the Measurement of Occupational Noise Exposure.

.7 ANSI/CSA B149.6-15 Code for Digester Gas, Landfill Gas and Biogas Generation and Utilization Published 2015, as amended.

.8 ASTM A403, Wrought Austenitic Stainless Steel Piping Fittings.

.9 ASTM A312, Seamless and Welded Austenitic Stainless Steel Pipes.

.6 Manufacturer's Standardization Society

.1 MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation

.2 MSS SP-69 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

.7 Ontario Building Code

.8 Ontario Boilers and Pressure Vessels Act

.9 Standards Council of Canada/Compressed Gas Association

.1 CAN/CGA B149.6 - 15 Code for Digester Gas and Landfill Gas Installations (as amended).

.10 Technical Standards and Safety Authority (TSSA)

.1 TSSA Digester, Landfill & Biogas Approval Code TSSA-DLB-2016, as amended.

.2 TSSA, Pressure Vessels Branch.

1.5 CERTIFICATES

.1 Welding qualifications and procedures to be in accordance with CSA B51, TSSA, B31.1 and Section IX of the ASME Boiler and Pressure Vessels Code.

.2 Use qualified and licensed welders possessing Ontario certificates (TSSA) for each procedure to be performed.

.3 Each Welder will provide qualifications to Contract Administration including identification stamp issued by TSSA as well as provide welding procedures for review.

1.6 SUBMITTALS

.1 Shop Drawings:

.1 Submit shop drawings in accordance with Section 44 00 10 – Process General Requirements and Section 01 33 00 – Submittals.

.2 Piping systems, which transport fluids in excess of 35 degrees C, require plans and sectional views, or single line dimensioned isometrics, identifying movements due to thermal expansion and contraction. Locations of the expansion pieces, guides, and anchors, sway braces shall be identified. The resultant movements due to these thermal expansions and contractions shall be shown on the Shop Drawings.

.3 Provide details of expansion pieces including list of materials.

.4 Valve schedule and identification list.

.5 Sectional details of drains, traps, valves and valve operators including list of materials and current ANSI pressure-temperature ratings for valve bodies, seats and stem seals.

.6 Provide general layout of equipment including anchor bolt locations, direction of rotation for rotating equipment and electric motor terminal box locations.

.7 Cross-sectional details of equipment with complete materials test.

.8 For pumps, certified, non-witnessed characteristic curves of capacity versus head; efficiency; net positive suction head and power expressed in kilowatts.

.9 For fans and blowers at rated rpm and 110 percent of rated rpm, certified, non-witnessed characteristic curves of capacity versus static pressure (discharge pressure); efficiency and power expressed in kilowatts, noise and noise levels on the A weighted scale.

.10 Dimensional drawings of motors and details including full output power expressed in kilowatts, rpm and slip, motor nameplate details and motor test data where required.

.11 Instrument details.

.12 Control panel layouts.

.13 Electrical control schematics and loop diagram.

.2 Test Reports and Certificates

.1 Certified shop mechanical test run results for fans 10 m^3/s and larger or 37 kW and larger.

.2 Certified shop test results for pumps.

.3 Certified shop tests for electric motors.

.4 Manufacturer's representative signed report.

.5 Field test reports for piping systems.

.6 TSSA Inspection Report indicating conformance with CGA B105.

1.7 QUALITY ASSURANCE

.1 Welding procedure for stainless steel:

.1 All piping shall be subject to the visual examination requirements of the ASME/ANSI Code B31.1 and B31.3. A minimum sample of 5% of all welds shall be non-destructively examined as per requirements of ASME/ANSI B31.3 Normal Fluid Service. Non-destructive testing shall be paid for by the contractor.

.1 Should any weld fail the visual examination, the Contractor will be responsible to perform additional non-destructive radiographic testing up to an additional 10% of the piping system as selected by the Contract Administrator.

.2 Should any weld fail the radiographic testing, all welds made by the responsible welder will be tested at the expense of the contractor.

.2 The Contractor Administrator may, at their expense, test any weld completed on the project in addition to the welds tested as part of the contract requirements identified in this section. The contactor will be responsible to repair any failed weld and piping replacement depending on the extent and ability to make a satisfactory repair as determined by the Contract Administrator.

.3 Testing (to be completed in accordance with this section Part 3 - Execution):

.1 Give 24 hours written notice of date of tests.

.2 Insulate and/or conceal work only after testing is satisfactorily completed and witnessed.

.3 Conduct all tests in the presence of the Contract Administrator.

.4 Bear all costs of testing including retesting and correcting any deficiencies.

.5 Maintain test pressures for at least 4 hours unless otherwise specified.

.6 Leakage from pipes will be zero. No loss of pressure will be accepted.

.7 If leaks are detected in the pipe or any of the appurtenances connected thereto, make any necessary repairs and retest.

.8 Provide test equipment as required to complete testing per ANSI/ASTM B31.1 and B31.3.

.9 Prior to tests, isolate all equipment or other parts, which are not designed to withstand test pressures.

.10 Contractor shall document each individual test, including: test pressure, temperature, duration, date and time of day, test fluid, and signatures of Contract Administrator and Contractor’s

representatives who witnessed the test, identification of piping system tested. Contractor shall provide a test plan and schedule to Engineer at start of work. The format of these records shall be approved by the Contract Administrator prior to the commencement of any field pressure testing.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 All materials and products shall be managed in accordance with the Process General Requirements (Section 44 00 10).

PART 2 PRODUCTS

2.1 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 Supply the equipment complete in all respects including all other accessories and auxiliaries necessary to provide for a satisfactory installation.

.6 Where equipment is supplied with larger or smaller power requirements than that shown coordinate with the electrical requirements of Division 25 - 28 to ensure compatibility with electrical and control components so that a complete working system is in place without extra cost to the Contract.

.7 It is the Contractor’s responsibility to confirm the Electrical Rating and Area Classification required for all equipment installed within Division 44. The electrical rating shall be as per NFPA 820.

.8 All external piping and electrical connections to this equipment, and all concrete and foundation bases (excluding grouting and shimming) will be done under the respective Sections for such work.

.9 Install drains on bottom of horizontal pipe at low points in the piping system, drawings may not indicate all required drain points.

.10 Check dimensions associated with existing structures, equipment and piping in the field before fabrication and installation are started.

.11 Contractor shall coordinate with the operating authority for any tie-ins, shut-downs or other existing process interruptions required to carry out work.

.12 All piping materials, valves and appurtenances located within 2.0 meters of the top water level of all process tanks, vessels or reactors shall be fabricated in stainless steel.

.13 All piping materials and appurtenances including couplings (flanges, mechanical grooved end couplings, bolting, nuts, etc.) supports, valves and valve actuators submerged in liquids shall be stainless steel.

.14 The process drawings may not present all required couplings and expansion joints. The Contractor or coupling Supplier shall review the entire pipeline and configurations with pipe supports and submit their review for the Engineer's approval. As per the pipe stress analysis or coupling Supplier's recommendations, the pipe support locations and coupling/expansion joint type may be changed, but no extra cost to the Owner shall be permitted. unless additional couplings, expansion joints and supports are required ten (10) percent more than them shown on the process drawings. The process drawings, unless otherwise specified, do not present any required rigid coupling, but flexible couplings only.

.15 The Contractor shall provide the detailed piping layouts, sections and calculation sheets as the shop drawings stamped by professional engineer who shall coordinate the coupling installation with the coupling manufacturer. Present the fixed and sliding support locations with couplings on the layout for the Engineer's review.

.16 Provide one (1) flexible coupling at every 90-degree bends to allow for deflection.

.17 Provide flexible couplings where deflection would occur and one (1) rigid coupling within 1.0m from each valve and flanged instrument for maintenance.

.18 Maximum temperature variation of process and channel mixing air pipe from blower/compressor shall be 140°C (-30°C to 110°C) to calculate the maximum expansion/contraction in the pipeline considering 107°C± of blower discharge temperature. Assume that the temperature during the pipeline installation would be 0°C.

.19 One (1) pipe expansion joint shall be installed above structural expansion joint. Assume that there would be one (1) structural expansion joint every 20 m if the structural expansion joints are not shown on the process drawings with existing structures.

.20 Provide two (2) supports at both sides of a thermal expansion /contraction joint with 1.0 m spacing from the joint.

.21 Maximum temperature variation of water and sludge piping shall be in the range of 0°C to 10°C to calculate the maximum expansion/contraction in the pipeline.

2.2 TYPE 304 L STAINLESS STEEL (304SS)

.1 General

.1 ANSI/ASTM Rating: Class 150 FF

.2 Service Limits:

.1 1050 kPa at a temperature range of -40°C to 40°C.

.2 750 kPa at a temperature of 50°C

.2 Pipe

.1 Tubing: 6 to 12mm, Seamless stainless steel tube to A269 Grade TP 304.

.2 Size: 12 to 50 mm, TP 304L Schedule 40s with PE, fully annealed hydraulic tubing, electric fusion welded stainless steel, A312 TP 304L, Joint Eff. 0.80. Dimensions conforming to ANSI B36.19.

.3 Size: 65 to 600 mm, TP 304L Schedule 10s with BE, Electric fusion welded stainless steel, A312 TP 304L, Joint Eff. 0.80, with dimensions conforming to ANSI B36.19.

.4 All pipe shall be pickled and passivated as per ASTM 380.

.3 Nipple

.1 Size: 12 to 50 mm, TP304L Seamless stainless steel to A312 in 50, 80 and 100 mm lengths with ends as required. Use Schedule 80s for all threaded nipples, wall schedule to match pipe schedule for all plain and beveled end nipples.

.4 Swages

.1 Size: 19 to 150 mm, TP304L Seamless stainless steel to A3012. Use Schedule 80s for all threaded swages. Wall schedule to match pipe schedule for all plain and beveled end swages.

.5 Flanges (Welded)

.1 Size: 12 to 19 mm, TP 304L 150# Raised Faced socket welded stainless steel flanges to A182 Grade F304L.

.2 Size: 25 to 600 mm, TP 304L 150# Flat Faced stainless steel Lap joints, galvanized carbon steel A105 (unless located in a submerged or within 2m of the TWL location in which case the use of SS304L Lap joint is required), for use with stub ends.

.3 Stub Ends: 25 to 600 mm, Schedule 10s with beveled end, Lap-stubs, MSS Type A Short, A403 Gr. WP 304L.

.6 Flanges (Grooved)

.1 Size: 12 to 600 mm, TP 304L 150# Raised Faced stainless steel blind flanges to A182 Grade F304L.

.2 Size: 65 to 600 mm, Grooved-end to Flange adapter to accommodate proposed bolt hole pattern (ANSI B16.1 Cl. 125) to be Ductile Iron, or

Stainless steel if installed in submerged condition or within 2.0m of water level.

.7 Couplings

.1 Stainless Steel: Sizes 65 to 600 mm, grooved end cast type 304 stainless steel housing with EPDM gasket (Water) or Fluoroelastomer (Air). To be used where piping is submerged or within 2m of the TWL.

.2 Carbon Steel (C/S): Sizes 65 to 600 mm, grooved end cast type carbon steel housing with EPDM gasket (Water) or Fluoroelastomer (Air). Not to be used in submerged applications. Standard of Acceptance: Victaulic hot-dipped galvanized Style 07.

.8 Piping/Fitting Below Ground

.1 All underground stainless steel piping shall be wrapped with a petroleum based anti-corrosion tape.

.1 Anti-corrosion materials consisting of Denso Paste Primer or Priming Solution for cold temperature application, Denso Profiling Mastic or Mastic Blankets for profiling of irregular contours and Denso LT or Densyl tape, or approved alternative that complies with CSA Z-245-30, meets ISO 9001 and ISO 14001 and is CFIA Approved.

.2 Supplier Contact: Stuart Reece - Denso North America 416-291-3435, stuart@densona-ca.com, www.densona.com

.9 Fittings

.1 Sizes: 6 to 25 mm (O.D.), Type 316 stainless steel compression type fitting, Standard of Acceptance: Swagelok or approved equal.

.2 Sizes: 12 to 50 mm, Stainless steel socket weld 3000# stainless steel, A182, Grade F304L.

.3 Sizes: 65 to 600 mm, Schedule 10s stainless steel butt weld to A403 Grade WP 304L, ASME/ANSI B16.9.

.4 Sizes: 65 to 250 mm, Schedule 10s grooved end stainless steel to A403 Grade WP 304L. Standard of Acceptance: Victaulic hot-dipped galvanized Style 07.

.10 Unions

.1 Sizes: 12 to 50 mm, 150 # threaded 304 stainless steel unions, with dimensions to ANSI B16.3 for M.I. screwed fittings.

.11 Nuts and Bolts

.1 ASTM A-307 Grade B zinc chromate plated carbon steel heavy hexagonal head bolts. Type 316 stainless steel ASTM A-193 Grade B8 M (buried service, submerged service, outdoor service, or when installed within 2.0m of water level) with heavy hex nuts A194 Gr. 8.

.12 Gaskets

.1 3mm thick, full faced premium grade EPDM with punched holes to match class of flanges and fittings as required. Standard of Acceptance: Garlock 8314.

.13 Instrument Connections

.1

Connection	Pressure	Flow
Piping Connection	NPS 19 mm SW	NPS 12 mm FNPT
Instrument Connection	19 mm FNPT	NPS 12 mm FNPT
Block Valve	19 mm THD Ball Valve	12 mm THD Ball Valve
Temperature Instrument Connection: NPS 25 mm FNPT		

.2 Ball Valves: Threaded, Class 150 Ball Valve, bronze body, chrome plated stainless steel ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon Buna N seat with screwed ends and steel lever handle. Standard of Acceptance: Milwaukee BA-100, Valpres 171N.

.14 Needle Valves: 316 Stainless steel body with threaded ends, stem and bonnet, PTFE packing suitable for 6000# service. Standard of Acceptance: CFF/Needle Valve.

.15 Globe Valves: Cast iron construction, with flanged ends ANSI Class 125/150 to ASTM A126, Class B body, bronze trim and bronze disc. Standard of Acceptance: Crane Fig No. 351.

.16 Ball Valves: Cast 316 Stainless steel body, ASTM A351 Gr. CF8M, 316SS ball and stem, blow-out proof stem, reinforced PTFE seats, PTFE seals, 80 mm and smaller shall be lever operated 100 mm and larger shall be gear operated. Provide electric actuator where indicated. Standard of Acceptance: Neles-Jamesbury/7150-31-3600MTT-1 CFF 13

.17 Check Valves:

.1 Size: 12 – 50 mm, Check valve with bronze body to ASTM B62 with threaded bonnet, integral seat, renewable disc, swing type with bronze trim. Threaded or socket weld ends for Class 150 service. Standard of Acceptance: Crane/137, Nibco/T-433-B.

.2 Size: 65 – 200 mm, Dual plate wafer style check valve, Cast 316 SS body and disc to ASTM A351 Gr. CT8M, 316 SS trim, metal to metal seat, Inconel X spring. Standard of Acceptance: AMRI/2A66MR, Mueller/72-HHH-H-X, PMP 2025.

.3 Size: 65 – 200 mm, Ball style check valve with full faced flanged ends, nodular cast iron body c/w floating or sinking ball to match service. Metal core ball with nitrile rubber vulcanized coating. Bolted valve cover, 3mm (T) red rubber gasket, valves to be epoxy coated with 316SS Cover bolts,

rated to Class 125 service. Standard of Acceptance: GA Industries Figure 240-D, Xylem Flygt/HDL CV Type 5087.

.4 Size: 65 – 200 mm, Swing Check style check valve for low lift applications with full faced flanged ends, cast iron body bolted valve cover, weight and lever type with stainless steel shafts and double O-ring packings with grease fittings. Valves to be epoxy coated with 316SS Cover bolts, rated to Class 125 service. These valves shall be used for all sludge pipe services. Standard of Acceptance: Jenkins/477LJ, Pratt/Milliken Millcentric 801BBW, Apco 250.

.18 Butterfly Valves:

.1 Size: 65 to 510 mm, Resilient seated butterfly valve with offset disc and lug style body. Cast iron to ASTM A126 Class B body, 316 SS ASTM A743, Gr. CF-8M Disc, 316 SS ASTM A276 Shaft with EPDM seat. PTFE stainless steel coated bearing, EPDM shaft seal, 316 SS Trim, ANSI Class 125 lugged end connections. For sizes up to 65 mm supply with 10 position lever actuator, for sizes 80 mm and larger supply with manual gear actuator. Standard of Acceptance: Dezurick/BRS, *, I1, CI, EPDM, EPDM,S2,S2; BRAY 31-169; Val-Matic.

.19 Plug Valves:

.1 Sizes: 12 to 50 mm, Eccentric plug valve with cast iron body, resilient faced plug. Threaded ends to ANSI Class 150. Cast iron, ASTM A126 Class B body. 316L SS bearing, packing to be Buna-N filed TFE U-ring seal c/w neoprene plug facing. Lever actuator with SS bolting with grease fitting in body and externally adjustable packing. Standard of Acceptance: Val-Matic, Dezurik/PEC,*,T1,CI,NBR,CR,LV,SB,BXX005; Pratt/Milliken Millcentric 603E1.

.2 Sizes: 65 to 450 mm, Eccentric, full-port plug valve with cast iron body, resilient faced plug. Flanged ends to ANSI Class 125/150. Cast iron, ASTM A126 Class B body. 316L SS bearing and plug, packing to be Buna-N filed TFE U-ring seal c/w neoprene plug facing. Fusion bonded epoxy coating. Lever actuator with SS bolting with grease fitting in body and externally adjustable packing. Standard of Acceptance: Val-Matic, Dezurik/PEC,*,F1,CI,NBR, CR, GS-6-HD*,BXX003; Pratt/Milliken Millcentric 601N1AG.

.3 Sizes: 65 to 300 mm, Eccentric plug valve with cast iron body, resilient faced plug. Ends to be flexible grooved ends (Style 31). Cast iron, ASTM A126 Class B body. 316 SS plug, 316L SS bearing, packing to be Buna-N filed TFE U-ring seal c/w neoprene plug facing. Lever actuator with SS bolting with grease fitting in body and externally adjustable packing. Standard of Acceptance: Val-Matic, Dezurik/PEC, *,VF, CI, NBR, CR, LV, SB, BXX005; Pratt/Milliken Millcentric 606SSN1

.20 Knife Gate Valve: 304 SS Valve body and gate c/w EPDM resilient seals and lugged body to ANSI B16.5 Class 150. For valves 200 mm and smaller provide handwheel actuator. For valves 250 mm and larger provide a fully enclosed grease packed bevel gear actuator complete with 90 degree mitre with 50mm nut

and crank. Maximum operating pull on the manual operator at 350 kPa pressure differential shall be 180 N. Actuator: 50-200 mm provide handwheel, 250mm and larger prove 90 deg. Mitre actuator. Standard of Acceptance: Trueline, Dezurik/KCB, **Orbinox**, *,F1 (Lug Style), S1, TBP, S1, EPDM;

.21 Duckbill Check Valves

.1 All rubber construction (Neoprene, Buna-N, EPDM or Viton).

.2 Flat-bottom, eccentric design with slip-on end and 304SS (or 316SS) clamping ring.

.3 Valve to have ~~**curved bill**~~ flat-bottom.

.4 Manufacturer shall have a minimum of 10 years experience in the design and manufacture of a flat-bottom, ~~**curved bill**~~ duckbill check valve.

.5 Acceptable Manufacturer: Tideflex, **EVR**,

.22 Vent and Drain Valves: Bronze body, chrome plated stainless steel ball valve with PTFE teflon adjustable packing, brass gland and PTFE teflon Buna-N seat. Screwed or threaded ends to ANSI Class 150 c/w steel lever handle. Standard of Acceptance: Neles-Jamesbury/7150-31-3600MTT-CFF 13.

.23 Air Release Valves: Wastewater Combination Air Valves shall be single body, double orifice automatic float operated valves to AWWA C512, designed to exhaust large quantities of air during the filling of a piping system and close upon liquid entry. The valve shall open during draining or if a negative pressure occurs. The valve shall also release accumulated air from a piping system while the system is in operation and under pressure. The valve shall perform the functions of both Air Release and Air/Vacuum Valves and furnished as a single body or dual body type as indicated on the plans. The valve should be suitable for operation in wastewater applications. Body and cover material made of Ductile Iron ASTM A-536 grade 65-45-12 ductile iron. Valve body to have holiday free interior and exterior, holiday free, Fusion Bonded Epoxy Coating, applied at the manufacturer's facility in accordance with AWWA C550. Stainless steel or polycarbonate float. Working pressure range shall be minimum 75 kPa to 1,035 kPa (11psi to 150 psi). Threaded (NPT) intake and discharge ends. Size in accordance with drawings. Valve shall come complete with backwash accessories, which shall consist of an inlet shut-off valve, a blow-off valve, a clean water inlet valve, rubber supply hose and quick disconnect coupling. Standard of acceptance: DeZurik/APCO or Val-Matic, **Pratt, GA**

2.3 TYPE 316 L STAINLESS STEEL (316SS)

.1 General

.1 ANSI/ASTM Rating: Class 150 FF

.2 ANSI B36.19

.3 Service Limits:

.1 1050 kPa at a temperature range of -40°C to 40°C.

.2 750 kPa at a temperature of 50°C

.2 Pipe (Above ground)

.1 Tubing: 6 to 12mm O.D., Seamless stainless steel tube to A269 Grade TP 316 with a minimum USS #16 gauge. Fittings shall be of the mechanical compression type.

.2 Tubing: 12 to 25 mm O.D., Seamless stainless steel tube to A269 Grade TP 316 with a minimum USS #14 gauge. Fittings shall be of the mechanical compression type.

.3 Size: 12 to 50 mm, TP 316L Schedule 40s with plain ends, fully annealed hydraulic tubing, electric fusion welded stainless steel, A312 TP 316L, Joint Eff. 0.80. Dimensions conforming to ANSI B36.19. All threaded fittings shall be Class 3000 threaded end type and comply with ANSI B16.11.

.4 Size: 65 to 600 mm, TP 316L Schedule 10s with bevelled ends, Electric fusion welded stainless steel, A312 TP 316L, Joint Eff. 0.80, with dimensions conforming to ANSI B36.19.

.5 All pipe shall be pickled and passivated as per ASTM 380.

.3 Pipe (Buried/Below Ground)

.1 Size: 19 to 325 mm, TP 316L Schedule 40s with beveled ends. Electric fusion welded stainless steel, A312 TP 316L, Joint Eff. 0.80, with dimensions conforming to ANSI B36.19.

.2 Biogas Application

.1 For Biogas applications there shall be no buried fittings (threaded or flanged) permitted.

.2 All pipe to be continuously sloped to condensate drains and shall be installed having a minimum 2% slope.

.3 Pipe to be identified and colour coded in accordance with CSA B149.6 Section 8.7.

.4 Exterior piping stall be insulated as per Specification 44 05 40.

.5 No flexible connections, flanged couplings or otherwise shall be used in the below grade piping.

.6 Transition couplings shall be provided 1m from the building/foundation wall, connecting the interior piping and the exterior piping. The transition coupling shall be:

.7 Standard of Acceptance: Straub Grip L (SS 316 L) restrained coupling with SS 316 insert, **Arpol FIX Pro restrained Coupling complete with SS 316 insert as necessary**

.8

.3 All underground stainless steel piping shall be wrapped with a petroleum based anti-corrosion tape.

.1 Anti-corrosion materials consisting of Denso Paste Primer or Priming Solution for cold temperature application, Denso Profiling Mastic or Mastic Blankets for profiling of irregular contours and Denso LT or Densyl tape, or approved alternative that complies with

CSA Z-245-30, meets ISO 9001 and ISO 14001 and is CFIA Approved.

.2 Installation shall conform to manufacturers execution procedure.

.4 Nipple

.1 Size: 12 to 50 mm, TP316L Seamless stainless steel to A312 in 50, 80 and 100 mm lengths with ends as required. Use Schedule 80s for all threaded nipples, wall schedule to match pipe schedule for all plain and beveled end nipples.

.5 Swages

.1 Size: 19 to 150 mm, TP316L Seamless stainless steel to A3012. Use Schedule 80s for all threaded swages. Wall schedule to match pipe schedule for all plain and beveled end swages.

.6 Flanges (Welded)

.1 Size: 12 to 19 mm, TP 316L 150# Raised Faced socket welded stainless steel flanges to A182 Grade F316L.

.2 Size: 25 to 600 mm, TP 316L 150# Flat Faced stainless steel Lap joints for use with stub ends. Weld neck flanges are also acceptable.

.3 Stub Ends: 25 to 600 mm, Schedule 10s with beveled end, Lap-stubs, MSS Type A Short, A403 Gr. WP 316L.

.7 Flanges (Grooved)

.1 Size: 12 to 600 mm, TP 316L 150# Raised Faced stainless steel blind flanges to A182 Grade F316L.

.2 Size: 65 to 600 mm, Grooved-end to Flange adapter to accommodate proposed bolt hole pattern (ANSI B16.1 Cl. 125) to be Stainless steel.

.8 Couplings

.1 Stainless Steel: Sizes 65 to 600 mm, grooved end cast type 316 stainless steel housing with EPDM gasket (Water) or Fluoroelastomer (Air).

.9 Fittings

.1 Sizes: 6 to 25 mm (O.D.), Type 316 stainless steel compression type fitting, Standard of Acceptance: Swagelok or approved equal.

.2 Sizes: 12 to 50 mm, Stainless steel socket weld 3000# stainless steel, A182, Grade F316L.

.3 Sizes: 65 to 600 mm, Schedule 10s stainless steel butt weld to A403 Grade WP 316L, ASME/ANSI B16.9.

.4 Sizes: 65 to 250 mm, Schedule 10s grooved end stainless steel to A403 Grade WP 316L. Standard of Acceptance: Victaulic hot-dipped galvanized Style 07.

.10 Unions

.1 Sizes: 12 to 50 mm, 150 # threaded 316 stainless steel unions, with dimensions to ANSI B16.3 for M.I. screwed fittings.

.11 Nuts and Bolts

.1 ASTM A-307 Grade B zinc chromate plated carbon steel heavy hexagonal head bolts. Type 316 stainless steel ASTM A-193 Grade B8 M (buried service, submerged service, outdoor service, biogas service or when installed within 2.0m of water level) with heavy hex nuts A194 Gr. 8 to ANSI B18.2.1.

.12 Gaskets

.1 3.17 mm thick, full faced premium grade EPDM or Neoprene with punched holes to match class of flanges and fittings as required. Standard of Acceptance: Garlock 8314.

.13 Instrument Connections

.1

Connection	Pressure	Flow
Piping Connection	NPS 19 mm SW	NPS 12 mm FNPT
Instrument Connection	19 mm FNPT	NPS 12 mm FNPT
Block Valve	19 mm THD Ball Valve	12 mm THD Ball Valve
Temperature Instrument Connection: NPS 25 mm FNPT		

2.4 PVC PIPING (PVC-1)

.1 General

.1 This specification includes the PVC piping for process chemicals and other process related functions, refer to Division 33 for PVC in buried applications. Refer to ANSI B16.5 for service ratings and fitting dimensions.

.2 All PVC piping for water service shall be CSA-900 certified.

.3 Cutting and installation shall be in accordance with the manufacturers' recommendations.

.4 Solvent weld all piping contained within the PVC-1specification.

.2 Pipe

.1 Size: 12 to 200 mm, PVC Type 1, Grade 1 Schedule 80s Class 12454-B conforming to ASTM D1785 and CSA B137.3.

.3 Flanges

.1 Size: 12 to 200 mm, Socket welded PVC Schedule 80, ANSI/ASTM D2467, Class 12454-B with ratings and dimensions as per ANSI B16.5 Class 150 flange.

.4 Fittings

.1 Socket welded PVC Schedule 80, ANSI/ASTM D2467 Class 12454-B to ANSI B16.5.

.5 Unions

.1 Sizes: 12 to 65 mm, Socket welded PVC Schedule 80, ANSI/ASTM D2467 Class 12454-B, PVC Type 1 with Buna-N/Vitron/EPDM O-ring seal depending on service application.

.6 Nuts and Bolts

.1 Bolts: ASTM A-307 Grade B zinc chromate plated carbon steel heavy hexagonal head bolts, galvanized.

.2 Nuts: ASTM A-563 Grade A zinc chromate plated carbon steel heavy hexagonal head bolts, galvanized.

.7 Gaskets

.1 3mm thick, full faced premium grade EPDM with punched holes to match class of flanges and fittings as required. Standard of Acceptance: Garlock 8314.

.8 Instrument Connections

.1

Connection	Pressure	Flow
Piping Connection	NPS 19 mm SW	NPS 12 mm SW
Instrument Connection	NPS 19 mm FNPT	NPS 12 mm FNPT
Bleed Valve	NPS 19 mm Ball Valve SW x THD	
Block Valve	19 mm THD Ball Valve SW	12 mm Ball Valve SW x THD
Temperature Instrument Connection: NPS 25 mm FNPT		

.9 Ball Valves: SW, Class 150 Ball Valve, PVC true union ball valves c/w PTFE seats, Vitron seals, for sizes 25mm and smaller provide round handle operator, for sizes up to 150 mm provide lever operator. To be used for drain and venting applications. Standard of Acceptance: Nibco/Chemtrol U45TB-V, or Spears equivalent.

.10 Check Valves: PVC True union ball type check valve c/w PTFE seats, Vitron seals for Class 150 service. For sizes 25mm and smaller provide round handle operator, for sizes up to 150 mm provide lever operator. End connections as specified. Standard of Acceptance: Nibco/Chemtrol S/U 45BC-V, or Sprears equivalent.

2.5 TEFLON TUBING (PP1)

.1 Pipe: Sizes : 6 to 25 mm, Pure Teflon PFA tubing with a minimum wall thickness of 1.0mm, per ASTM D 6867-03. Service pressure: 1050 kPa; Service temperature: -40 °C to 40 °C. For Aluminum Sulfate, Sodium Hypochlorite and Sodium Bisulfate service.

.2 Fittings: Pure Teflon PFA fittings suitable for service pressure. Standard of Acceptance: ChemFlare.

2.6 POLYETHYLENE TUBING (PP2)

.1 Pipe: LDPE Tubing with a minimum wall thickness of 0.063mm.

.2 Fittings: Pure Teflon fittings suitable for service. Standard of Acceptance: Swagelok.

2.7 PUDDLE FLANGES AND PIPE SLEEVES

.1 Puddle flanges and sleeves shall be provided at locations where pipes pass through concrete, masonry or other structure shall be stainless steel type 304L Schedule 40s with an annular fin welded continuously at midpoint of pipe penetrations. The fin shall be constructed of 6.35mm steel plate (min.) and shall have diameters as follows:

.1 Pipe diameter: 75 to 300 mm; Puddle flange dia.: Pipe dia. plus 50 mm.

.2 Pipe diameter: 350 to 550 mm; Puddle flange dia.: Pipe dia. plus 100 mm.

.3 Pipe diameter: 600 and larger mm; Puddle flange dia.: Pipe dia. plus 150mm.

.2 Puddle flanges shall be provided with adequate clearances to suite the process arrangement and provide sufficient space for installation of the required connection. Flanges shall be the same specification as the piping.

.3 Sleeves shall be completed flush with the interior and exterior of the wall and extend 100 mm above the finished floor elevation. Sleeve sizing shall provide a minimum of 6 mm of annular space between the penetrating pipe and the sleeve. Where sleeve penetrate walls into process vessels, these are to be provided with modular mechanical seal.

.1 Modular Mechanical Seals: EPDM rubber seals c/w 316 SS hardware and reinforced nylon polymer pressure plates. Standard of Acceptance: LS-316 Link -Seal Modular Seal.

2.8 HEAT TRACING

.1 All electrical heat-tracing applications shall be designed to maintain the process temperatures of 10°C with an exposure temperature of -40°C) using self-regulating cables. As a minimum, the heat-tracing shall provide 80 mm pipe and smaller with

25 mm thick insulation, 4 watts/0.3 m, and 100 mm pipe and larger with 50 mm thick insulation, 8 watts/0.3 m.

.1 Self-regulating heating cable shall vary its power output relative to the temperature of the surface of the pipe or the vessel. The cable shall be designed such that it can be crossed over itself and cut to length in the field.

.2 Self-regulating heating cable shall be designed for a useful life of 20 years or more with “power on” continuously, based on the following useful life criteria:

.1 Retention of at least 75 percent of nominal rated power after 20 years of operation at the maximum published continuous exposure (maintain) temperature.

.2 Retention of at least 90 percent of nominal rated power after 1000 hours of operation at the maximum published intermittent exposure temperature. The testing shall conform to UL 746B, IEC 60216-1.

.3 A warranty against manufacturing defects for a period of 10 years shall be available.

.4 All cables shall be capable of passing a 2.2 kV dielectric test for one minute after undergoing a 1.0 kg-0.7 m impact (IEC/IEEE 60079-30-1:2015, clause 5.1.5.1).

.2 Process Temperature Maintenance

.1 The heating cable shall consist of two 16 AWG or larger nickel-plated copper bus wires, embedded in a self-regulating polymeric core that controls power output so that the cable has a temperature identification number (T-rating) of T4 (275°F or 135°C) without use of thermostats.

.2 A ground-fault protection device set at 30 mA, with a nominal 100-ms response time, shall be used to protect each circuit.

.3 The heating cable shall have a tinned copper braid wire with a cross-sectional area being equal to or greater than conductor cross-sectional area. The braid shall be protected from chemical attack and mechanical abuse by a fluoropolymer outer jacket.

.4 Standard of Acceptance: Raychem QTVR-CT self-regulating heater or approved equivalent.

.3 Terminations for Nonhazardous and Hazardous Class I, Div 2 Locations

.1 All connection kits used to terminate heating cables—including power connectors, splices, tees, and connectors—shall be approved for the respective area classification and approved as a system with the particular type of heating cable in use. Under no circumstances shall terminations be used which are manufactured by a vendor other than the cable manufacturer.

.2 In order to keep connections dry and corrosion resistant, connection kits shall be constructed of nonmetallic, electrostatic, charge-resistant, glass-

filled, engineered polymer enclosure rated TYPE 4X. The connection kit stand shall allow for up to four inches (100 mm) of thermal insulation.

.3 Terminals shall be the spring clamp wire connection type to provide reliable connection, maintenance-free operation, and ease of reentry.

.4 Heating cable terminations shall use cold-applied materials and shall not require the use of a heat gun, torch, or hot work permit for installation.

.5 Components shall be rated to a minimum installation temperature of –40°C, minimum usage temperature of –60°C, and maximum pipe temperature of 60°C.

.6 Standard of Acceptance: The connection kit system shall be Raychem JBM-100-L-A connection kit complete with integral LED power indicating light to serve as complete power, splice, or tee connection for up to three industrial parallel heating cables or approved equivalent.

2.9 FLEXIBLE ADAPTER COUPLINGS FOR UNDERGROUND APPLICATION

.1 Flexible couplings are to be fusion bonded epoxy coated carbon steel couples with ANSI 304 hardware. Gaskets for be compatible with contacting materials. To be sized to allow coupling of different OD piping in transition between pipe types. Standard of Acceptance: Robar 1506 or approved equivalent.

.2 Flanged to Plain End flexible sleeve type couplings:

.1 Type: Flanged cylindrical centre ring, companion flange, one follower ring, resilient gasket, and connecting bolts.

.1 Acceptable manufacturers:

.1 Robar 7808.

.2 Romac 501 & 400

.3 Blair Smith 400 Series

.4 GE Multi-Joint 3000 Plus to be used at Headworks to IPS Raw Sewage piping connection to splitter box.

.3 Provide necessary amount and appropriate size of restraining rods and gussets as recommended by manufacturer.

.4 Mechanical Joint Restraint Glands:

.1 Use flexible sleeve-type coupling with restraining rods (3 x 16mm dia. Minimum), and gussets welded to pipe. Provide sufficient restraint to resist pressure equal to twice system test pressure. Restraint Glands to be cast ductile iron Grade 70-50-5, compliant with AWWA/ANSI C110/A21.10/11. 16 mm set screws with knurled cup-point, 4140 steel, Rockwell ‘C’ scale 45-47.

.5 Do not use Type I flexible couplings in pipe systems which undergo thermal expansion and contraction; do not use these couplings at structural joints.

.6 Thrust Restraint:

.1 Provide hardened steel wedges that bear against and engage outer pipe surface, and allow articulation of pipe joint after assembly while wedges remain in their original setting position on pipe surface.

.2 Products employing set screws that bear directly on pipe will not be acceptable.

.3 Manufacturer and Product: EBAA Iron Sales Co.; Mega-Flange.

2.10 RIGID AND FLEXIBLE COUPLINGS FOR AIR, WATER AND SLUDGE PIPES

.1 Rigid couplings shall be required for maintenance of valves and flanged instruments; one (1) rigid coupling within 1.0m from each valve and flanged instrument for maintenance. Rigid couplings shall be also applied to the pipeline wherever the clearance for welding or flange connections is not sufficient.

.2 Flexible couplings shall be provided for the air, water and sludge pipes located inside the buildings to allow for deflection and minor axial movement.

.3 As the Contract Drawings may not present all flange or coupling connections, the Contractor shall determine the location of flange or coupling connections. Submit the shop drawing to present the connection type and locations.

Item	Size Range (mm)	Application	Description
Flexible Couplings	All sizes	Potable and non-potable lines	Victaulic Style 232S, 316L.
	All sizes	Process air AND sludge	Victaulic Style 77 and W77 c/w fusion bonded epoxy. W77 with AGS roll groove.
Rigid Couplings	40 mm to 500 mm	Potable and non-potable lines	Victaulic Style 489 and W489, 316L. W489 with AGS roll groove.
	600 mm & larger		Victaulic Style W89 c/w NSF approved coating. AGS roll groove.
	50 mm to 600 mm	Process air and sludge	Victaulic Style 89 and W89 c/w fusion bonded epoxy. W89 with AGS roll groove.
	750 mm and larger		Victaulic Style W07 c/w fusion bonded epoxy. AGS roll groove.
Coating on Couplings	All sizes	The colour of Fusion bonded epoxy to be similar to pipe colour.	

.4 Other acceptable products for couplings in addition those listed in the table above:

.1 Straub couplings may be acceptable for the process air, odorous air lines, water and sludge lines, but not for underground application.

.2 Refer to ~~**Section 11170 – Pipeline Pressure and Leakage Testing**~~ **44 01 27 Field Pressure Testing of Process Piping** to comply with the pressure requirements. 1.2 of safety factor shall be applied to test pressure.

.3 Straub axial restraint pipe couplings;

.1 No deflection nor axial movement.

.2 All component material shall be of stainless steel 316L.

.4 Straub (Straub-Flex) non-axial restraint pipe couplings;

.1 More Straub couplings and supports may be required to provide the required thermal axial movement. The Contract Drawings are developed based on Victaulic expansion joints.

.2 Those shall be furnished with a strip insert to allow for the required expansion. It is a distance between pipe ends, but required axial

movement. Refer to Clause 2.1.7.4 herein for expansion calculation.

.3 Allow for deflection and some axial movement.

.4 All component material shall be of stainless steel 316L.

.5 The Contractor and coupling Supplier shall confirm the gasket seal requirements for couplings; liquid and temperature.

.1 Potable and non-potable water lines:

.1 Grade “E” EPDM: UL Classified in accordance with NSF/ANSI/CAN 61 for cold and hot water service and NSF/ANSI/CAN 372 with temperature range of –34°C to +110°C

.2 Sludge lines

.1 Grade “E” EPDM: UL Classified in accordance with NSF/ANSI/CAN 61 for cold and hot water service and NSF/ANSI/CAN 372 with temperature range of –34°C to +110°C

.3 Sewer and raw wastewater lines

.1 Grade “T” Nitrile, flush seal type with temperature range of –29°C to +82°C

.4 Process lines

.1 Grade “L” Silicone: Dry heat, air without hydrocarbons and certain chemical services with temperature range of –34°C to +177°C

2.11 PIPE HANGERS, SUPPORTS, AND GUIDES

.1 Pipe connections to equipment shall be supported, anchored, and guided to minimize stresses and loads on equipment flanges and equipment. Supports and hangers shall comply with the requirements of Division 22 and/or as shown in the drawings. Hangers, supports, and guides shall be designed and installed in compliance with ANSI/ASME B31.3 and with MSS-SP-58, MSS-SP-69 and as shown in the drawings.

2.12 FLEXIBLE CONNECTORS AND DUAL PIPE COUPLINGS

.1 Flexible connectors shall be installed in piping connections to engines, blowers, compressors, and other vibrating equipment in accordance with the requirements of the ANSI B31.1. Flexible connectors shall be provided in all piping connections to engines, blowers, compressors, vibrating equipment, and where indicated. Flexible connectors for service temperatures up to 90 °C shall be flanged reinforced neoprene or butyl rubber spools, rated for working pressures of 275 to 1050 kPa or reinforced flanged rubberized duck, as best suited for the application. For temperatures above 90 °C, flexible connectors shall be flanged braided Type316 stainless steel spools with inner corrugated stainless steel hose rated for minimum 1050 kPa working pressure unless indicated otherwise. Connectors shall be minimum of 200 mm face to face between flanges. Material selection shall be proposed by the manufacturer based on the application.

.2 Dual pipe couplings, separated by an 18-inch pipe spool unless otherwise indicated, shall be installed on the suction and discharge of all pumps - inboard of the isolation valves. Dual pipe couplings, separated by not less than two pipe diameters nor more than 1.5m, shall be installed on all piping where it exits a structure. Couplings shall be restrained where required. Dual flexible pipe joints may be used where indicated in buried pipe applications in lieu of dual pipe couplings. Flexible connectors are not permitted where dual pipe couplings are specified.

.3 For Flexible Connection of standard lengths:

.1 Type 316L s/s braided, corrugated metal hose complete with Class 150 raised face stainless steel flanges.

.2 Maximum working pressure to be 1064KPa @ 177°C.

.3 Length: 300mm flange to flange, minimum live length of 216mm.

.4 Standard of Acceptance: Senior Flexonics model UFBX-1-16.

.4 For Flexible Connections requiring short lengths:

.1 Multi-ply stainless steel bellows complete with Class 150 SS316 flat faced flanges.

.2 Maximum working pressure to be 1446KPa @ 121°C.

.3 Overall face to face length to be 150mm for nominal pipe sizes of 50mm thru 200mm inclusive, and 200mm face to face for nominal pipe sizes of 250mm thru 350mm inclusive.

.4 Standard of Acceptance:Senior Flexonics model TCS-R.

.5 Expansion Joints

.1 Elastomer Bellows:

.1 Type: Reinforced molded wide arch.

.2 End Connections: Flanged, drilled Class 125 ASME B16.1 standard, with split galvanized steel retaining rings.

.3 Washers: Over retaining rings to help provide a leak-proof joint under test pressure.

.4 Thrust Protection: Control rods to protect the bellows from overextension.

.5 Bellows Arch Lining: Buna N, nitrile, or butyl.

.6 Rated Temperature: Suitable for intended service.

.7 Rated Deflection and Pressure:

.1 Lateral Deflection: 19 mm, minimum.

.2 Burst Pressure: Four times the working pressure.

.3 Maximum compression deflection and minimum working pressure as follows:

Size (mm)	Deflection (mm)	Pressure (kPa(g))

65 to 300	**27**	**1035**
350	**42**	**896**
400 to 500	**42**	**759**

.8 Manufacturers and Products:

.1 General Rubber Corp.; Style 1015 Maxijoint.

.2 Mercer Rubber Co; Flexmore Style 450.

.3 Goodall Rubber Company of Canada; Specification E 711.

.4 Unisource Manufacturing, Inc.; Series 1500.

.5 Proco Products, Inc.; Series 251.

.6 Teflon Bellows:

.1 Type: Three convolutions, with metal reinforcing bands.

.2 Flanges: Ductile iron, drilled Class 150 ASME B16.5 standard.

.3 Working Pressure Rating: Suitable for the intended service..

.4 Thrust Restraint: Limit bolts to restrain force developed by the specified test pressure.

.5 Manufacturers and Products:

.1 Garlock Inc. Sealing Technologies; Style 215.

.2 Crane Co. Resistoflex; No. R6905.

.3 Unisource Manufacturing, Inc.; Style 113,

.4 Proco Products, Inc.; Series 443.

.7 Metal Bellows:

.1 Type: Single-ply, annular corrugated metal bellows with limit rods. Circumferential convolution welds not permitted.

.2 Material: Type 316 stainless steel.

.3 End Connections: ASME Class 150 carbon steel flanges.

.4 Minimum Design Working Pressure: Suitable for the intended service

.5 Length: Minimum of four convolutions and the minimum recommended by the manufacturer for vibration isolation.

.6 Manufacturers and Products:

.1 Hyspan Precision Products, Inc.; Series 1500.

.2 **Senior Flexonics Inc**.

2.13 EXPANSION JOINTS FOR AIR, WATER AND SLUDGE PIPES

.1 Linear Expansion Only:

.1 Thermal Expansion/Contraction Joints: Victaulic Style 231S Non-Restrained flexible expansion coupling. Stainless steel 304 or 316L same

as pipe material. Shoulders and two (2) restraint rings for 400 mm and larger size couplings.

.2 Refer to Clause 2.10 for gaskets and alternatives.

.2 Linear, Angular, and Lateral Movement:

.1 Straub (Straub-Flex) non-axial restraint pipe couplings with strip inserts.

.2 Straub-Flex 1 & 2 couplings shall be installed on the air and sludge pipes between AGS tanks and operation building to allow for both axial movement and deflection. No alternative.

.3 Refer to Clause 2.10 for gaskets.

2.14 QUICK CONNECT

.1 Quick connectors shall be Kamlock type quick connectors, constructed of 316L stainless steel, seals to be compatible with piping service. Flanged ends for pipe connections DN 65 and larger, threaded ends for connections DN 50 and smaller.

.2 Provide female cap with chain for male end; male dust plug for each female end.

.3 Sizes: Line size as per drawings

.4 Pressure Rating: Suitable for the intended service

.5 Manufacturers and Products:

.1 OPW Engineered Systems Inc.; Kamlok.

.2 Ryan Herco Products Corp; 1300 Series.

.6

2.15 FLEXIBLE HOSE

.1 Rubber steel reinforced hose.

.2 Ends to have female Kamlock quick connect ends constructed of 316L stainless steel.

.3 Diameter: 50 to 250 mm.

.4 Pressure rating of the hose is have a Maximum pressure: 689 KPa (100 psi) and mush be adequate for suction applications.

.5 Length: As required to suit site conditions with adequate additional length to provide easy manipulation and handling of hose.

2.16 PRESSURE RELIEF VALVE

.1 Pressure relief valve for potable and non-potable water supply to equipment.

.2 Brass body construction, hardened 416 stainless steel piston, 50mm diameter (or size as indicated) NPT pipe connections, viton O-ring cap seal, and spring selected to achieve 30 psi overpressure at 100 GPM full bypass. Maximum flow to be 150 GPM.

.3 Standard of Acceptance: VSS Fulflo Pressure Relief Valve or Approved Equivalent.

2.17 ELECTRIC SOLENOID VALVES

.1 Gland Sealed Electric Solenoid Valves

.1 Electric solenoid valve for the provision of water to all pump gland seals and other locations as indicated..

.2 The solenoid valve shall be pilot operated diaphragm type solenoid valve having a brass body and resilient seat and operate with minimum operating pressure differential no greater than 70 kPa and maximum operating pressure differential no less than 680 MPa. Internal parts shall be corrosion-resistant. The solenoid valve shall have Class F molded coils for operation on 120 volts, 60-Hz, ac, unless otherwise indicated. The solenoid enclosure shall conform to NEMA 4X enclosure (non hazardous area) or NEMA 7 enclosure (hazardous area). Solenoids on double acting cylinders for open-close and throttling valves shall be four-way with dual coils.

.3 The solenoid valve shall be a 2 way normally open valve (open when de-energized).

.4 Standard of Acceptance: ASCO General service valve or Approved Equivalent.

2.18 PRESSURE REDUCING REGULATOR

.1 Pressure Reducing Regulator shall be spring operated, with epoxy coated carbon steel body and spring chamber, flow to open with internal pressure balancing piston-cylinder that provides high flow capacity and high pressure drop capacity.

.2 Standard of Acceptance: Kaye MacDonald (Cashco) Model DA1 Do-All Series 1 or Approved Equivalent.

2.19 LOW PRESSURE CONTROL VALVE

.1 Low Pressure Control Valve shall be a segment valve with 316SS flanged body, ANSI class 150, AISI 329 hard chrome plated segment, shafts, pins and bearing AISI 329SST & PTFE on 316SS net, PTFE V-Ring packing, stainless

steel metal seat with CoCr hard facing. Valve shall be supplied complete with spring diaphragm rotary actuator and intelligent valve controller.

.2 Standard of Acceptance: Segment Valve: Neles Model# RECA06CJJST, Spring Diaphragm Rotary Actuator: Jamesbury Quadra-PowrX Model #QPX4C/K40, Intelligent Valve Controller: Neles ND9000 Model # ND9106HU2Y w/ 2-line display visible through main cover and local interface for configuration and calibration.

2.20 SINGLE BRAIDED STANDARD PRESSURE HOSE

.1 Single braded standard pressure hose.

.2 Material to be SS321 Stainless Steel complete with FNPT connections.

.3 Size: 6 to 50 mm

.4 Length: As required to suite site conditions with adequate additional length to provide easy manipulation and handling of hose.

.5 Minimum hose working pressure: 2600 kPa.

.6 Standard of Acceptance: Senior Flexonics Series 101 hose braided stainless 321 hose or equivalent.

2.21 PIPE SLEEVES

.1 Steel Pipe Sleeve:

.1 Minimum Thickness: 4.7 mm.

.2 Seep Ring:

.1 Center steel flange for water stoppage on sleeves in exterior or water-bearing walls, 4.7 mm minimum thickness.

.2 Outside Diameter: Unless otherwise shown on the Contract Drawings, 80 mm greater than pipe sleeve outside diameter.

.3 Continuously fillet weld on each side all around.

.3 Factory Finish:

.1 Galvanizing:

.1 Hot-dip applied, meeting requirements of STM A153/A153M.

.2 Electroplated zinc or cadmium plating is unacceptable.

.2 Shop Lining and Coating: Factory prepare, prime, and finish coat in accordance with Section 09900 – Painting.

.2 Molded Polyethylene Pipe Sleeve:

.1 Molded HDPE with integral water stop ring not less than 80 mm larger than sleeve.

.2 Provided with end caps for support during concrete placement.

.3 Manufacturer and Product: Century-Line, Model CS sleeves as manufactured by PSI-Thunderline/Link-Seal Inc.

.3 Insulated and Encased Pipe Sleeve:

.1 Manufacturer and Product: Pipe Shields, Inc.; Models WFB, WFB-CS and -CW Series, as applicable.

.4 Modular Mechanical Seal:

.1 Type: Interconnected synthetic rubber links shaped and sized to continuously fill annular space between pipe and wall sleeve opening.

.2 Fabrication:

.1 Assemble interconnected rubber links with ASTM A276, Type 316 stainless steel bolts and nuts.

.3 Pressure plates shall be reinforced nylon polymer.

.4 Size: According to the manufacturer's instructions for size of pipes shown to provide a watertight seal between pipe and wall sleeve opening, and to withstand a hydrostatic head of 12 metres of water.

.5 Manufacturer: Thunderline Corp., Link-Seal Division.

2.22 MISCELLANEOUS SPECIALTIES

.1 Strainers, Water Service, 50 mm and Smaller:

.1 Type: Bronze body, Y-pattern, 1380 kPa nonshock rated, with screwed gasketed bronze cap.

.2 Screen: Heavy-gauge Type 304 stainless steel or Monel, 20-mesh.

.3 Manufacturers and Products:

.1 Armstrong International Inc.; Model F.

.2 Corix Water Products Inc. Model 351M.

.2 Strainers, Water Service, 65 mm and Larger:

.1 Type: Cast iron or ductile iron body, Y-pattern, 1200 kPa nonshock rated, with flanged gasketed iron cap.

.2 Screen: Heavy-gauge Type 316 stainless steel, 1.1 mm perforations.

.3 Manufacturers and Products:

.1 Armstrong International, Inc.; Model A1FL 125.

.2 Corix Water Products Inc. Model 751/752.

.3 Strainers, Plastic Piping Systems, 100 mm and Smaller:

.1 Type: Y-pattern PVC body, 1035 kPa non-shock rated, with screwed PVC cap and Viton seals

.2 End Connections: Screwed or solvent weld, 50 mm and smaller. Class 150 ANSI flanged, 65 mm and larger.

.3 Screen: Heavy-gauge PVC, 0.8 mm mesh, minimum 2 to 1 screen area to pipe size ratio.

.4 Manufacturer: Hayward Industries Inc.

.4 Pump Seal Water Sight Flow Indicator: 10 mm horizontal, ball action with tempered glass.

.1 Rated 860 kPa with NPT screwed ends.

.2 Operate with a minimum flow of 0.94 Litres/min.

.3 Manufacturers and Products:

.1 Eugene Ernst Products Co.; Series E-57-4.

.2 Jacoby Tarbox Co.

.5 Rotameters for seal water connection:

.1 Type: glass tube variable area rotameter.

.2 Tube: Borosilicate glass.

.3 Housing: Cast aluminum alloy with epoxy paint.

.4 Float: 316 stainless steel.

.5 Capacity: 8 litres per minute.

.6 Scale: 200 mm, detachable aluminum plate.

.7 Accuracy: ±2 per cent of full scale from 10 per cent to 100 per cent of scale reading

.8 Pressure rating: 2068 kPa

.9 Connections: Flanged ANSI Class 150.

.10 Manufacturers and Products:

.1 Brooks Instrument LLC; Model 1024

.2 or an approved equal

2.23 RESTRAINED JOINTS AND VALVES

.1 Where not expressly indicated on the Contract Drawings, thrust blocks shall be used for thrust restraint as per the latest revision of OPSD 1103.010, 1103.020.

.2 Valves shall also be restrained using the strap method of thrust restraint as per the latest revision of OPSD 1103.020.

.3 Pipe restraint, where indicated on the Contract Drawings, shall be provided by a system using wedges or gripping teeth. The system shall be specifically recommended by the restraint manufacturer for use on PVC, HDPE, and/or Stainless Steel pipe. Systems with set screws shall not be used.

.4 Minimum Pressure Rating: 1034 kPa(g).

2.24 VALVE BOXES

.1 Valve boxes to be 150 mm screw type.

.2 Valve boxes are to be grey iron, have a tensile strength of not less than 138 Mpa, and shall conform to CSA 61.

.3 The length of the valve box from the top of the connecting pipe to the ground shall be suitable to match the finish grading shown on the Drawings.

.4 Valve boxes are to be supplied with a guide plate to centre the bottom of the box on the valve.

.5 Supply with adjustable valve box and lid.

.6 Acceptable manufacturers:

.1 Bibby-Ste-Croix div. of Canada Pipe Co. Ltd.

.2 Sigma Valves Inc.

.3 **Mueller Flow Control Inc**.

2.25 YARD HYDRANTS

.1 Hydrants to be Zurn Z-1483, 40 mm diameter, non-freeze type post hydrant, with goldenized decorative aluminium shield and removable keys.

.2 Depth of burial from top of hydrant lead pipe to finished grade – 1800 mm.

PART 3 EXECUTION

3.1 INSTALLATION

.1 All piping systems and process appurtenances shall be fabricated, installed, inspected and tested according to the following:

.1 For all liquids: the Fabrication, Assembly and Erection shall be as per ASME B31.3 for Normal Fluid Service.

.2 For all air piping: Fabrication, Assembly and Erection shall be as per ASME B31.1 for Power Piping.

.3 For all biogas piping: Fabrication, Assembly and Erection shall be consistent with the requirements of CSA-B149.6-2022 as amended.

.4 All water distribution piping shall be installed as per Part 7 of the Ontario Building Code.

.5 All application specific installations shall meet the requirements of the applicable governing authority including the Technical Standards and Safety Authority (TSSA) and the specific regulations under TSSA (i.e. Boilers and Pressure Vessels Act, Digester, Landfill & Biogas Approval Code etc.).

.2 Installation General:

.1 Piping shall be cleaned of all foreign materials. If the piping is suspected of containing materials other than those required for testing, commissioning and operation, the Contractor will be responsible to drain and CCTV the pipe to confirm the internal condition.

.2 No backing rings will be allowable.

.3 Branch connections and reinforcing pads shall be as per section Chapter V of B31.3.

.4 Pipes, fittings, and appurtenances shall be installed in accordance with the manufacturer's installation instructions.

.5 Protect installed work from dust, contamination and damage from other construction activities prior to substantial completion. Cover open ended pipes following erection and until connections and terminations are complete. Provide appropriate care to new and existing piping, equipment, instrumentation and appurtenances to maintain their respective protective coatings, painting, and pickled/passivated surfaces from contamination during construction. Contactor shall be responsible to repair or replace damaged process piping and equipment as determined by the Contract Administrator.

.3 Connecting Dissimilar Piping System

.1 Provide dielectric fittings and/or adapting flanges and couplings to connect dissimilar metals such as steel and stainless steel.

.4 Drains

.1 Services: All.

.2 Horizontal pipes: 25 mm drains point with Schedule 40S Type 304L stainless steel NPS pipe, manual ball valve, nipple and a plug. Valves are supplied under this section. For piping smaller than 25 mm, provide drain and vents that are line size.

.3 Nipples shall extend 80mm beyond pipe insulation.

.4 Locations:

.1 Install drain point on bottom of horizontal pipe at low points in process piping system in order to drain the lines or equipment.

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

.5 Vents shall be provided at high points in the piping system to bleed off/purge air. Vents shall be constructed in the same manner as drains.

.6 Vents, Drains and Instrument connections shall be constructed using ‘Olets (Weldolets, Coupolet, Nipolet, Thredolet, etc.).

.7 Existing Pipe, Channel and Vessel Cleaning

.1 Flush existing pipe, channel and Vessels, 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 Complete all cleaning to the Contractors requirements, as per their Health and Safety Plan, in order to complete work.

.4 Submit cleaning procedures to Engineer for review well in advance of work.

.8 Cleaning

.1 Pipe cleaning: In accordance with Section 44 05 00 and Division 01.

.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 all 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.

.9 Pipe Sleeves and Wall/Floor Penetrations

.1 All sleeves, holes and pipe chases, penetrations in general through walls and floors shall be large enough to accommodate the thickness of insulation specified.

.2 Penetrations through fire separations shall be provided with adequate annular space for fire stopping. The integrity of the fire rating shall be maintained.

.3 The annular space between the pipe and sleeve shall be adequately sized to be sealed with Rockwool insulation and caulked with waterproof fire resistant non-hardening mastic.

.10 Field Testing

.1 All process pipe testing shall be completed in accordance with ANSI/ASTM B31.3 -Chapter VI, as applicable and ANSI/ASTM B31.1 for compressed air systems. Non-metallic piping shall be tested in accordance with B31.3 in adherence with the manufacturer’s rated capacities.

.2 The process piping system shall be completed by preparing the piping for testing in accordance with B31.3 Section 345.5.

.3 Biogas piping shall be tested in accordance with CSA B149.6-20.

.4 All instrumentation shall be removed prior to testing.

.5 All piping system valves and appurtenances not rated for the test pressure shall be removed or isolated prior to the test.

.6 The test shall be applied incrementally, air shall be purged during filling and the initial pressurization, equipment vents shall be opened to avoid pressure buildup beyond the testing segment.

.7 Following testing all piping systems shall be drained, all temporary blanks and temporary shall be removed. Disconnect all testing equipment.

.8 Repair all deficiencies as required and re-test.

.9 Reconnect all appurtenances and instruments that removed for testing.

.10 Replace all gaskets that where in-place for temporary blanks, blinds, etc.

.11 Return all valving to the normal operating condition.

.12 Clean all temporary strainers and other consumable items and install permanent items.

END OF SECTION

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

2/20/2025

AquaNereda® Aerobic Granular Sludge
Estimate of In-Basin Equipment Installation Time

Napanee ON

Project ID: 704419A Design #: DESIGN #

The following provides a preliminary estimate of installation hours for the in-basin equipment portion of the AquaNereda® AGS scope of supply. It excludes all equipment outside of the basin, including instrumentation, electrical, controls, yard piping, blowers, valves, etc. This estimate is based on several projects in which installation hours were provided by the installing contractor upon completion of work. Installation time can vary considerably based on specific site conditions, crew experience, site access, basin geometry and other factors. Therefore, this should be used as high-level guidance only and it is advised that detailed take-offs be conducted based on the plans provided during project development for the most accurate estimates. ***No guarantee shall be construed from this information which is provided for informational purposes only.***

DESIGN / COST BASIS

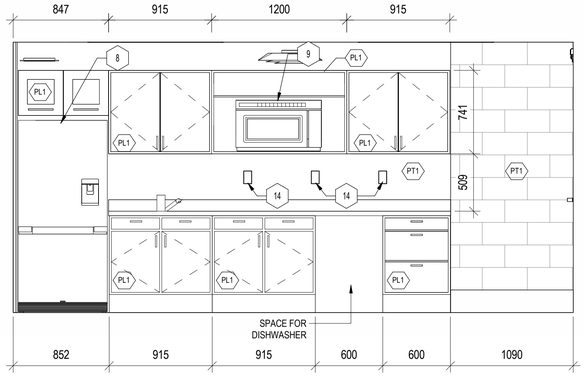
Reactor Qty	3	Location	Outdoor
Volume per reactor	3,533 m3	Reactor Geometry	Rectangular/Square
Total Process Volume	10,599 m3	Installation Type	Greenfield
		Application Type	Municipal

INSTALLATION HOUR ESTIMATE

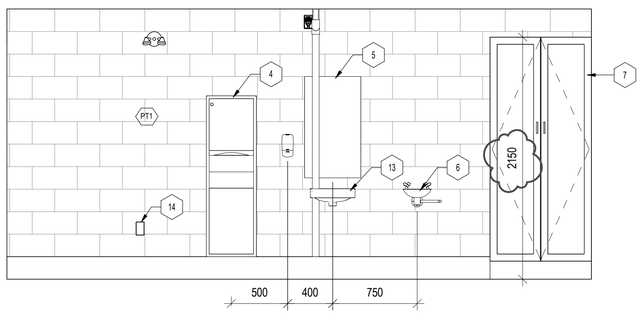
Item Description	HOURS PER BASIN	TOTAL HOURS
FFB Diffusers	221	662
Influent distribution grid	590	1,769
Sludge decant manifold	369	1,106
Effluent weirs and launders	291	874
TOTAL	**1,471**	**4,412**

CONFIDENTIAL

6306 N. Alpine Rd. Loves Park, IL 61111-7655 p 815.654.2501 f 815.654.2508 www.aqua-aerobic.com



5 A1401 LUNCH ROOM -NORTH ELEVATION
SCALE: 1 : 25



4 A1401 LABORATORY NORTH ELEVATION
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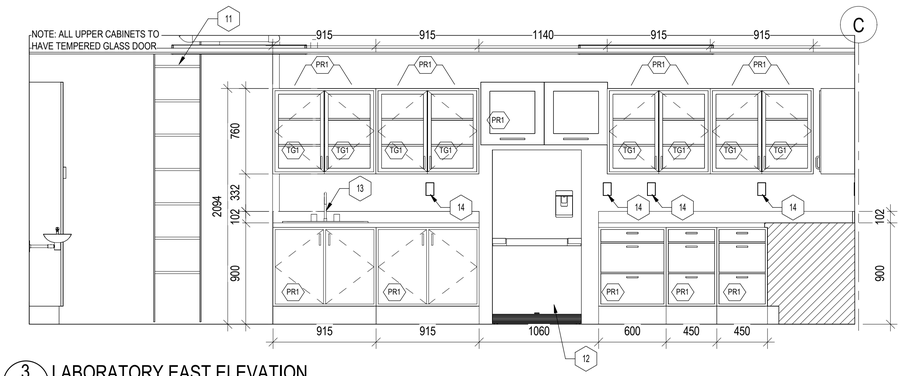

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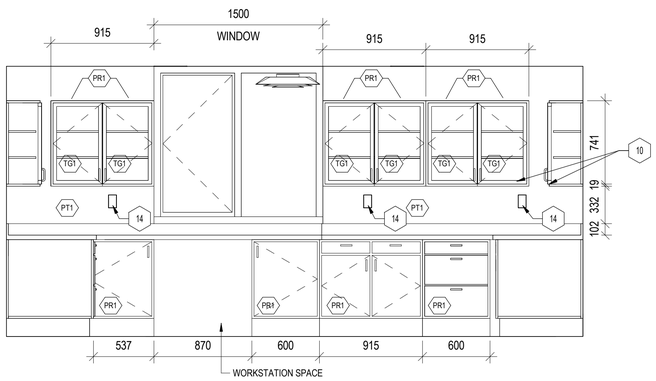

2 A1401 LABORATORY SOUTH ELEVATION
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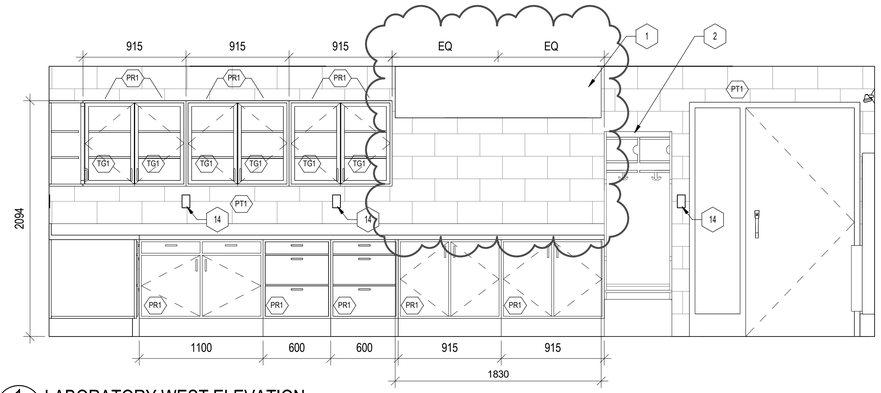


1 A1401 LABORATORY WEST ELEVATION
SCALE: 1 : 25

GENERAL NOTES

1. REFER TO ELECTRICAL DRAWINGS / SPECIFICATIONS FOR ALL QUANTITIES / LOCATIONS OF ELECTRICAL RECEPTACLES.
2. REFER TO MECHANICAL DRAWINGS / SPECIFICATIONS FOR ALL QUANTITIES / LOCATIONS OF MECHANICAL RECEPTACLES.
3. REFER TO INTERIOR ELEVATION DRAWINGS FOR ALL MILLWORK SCOPE / DETAILS.
4. UNLESS OTHERWISE INDICATED, LIGHTING TO BE CENTERED BETWEEEN INTERIOR PARTITIONS OF BOUNDING ROOM.
5. REFER TO A0004 & A0005 FOR ALL STANDARD DETAILS ASSOCIATED WITH WASHROOMS, INCLUDING BT NOT LIMITED TO: UNIVERSAL WASHROOM REQUIREMENTS, BARRIER FREE CLEARANCE REQUIREMENTS, TYPICAL MOUNTING HEIGHTS, ETC.
6. WHERE NO WALL FINISH HAS BEEN NOTED ON THE ELEVATIONS, THE WALL FINISH SHALL BE PAINT.

INTERIOR ELEVATION KEYNOTES

1. MECHANICAL HOOD (REFER TO MECHANICAL)
2. COAT RACK
3. N/A
4. PAPER TOWEL DISPENOR + WASTE RECEPTABLE
5. MIRROR
6. EYE WASH STATION (REFER TO MECHANICAL)
7. FULL HEIGHT CABINET 356MM DEEP COMPLETE WITH TYP. TOEKICK OF 102MM HIGH X 76 MM DEEP WITH ALL GLASS TEMPERED DOORS AND SHELVES AND DOORS AS SHOWN
8. FRIDGE
9. MICROWAVE
10. N/A
11. ROOF ACCESS HATCH
12. FREEZE N.I.C.
13. SINK (REFER TO MECHANICAL)
14. OUTLET / SWITCH (REFER TO ELECTRICAL)

INTERIOR FINISH LEGEND

- F1 SEALED CONCRETE
- PT1 PAINT (REFER TO SPECIFICATIONS FOR TYPE / COLOUR ETC.)
- TG1 TEMPERED GLASS
- PL1 PLASTIC LAMINATE
- PR1 PHENOIC RESIN

DATE	NO.	REVISION
2025/03/05	3	ISSUED FOR ADDENDUM No. A01
2025/01/23	2	ISSUED FOR TENDER
2024/08/23	1	ISSUED FOR ECA APPROVAL

CONSULTANT:
EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL:613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

SUB-CONSULTANT:
C2 Architecture
C2 Architecture Inc.
415 Baseline Road West
Bowmanville, ON L1C 5M2
☎ 905.697.4464

CLIENT:
Greater Napanee
GREATER FOR MANY REASONS

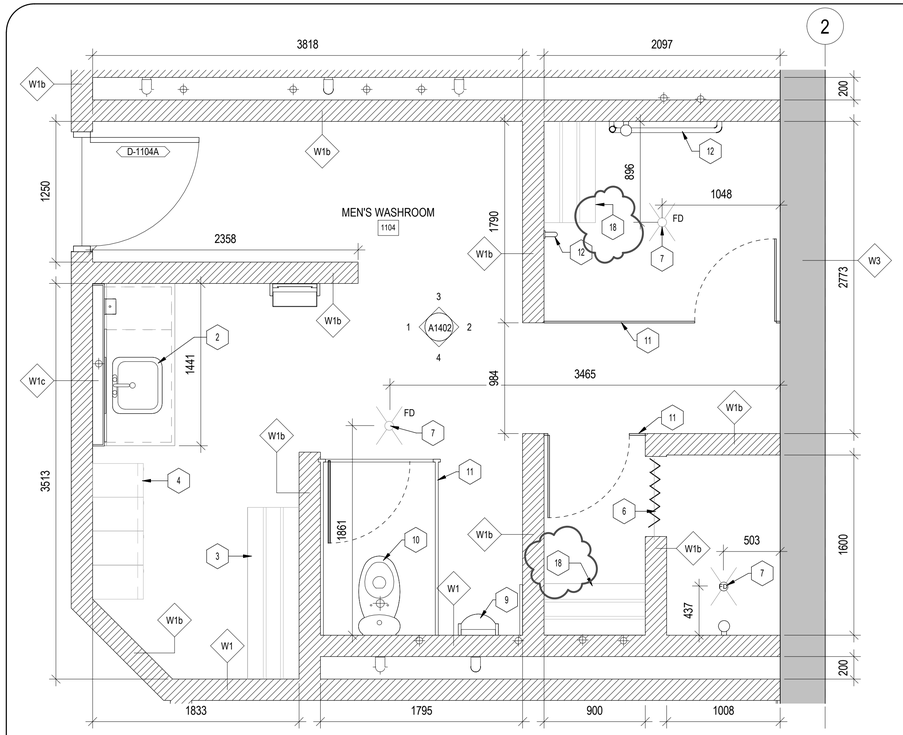
PROJECT:

NEW NAPANEE WPCP

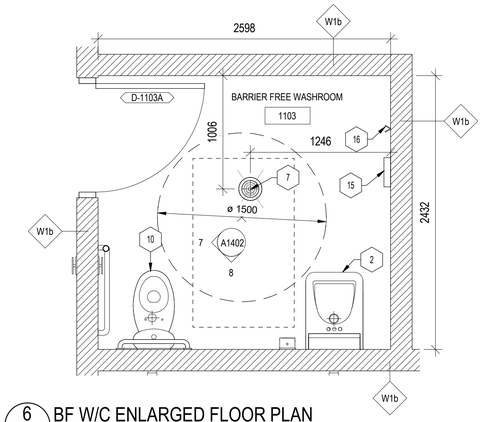
TITLE:

LABORATORY & LUNCH ROOM INTERIOR ELEVATIONS

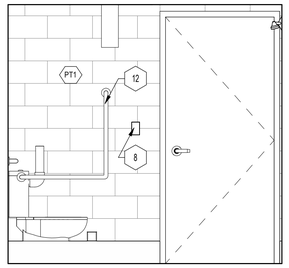
SCALE: 1 : 25	JOB NO: 22001
DESIGNED BY: LC	DATE: 2025/01/23
DRAWN BY: BB/CH	DRAWING NO. A1401
CHECKED BY: JS	



5 MEN'S WASHROOM ENLARGED FLOOR PLAN
A1402 SCALE: 1 : 25



6 BF W/C ENLARGED FLOOR PLAN
A1402 SCALE: 1 : 25



7 BF W/C WEST ELEVATION
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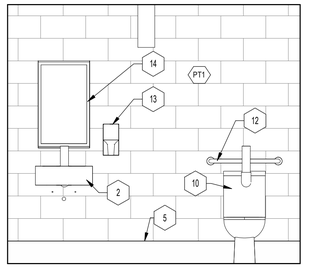
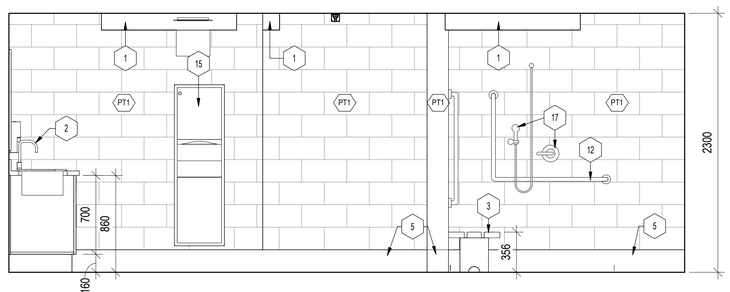
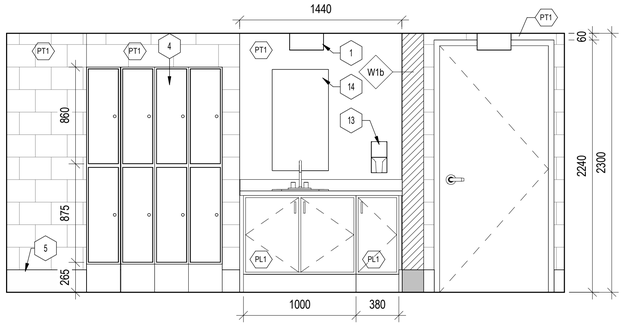


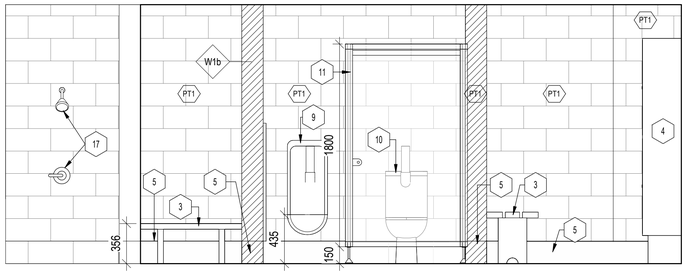
8 BF W/C SOUTH ELEVATION
A1402 SCALE: 1 : 25



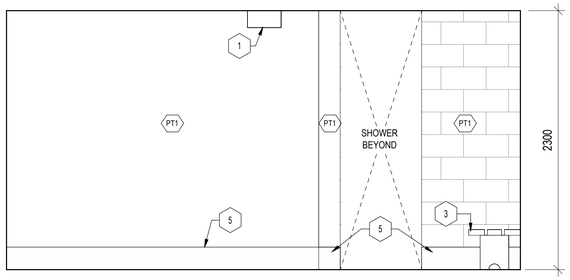
3 MEN'S WASHROOM NORTH ELEVATION
A1402 SCALE: 1 : 25



1 MEN'S WASHROOM WEST ELEVATION
A1402 SCALE: 1 : 25



4 MEN'S WASHROOM SOUTH ELEVATION
A1402 SCALE: 1 : 25



2 MEN'S WASHROOM EAST ELEVATION
A1402 SCALE: 1 : 25

GENERAL NOTES

1. REFER TO ELECTRICAL DRAWINGS / SPECIFICATIONS FOR ALL QUANTITIES / LOCATIONS OF ELECTRICAL RECEPTACLES.
2. REFER TO MECHANICAL DRAWINGS / SPECIFICATIONS FOR ALL QUANTITIES / LOCATIONS OF MECHANICAL RECEPTACLES.
3. REFER TO INTERIOR ELEVATION DRAWINGS FOR ALL MILLWORK SCOPE / DETAILS.
4. UNLESS OTHERWISE INDICATED, LIGHTING TO BE CENTERED BETWEEEN INTERIOR PARTITIONS OF BOUNDING ROOM.
5. REFER TO A0004 & A0005 FOR ALL STANDARD DETAILS ASSOCIATED WITH WASHROOMS, INCLUDING BT NOT LIMITED TO: UNIVERSAL WASHROOM REQUIREMENTS, BARRIER FREE CLEARANCE REQUIREMENTS, TYPICAL MOUNTING HEIGHTS, ETC.
6. WHERE NO WALL FINISH HAS BEEN NOTED ON THE ELEVATIONS, THE WALL FINISH SHALL BE PAINT.

WASHROOM KEYNOTES

1. LIGHTING (REFER TO ELECTRICAL)
2. SINK (REFER TO MECHANICAL)
3. LOCKER ROOM BENCH FURNITURE
4. LOCKERS
5. MASONRY WALL RESTS ON COCNRETE CURB (REFER TO STRUCTURAL)
6. SHOWER CURTAINS & RODS
7. FLOOR DRAIN (REFER TO MECHANICAL)
8. OUTLET / SWITCH (REFER TO ELECTRICAL)
9. URINAL TOILET (REFER TO MECHANICAL)
10. TOILET (REFER TO MECHANICAL)
11. TOILET / SHOWER PARTITION SCREEN
12. GRAB BAR (REFER TO DETAILS ON A0004 & A0005)
13. SOAP DISPENSER
14. MIRROR
15. HAND TOWEL DISPENSER
16. COAT HOOK
17. SHOWER ACCESSORIES (REFER TO MECHANICAL)
18. FOLD DOWN SHOWER SEAT (REFER TO DWG A0005)

INTERIOR FINISH LEGEND

- F1 SEALED CONCRETE
- PT1 PAINT (REFER TO SPECIFICATIONS FOR TYPE / COLOUR ETC.)
- TG1 TEMPERED GLASS
- PL1 PLASTIC LAMINATE
- PR1 PHENOIC RESIN

PLAN SYMBOLS LEGEND

- FD FLOOR DRAIN (REFER TO MECHANICAL)

DATE	NO.	REVISION
2025/03/05	3	ISSUED FOR ADDENDUM No. A01
2025/01/23	2	ISSUED FOR TENDER
2024/08/23	1	ISSUED FOR ECA APPROVAL

PROJECT NORTH

T.N. = TRUE NORTH

CONSULTANT:
EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL:613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

SUB-CONSULTANT:
C2 Architecture
C2 Architecture Inc.
415 Baseline Road West
Bowmanville, ON L1C 5M2
☎ 905.697.4464

CLIENT:
Greater Napanee
GREATER FOR MANY REASONS

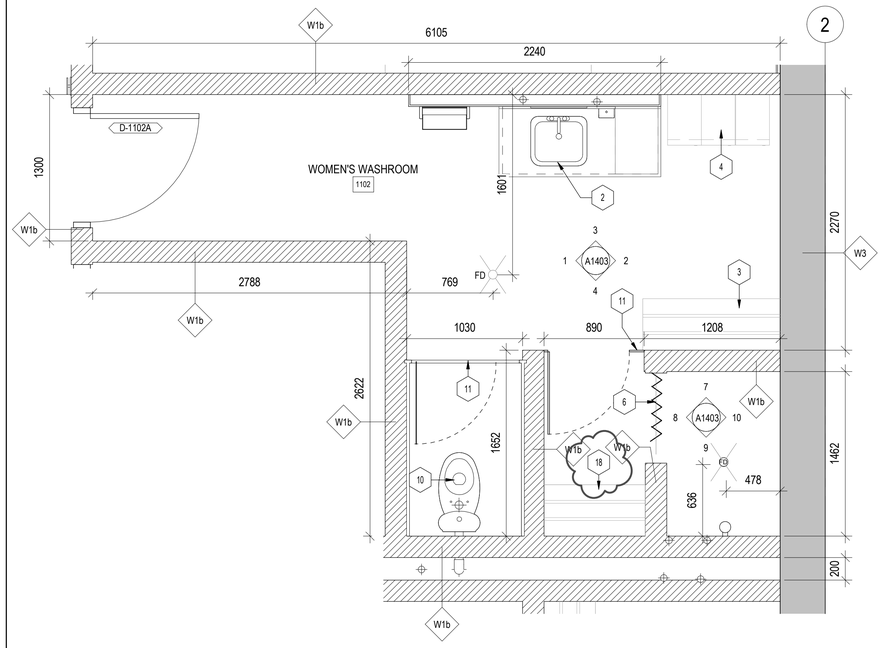
PROJECT:

NEW NAPANEE WPCP

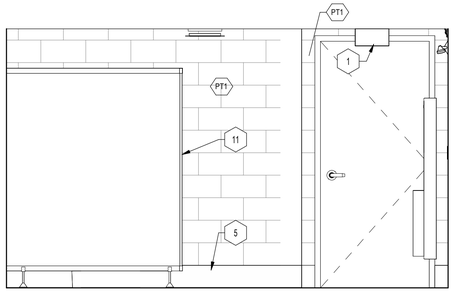
TITLE:

MEN'S & BF WASHROOM

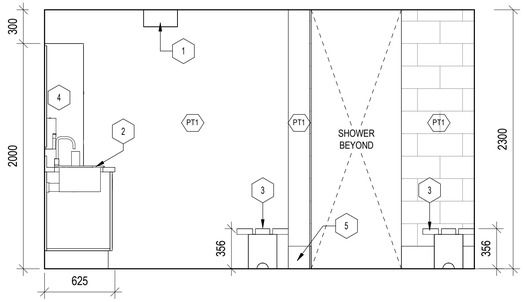
SCALE:	JOB NO:
As indicated	22001
DESIGNED BY:	DATE:
LC	2025/01/23
DRAWN BY:	DRAWING NO.
BB/CH	A1402
CHECKED BY:	
JS	



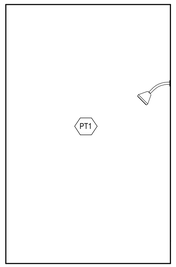
5 A1403 WOMEN'S WASHROOM ENLARGED FLOOR PLAN
SCALE: 1 : 25



1 A1403 WOMEN'S WASHROOM WEST ELEVATION
SCALE: 1 : 25



2 A1403 WOMEN'S WASHROOM EAST ELEVATION
SCALE: 1 : 25



10 A1403 SHWR EAST ELEVATION
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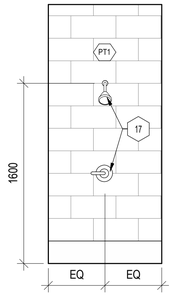
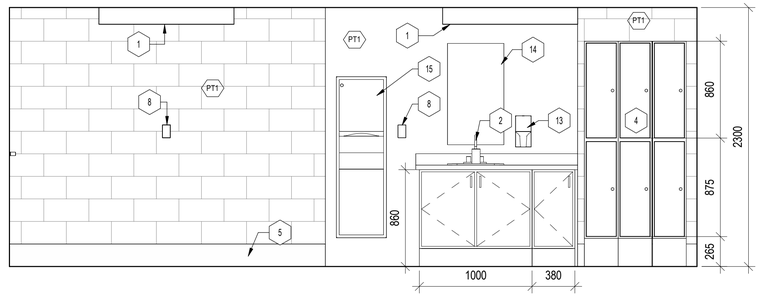


9 A1403 SHWR SOUTH ELEVATION
SCALE: 1 : 25



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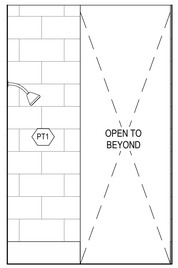
SCALE: 1 : 25



8 A1403 SHWR WEST ELEVATION
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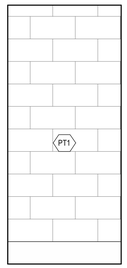

7 A1403 SHWR NORTH ELEVATION
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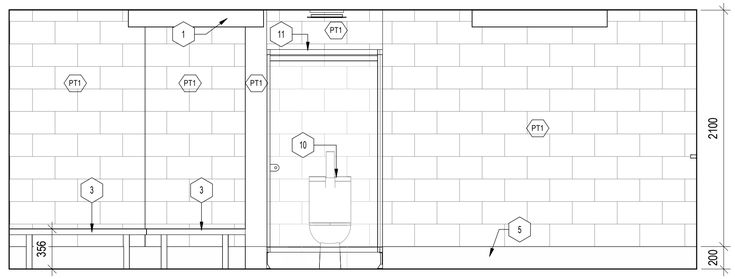


4 A1403 WOMEN'S WASHROOM SOUTH ELEVATION
SCALE: 1 : 25

GENERAL NOTES

1. REFER TO ELECTRICAL DRAWINGS / SPECIFICATIONS FOR ALL QUANTITIES / LOCATIONS OF ELECTRICAL RECEPTACLES.
2. REFER TO MECHANICAL DRAWINGS / SPECIFICATIONS FOR ALL QUANTITIES / LOCATIONS OF MECHANICAL RECEPTACLES.
3. REFER TO INTERIOR ELEVATION DRAWINGS FOR ALL MILLWORK SCOPE / DETAILS.
4. UNLESS OTHERWISE INDICATED, LIGHTING TO BE CENTERED BETWEEEN INTERIOR PARTITIONS OF BOUNDING ROOM.
5. REFER TO A0004 & A0005 FOR ALL STANDARD DETAILS ASSOCIATED WITH WASHROOMS, INCLUDING BT NOT LIMITED TO: UNIVERSAL WASHROOM REQUIREMENTS, BARRIER FREE CLEARANCE REQUIREMENTS, TYPICAL MOUNTING HEIGHTS, ETC.
6. WHERE NO WALL FINISH HAS BEEN NOTED ON THE ELEVATIONS, THE WALL FINISH SHALL BE PAINT.

WASHROOM KEYNOTES

1. LIGHTING (REFER TO ELECTRICAL)
2. SINK (REFER TO MECHANICAL)
3. LOCKER ROOM BENCH FURNITURE
4. LOCKERS
5. MASONRY WALL RESTS ON COCNRETE CURB (REFER TO STRUCTURAL)
6. SHOWER CURTAINS & RODS
7. FLOOR DRAIN (REFER TO MECHANICAL)
8. OUTLET / SWITCH (REFER TO ELECTRICAL)
9. URINAL TOILET (REFER TO MECHANICAL)
10. TOILET (REFER TO MECHANICAL)
11. TOILET / SHOWER PARTITION SCREEN
12. GRAB BAR (REFER TO DETAILS ON A0004 & A0005)
13. SOAP DISPENSER
14. MIRROR
15. HAND TOWEL DISPENSER
16. COAT HOOK
17. SHOWER ACCESSORIES (REFER TO MECHANICAL)
18. FOLD DOWN SHOWER SEAT (REFER TO DWG A0005)

INTERIOR FINISH LEGEND

- F1 SEALED CONCRETE
- PT1 PAINT (REFER TO SPECIFICATIONS FOR TYPE / COLOUR ETC.)
- TG1 TEMPERED GLASS
- PL1 PLASTIC LAMINATE
- PR1 PHENOIC RESIN

PLAN SYMBOLS LEGEND

- FD FLOOR DRAIN (REFER TO MECHANICAL)

DATE	NO.	REVISION
2025/03/05	3	ISSUED FOR ADDENDUM No. A01
2025/01/23	2	ISSUED FOR TENDER
2024/08/23	1	ISSUED FOR ECA APPROVAL

PROJECT NORTH
T.N. = TRUE NORTH

CONSULTANT:
EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL:613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

SUB-CONSULTANT:
C2 Architecture
C2 Architecture Inc.
415 Baseline Road West
Bowmanville, ON L1C 5M2
☎ 905.697.4464

CLIENT:
Greater Napanee
GREATER FOR MANY REASONS

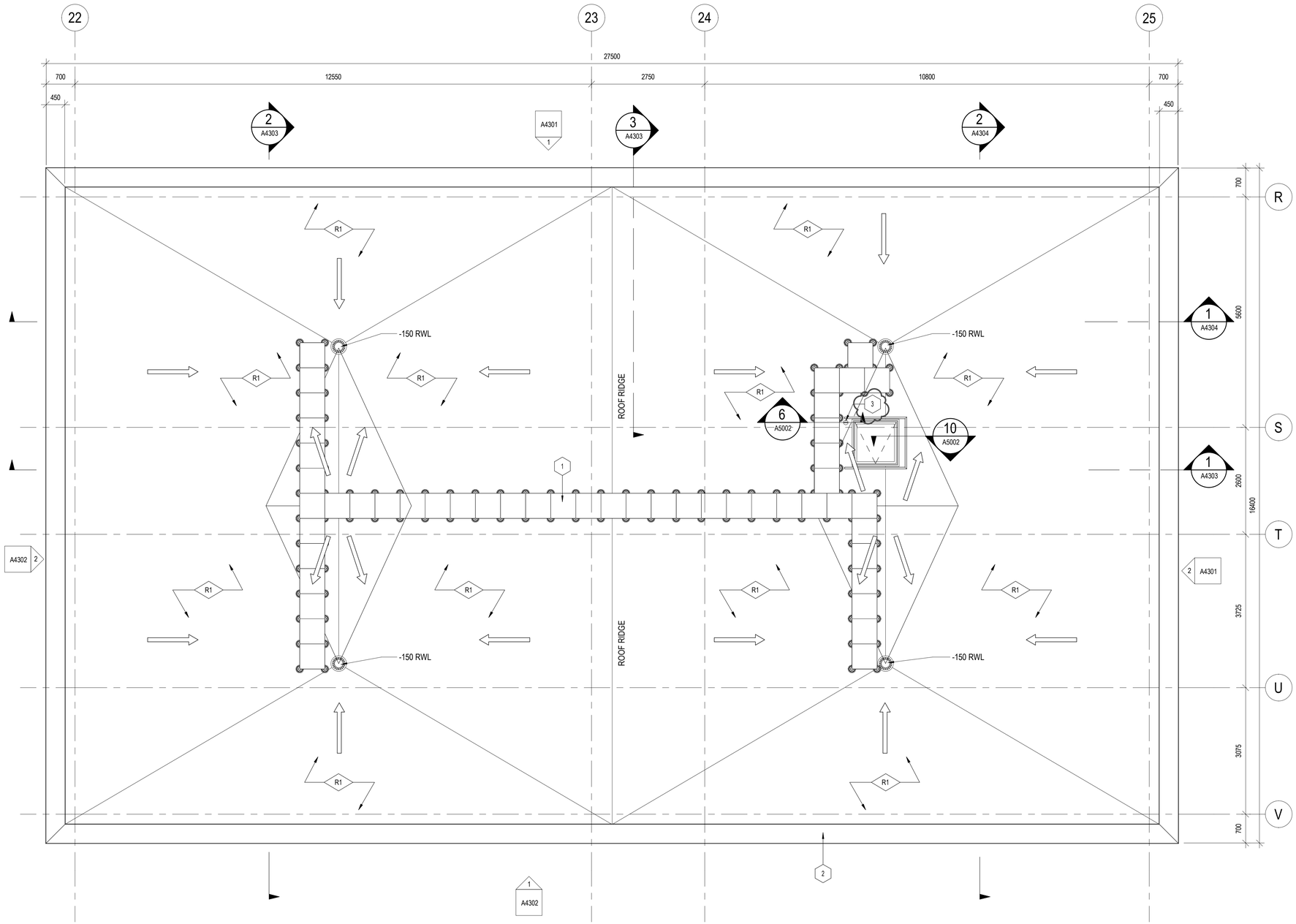
PROJECT:

NEW NAPANEE WPCP

TITLE:

WOMEN'S WASHROOM & TYP. SHOWER ELEVATIONS

SCALE: As indicated	JOB NO: 22001
DESIGNED BY: LC	DATE: 2025/01/23
DRAWN BY: BB/CH	DRAWING NO. A1403
CHECKED BY: JS	



PLAN GENERAL NOTES

1. REFER TO ELECTRICAL DRAWINGS/SPECIFICATIONS FOR ALL QUANTITIES/LOCATIONS OF ELECTRICAL RECEPTACLES.
2. REFER TO MECHANICAL DRAWINGS/SPECIFICATIONS FOR ALL QUANTITIES/LOCATIONS OF MECHANICAL RECEPTACLES.
3. REFER TO INTERIOR ELEVATIONS FOR ALL MILLWORK SCOPE/DETAILS.
4. UNLESS OTHERWISE INDICATED, LIGHTING TO BE CENTERED BETWEEN INTERIOR PARTITIONS OF BOUNDING ROOM.
5. ALL BULKHEAD WIDTHS SUBJECT TO SITE CONFIRMATION.
6. WHERE NO WALL FINISH HAS BEEN NOTED ON THE ELEVATIONS, THE WALL FINISH SHALL BE PAINT.
7. REFER TO ROOM FINISH SCHEDULE FOR FLOOR FINISHES
8. PLEASE NOTE, NOT ALL PLAN BASED EXTERIOR DETAILS ARE CALLED OUT IN THE PLANS. EXTERIOR DETAILS ARE LABELED TYP. WHERE THEY ARE TYPICAL. CONTRACTOR TO REVIEW ALL CONTRACT DOCUMENTS TO IDENTIFY QUANTITY AND LOCATION.
9. COORDINATE WITH MECHANICAL CONTRACTOR FOR LOCATION AND QUANTITY FOR LOCATION AND QUANTITY OF PLUMBING VENT. REFER TO VENT PENETRATION DETAIL 6 / A5002.

ROOF PLAN SYMBOLS LEGEND

- ROOF ACCESS HATCH
- WATER FLOW DIRECTION
- RAIN WATER LEADER
- CRICKETS FORMED BY TAPERED INSULATION
- ROOFTOP PEDESTAL PAVER SYSTEM

ROOF PLAN KEYNOTES

1. PRECAST CONCRETE PAVERS AND PEDISTALS
2. PREFININISHED METAL CAP LFASHING
3. ROOF ANCHOR, REFER TO STRUCTURAL

DATE	NO.	REVISION
2025/03/05	3	ISSUED FOR ADDENDUM No. A01
2025/01/23	2	ISSUED FOR TENDER
2024/08/23	1	ISSUED FOR ECA APPROVAL

PROJECT NORTH

T.N. = TRUE NORTH

CONSULTANT:
EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL:613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

SUB-CONSULTANT:
C2 Architecture
C2 Architecture Inc.
415 Baseline Road West
Bowmanville, ON L1C 5M2
☎ 905.697.4464

CLIENT:
Greater Napanee
GREATER FOR MANY REASONS

PROJECT:

NEW NAPANEE WPCP

TITLE:

TERTIARY / UV BUILDING ROOF PLAN

SCALE:	JOB NO:
1 : 50	22001
DESIGNED BY:	DATE:
LC	2025/01/23
DRAWN BY:	DRAWING NO.
BB / CH	A4103
CHECKED BY:	
JB	

ROOM FINISH SCHEDULE*

	ROOM NUMBER	ROOM NAME	FLOOR FINISH	RAMP TEST RATING	BASE FINISH	WALL FINISH				CEILING FINISH	COMMENTS
						NORTH	EAST	SOUTH	WEST		
HEADWORKS	1101	OFFICE	LIQUID HARDENER	R9	TP RUBBER	INT 9.2C	INT 9.2C	INT 4.2C	INT 4.2C	N/A	
	1102	WOMEN'S WASHROOM	LIQUID SEALER	R12	TP RUBBER	INT 4.2G	INT 4.2G	INT 4.2G	INT 4.2G	INT 4.2G	
	1103	BARRIER FREE WASHROOM	LIQUID SEALER	R12	TP RUBBER	INT 4.2F	INT 4.2F	INT 4.2F	INT 4.2F	N/A	
	1104	MEN'S WASHROOM	LIQUID SEALER	R12	TP RUBBER	INT 4.2G	INT 4.2G	INT 4.2G	INT 4.2G	INT 4.2G	
	1105	LABORATORY ROOM	LIQUID HARDENER	R9	TP RUBBER	INT 4.2G	INT 9.2L	INT 9.2L	INT 4.2G	N/A	
	1106	ELECTRICAL ROOM	EXPOSED	R9	NONE	EXPOSED	EXPOSED	EXPOSED	EXPOSED	NONE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	1107	MECHANICAL ROOM	EXPOSED	R9	NONE	EXPOSED	EXPOSED	EXPOSED	EXPOSED	NONE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	1108	LUNCH ROOM	LIQUID SEALER	R9	TP RUBBER	INT 4.2C	INT 4.2C	INT 4.2C	INT 9.2C	N/A	
	1109	LAUNDRY ROOM	LIQUID SEALER	R9	TP RUBBER	INT 4.2C	INT 4.2C	INT 4.2C	INT 3.1E	N/A	
	1110	JANITOR ROOM	LIQUID SEALER	R11	TP RUBBER	EXPOSED	EXPOSED	EXPOSED	EXPOSED	NONE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	1111	OFFICE	LIQUID HARDENER	R9	TP RUBBER	INT 9.2C	INT 4.2C	INT 4.2C	INT 9.2C	N/A	
	1112	VESTIBULE	LIQUID HARDENER	R9	TP RUBBER	INT 9.2C	INT 4.2C	NONE	INT 4.2C	N/A	
	1113	CORRIDOR	LIQUID HARDENER	R9	TP RUBBER	NONE	INT 4.2C	INT 4.2C	INT 4.2C	N/A	
	1201	HEADWORKS ROOM	HVY EPOXY SYSTEM 1	R11	HVY EPOXY SYSTEM 1	INT 3.1L	INT 3.1L	INT 3.1L	INT 3.1L	NONE	APPLY BASE FINISH TO 300mm AFF
	1202	ELECTRICAL ROOM	EXPOSED	R9	NONE	EXPOSED	EXPOSED	EXPOSED	EXPOSED	NONE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
OPERATIONS	3101	CONNECTING PASSAGE	LIQUID HARDENER	R9	N/A	INT 3.1L	INT 4.2	INT 3.1L / INT 4.2K	INT 3.1L	EXPOSED CONCRETE	
	3102	STAIR A	LIQUID HARDENER	R9	N/A	INT 4.2K	INT 3.1L	INT 3.1L	INT 3.1L	EXPOSED CONCRETE	
	3103	AGS PIPING GALLERY	LIQUID HARDENER	R9	N/A	INT 3.1L	INT 3.1L	INT 3.1L	INT 3.1L	EXPOSED CONCRETE	APPLY INT 4.2K TO EXTERIOR FACE OF MECHANICAL ROOM
	3104	MECHANICAL ROOM	LIQUID HARDENER	R9	N/A	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	3105	PIPING SERVICE AREA	LIQUID HARDENER	R10	N/A	INT 3.1L	INT 3.1L	INT 3.1L	INT 3.1L	EXPOSED CONCRETE	
	3106	DOSING TANKS	CHEM TYPE 3	R11	CHEM TYPE 4	INT 3.1L	INT 3.1L	INT 4.2K	N/A	EXPOSED CONCRETE	BASE FINISH TO 300mm AFF
	3201	WAS THICKENER ROOM	CHEM TYPE 3	R11	CHEM TYPE 4	INT 3.1L	INT 4.2K	INT 4.2K	INT 3.1L	EXPOSED CONCRETE	BASE FINISH TO 1000mm AFF
	3202	ELECTRICAL ROOM	LIQUID HARDENER	R9	N/A	INT 4.2K	INT 4.2K	INT 4.2K	INT 3.1L	EXPOSED CONCRETE	
	3203	BLOWER ROOM	LIQUID HARDENER	R9	N/A	INT 4.2K	INT 3.1L	INT 3.1L	INT 3.1L	EXPOSED CONCRETE	
	3204	STAIR A	LIQUID HARDENER	R9	N/A	INT 3.1L	INT 3.1L	INT 3.1L	INT 3.1L	EXPOSED CONCRETE	
	3205	CORRIDOR	LIQUID HARDENER	R9	N/A	INT 3.1L	INT 3.1L	INT 4.2K	INT 4.2K	EXPOSED CONCRETE	APPLY INT 4.2K TO NORTH FACE OF CMU ALONG CORRIDOR LENGTH
TERTIARY	4001	FILTER ROOM	LIQUID HARDENER	R9	N/A	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	4101	UV ROOM	LIQUID HARDENER	R9	N/A	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	4102	LOADING BAY	LIQUID HARDENER	R11	N/A	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	4103	STORAGE	LIQUID HARDENER	R9	N/A	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	4104	ELECTRICAL ROOM	LIQUID HARDENER	R9	N/A	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	4105	STAIRS	LIQUID HARDENER	R9	N/A	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH
	4201	MEZZANINE	LIQUID HARDENER	R9	N/A	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	EXPOSED CONCRETE	ALL EXPOSED CONCRETE WALLS TO HAVE SACK-RUBBED FINISH

DOOR SCHEDULE*

	DOOR NUMBER	FROM ROOM NO.	TO ROOM NO.	PANEL					FRAME			HARDWARE GROUP	FIRE RATING	STC RATING	ELECTRIFICATION	HEAD DETAIL	JAMB DETAIL	SILL DETAIL	COMMENTS
				WIDTH	HEIGHT	TYPE	MATERIAL	FINISH	TYPE	MATERIAL	FINISH								
HEADWORKS	D-1101A	1113	1101	965	2190	A	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	N/A	-		6 / A0002	5 / A0002	-	
	D-1102A	1113	1102	965	2190	A	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	N/A	-		6 / A0002	5 / A0002	-	
	D-1103A	1113	1103	965	2190	A	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	N/A	-	PO	6 / A0002	5 / A0002	-	
	D-1104A	1113	1104	965	2190	A	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	N/A	-		6 / A0002	5 / A0002	-	
	D-1105A	1113	1105	965	2030	C	HM	PT-INT 5.3D	1	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	1.5 HR	-		6 / A0002	5 / A0002	-	
	D-1106A	1113	1106	965	2190	A	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	45 MIN	-		6 / A0002	5 / A0002	-	
	D-1107A	1113	1107	965	2190	A	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	45 MIN	-		6 / A0002	5 / A0002	-	
	D-1108A	1113	1108	965	2190	C	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	N/A	-		6 / A0002	5 / A0002	-	
	D-1109A	1113	1109	965	2190	A	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	45 MIN	-		6 / A0002	5 / A0002	-	
	D-1110A	1113	1110	965	2190	A	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	45 MIN	-		6 / A0002	5 / A0002	-	
	D-1111A	1113	1111	965	2190	D	HM	PT-INT 5.3D	5i	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	N/A	-		6 / A0002	5 / A0002	-	
	D-1112A	1112	EXTERIOR	965	2030	C	HM	PT-EXT 5.3D	1g	HM	PT-EXT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	N/A	-	CR, PO, ES	5 / A5001	7 / A5001	4 / A5001	
	D-1112B	1113	1112	965	2030	C	HM	PT-INT 5.3D	2i	HM	PT-INT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	N/A	-	PO	6 / A0002	5 / A0002	-	
	D-1113A	1113	EXTERIOR	965	2030	D	HM	PT-EXT 5.3D	1g	HM	PT-EXT 5.3D	CL1, H1, E01, DS2, TH1, DT1, WS1	45 MIN	-	CR, ES	5 / A5001	7 / A5001	4 / A5001	
	D-1201A	1201	EXTERIOR	965	2030	D	FRP	TH-COL	1g	FRP	TH-COL	CL1, DC1, FB1, H1, E01, DS2, TH2, DT1, WS1	N/A	-	CR, ES	5 / A5001	7 / A5001	4 / A5001	
	D-1201B	1201	EXTERIOR	965	2030	A	FRP	TH-COL	1g	FRP	TH-COL	CL1, H1, E01, DS2, TH2, DT1, WS1	1.5 HR	-	CR, ES	5 / A5001	7 / A5001	4 / A5001	
	D-1201C	1201	EXTERIOR	3000	3000	E	SS	NONE	1r	SS	NONE	CL1, H1, TH2, DT1, WS1/WS2	N/A	-	PO	8 / A5001	8 / A5002	7 / A5001	
	D-1202A	1202	EXTERIOR	965	2030	B	HM	PT-EXT 5.3D	4g	HM	PT-EXT 5.3D	AS1, CL1, DC1, FB1, H1, E01, DS2, TH2, DT1, WS1	45 MIN	-	CR, ES	5 / A5001	7 / A5001	4 / A5001	
OPERATIONS	D-3101A	EXISTING	3101	915	2140	D	HM	PT-INT 5.3D	4i	HM	PT-INT 5.3D	CL1, H1, DS2, TH2, DT1, WS1	1.5 HR	-		5 / A3305	4 / A3101	-	
	D-3102A	3101	3102	915	2140	D	HM	PT-INT 5.3D	4i	HM	PT-INT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	45 MIN	-		6 / A0002	5 / A0002	-	
	D-3102B	3102	EXTERIOR	965	2030	A	HM	PT-EXT 5.3D	3i	HM	PT-EXT 5.3D	CL1, H1, E01, DS2, TH2, DT1, WS1	N/A	-		5 / A5001	7 / A5002	4 / A5001	
	D-3103A	3103	3101	965	2030	D	FRP	TH-COL	1e	FRP	TH-COL	AS1, CL1, DC1, FB1, H1, E01, DS2, TH2, DT1, WS1	N/A	-		8 / A0002	7 / A0002	-	
	D-3103B	3103	EXTERIOR	3000	3000	E	HM	PT-EXT 5.3D	1r	HM	PT-EXT 5.3D	CL1, H1, TH2, DT1, WS1/WS2	45 MIN	-	PO	8 / A5001	8 / A5002	7 / A5001	
	D-3103C	3103	EXTERIOR	965	2030	D	HM	PT-EXT 5.3D	3i	HM	PT-EXT 5.3D	CL1, H1, E01, DS2, TH2, DT1, WS1	45 MIN	-	CR, ES	5 / A5001	7 / A5002	4 / A5001	
	D-3103D	3103	3105	940	2340	B	FRP	TH-COL	7i	FRP	TH-COL	CL1, H1, E01, DS2, TH2, DT1, WS1	45 MIN	-		8 / A0002	7 / A0002	-	
	D-3103E	3103	3105	940	2340	B	FRP	TH-COL	7i	FRP	TH-COL	CL1, H1, E01, DS2, TH2, DT1, WS1	45 MIN	-		8 / A0002	7 / A0002	-	
	D-3104A	3103	3104	1040	2340	B	HM	PT-INT 5.3D	6i	HM	PT-INT 5.3D	AS1, CL1, DC1, FB1, H1, E01, DS2, TH2, DT1, WS1	45 MIN	-		6 / A0002	5 / A0002	-	
	D-3201A	3201	EXTERIOR	965	2030	A	FRP	TH-COL	3g	FRP	TH-COL	CL1, H1, E01, DS2, TH2, DT1, WS1	N/A	-	CR, ES	5 / A5001	7 / A5002	4 / A5001	
	D-3201B	3201	EXTERIOR	3000	3000	E	SS	NONE	1r	SS	NONE	CL1, H1, TH2, DT1, WS1/WS2	N/A	-	PO	8 / A5001	8 / A5002	7 / A5001	
	D-3202A	3205	3202	940	2340	B	HM	PT-INT 5.3D	7i	HM	PT-INT 5.3D	AS1, CL1, DC1, FB1, H1, E01, DS2, TH2, DT1, WS1	45 MIN	-		8 / A0002	7 / A0002	-	
	D-3202C	3203	EXTERIOR	3000	3000	E	ALUM	PT-EXT 5.3D	1r	HM	PT-EXT 5.3D	CL1, H1, TH2, DT1, WS1/WS2	45 MIN	-	PO	8 / A5001	8 / A5002	7 / A5001	
	D-3203A	3205	3203	940	2340	B	HM	PT-INT 5.3D	7i	HM	PT-INT 5.3D	AS1, CL1, DC1, FB1, H1, E01, DS2, TH2, DT1, WS1	N/A	-		6 / A0002	5 / A0002	-	
	D-3204A	3205	3204	965	2030	D	HM	PT-INT 5.3D	1e	HM	PT-INT 5.3D	CL1, H1, E01, DS2, TH2, DT1, WS1	45 MIN	-		8 / A0002	7 / A0002	-	
	D-3205A	3205	EXTERIOR	965	2030	B	HM	PT-EXT 5.3D	6g	HM	PT-EXT 5.3D	AS1, CL1, DC1, FB1, H1, E01, DS2, TH2, DT1, WS1	N/A	-		5 / A5001	7 / A5002	4 / A5001	
	D-3205B	3205	EXTERIOR	965	2030	D	HM	PT-EXT 5.3D	3i	HM	PT-EXT 5.3D	CL1, H1, E01, DS2, TH2, DT1, WS1	N/A	-	CR, ES	5 / A5001	7 / A5002	4 / A5001	
TERTIARY	D-4001A	4001	4002	965	2030	D	HM	PT-INT 5.3D	3i	HM	PT-INT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	45 MIN	-		8 / A0002	7 / A0002	-	
	D-4101A	4101	EXTERIOR	965	2030	D	HM	PT-EXT 5.3D	3g	HM	PT-EXT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	N/A	-		5 / A5001	7 / A5002	4 / A5001	
	D-4101B	4101	EXTERIOR	915	2030	B	HM	PT-EXT 5.3D	6g	HM	PT-EXT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	N/A	-		5 / A5001	7 / A5002	4 / A5001	
	D-4102A	4102	EXTERIOR	965	2030	D	HM	PT-EXT 5.3D	3g	HM	PT-EXT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	N/A	-		5 / A5001	7 / A5002	4 / A5001	
	D-4102B	4102	EXTERIOR	965	2440	A	HM	PT-EXT 5.3D	2e	HM	PT-EXT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	45 MIN	-	CR, ES	5 / A5001	7 / A5002	4 / A5001	
	D-4102C	4102	EXTERIOR	5200	3790	E	ALUM	PT-EXT 5.3D	2r	HM	PT-EXT 5.3D	CL1, H1, TH2, DT1, WS1/WS2	1.5 HR	-	PO	8 / A5001	8 / A5002	7 / A5001	
	D-4102D	4102	4105	865	2030	A	HM	PT-INT 5.3D	2i	HM	PT-INT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	45 MIN	-		8 / A0002	7 / A0002	-	
	D-4103A	4103	EXTERIOR	915	2440	B	HM	PT-EXT 5.3D	3e	HM	PT-EXT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	1.5 HR	-	CR, ES	5 / A5001	7 / A5002	4 / A5001	
	D-4103B	4103	4105	865	2030	A	HM	PT-INT 5.3D	2i	HM	PT-INT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	45 MIN	-		8 / A0002	7 / A0002	-	
	D-4104A	4104	EXTERIOR	915	2440	B	HM	PT-EXT 5.3D	3e	HM	PT-EXT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	1.5 HR	-		5 / A5001	7 / A5002	4 / A5001	
	D-4105A	4105	EXTERIOR	965	2440	D	HM	PT-EXT 5.3D	2e	HM	PT-EXT 5.3D	CL2, H2, I02, DS2, TH1, DT1, WS1F	1.5 HR	-		5 / A5001	7 / A5002	4 / A5001	

ROOM FINISH GENERAL NOTES

1. UNLESS OTHERWISE NOTED, FLOORING MATERIAL CHANGES SHOULD OCCUR AT THE DOOR THRESHOLD.
2. WHERE NO FINISHES ARE IDENTIFIED, REFER TO ROOM FINISH SCHEDULE.
3. CEILING / FLOOR FINISHES SHOWN IN THE ROOM FINISH SCHEDULE WITH "EXPOSED" ARE TO BE SEALED (REFER TO SPECIFICATIONS).
4. PLEASE NOTE THAT "CEILING ASSEMBLIES" (I.E. ACT / GWB) ARE NOT DOCUMENTED ON THE ROOM FINISH SCHEDULE. FOR SPECIFIC "CEILING ASSEMBLIES" REFER TO THE REFLECTED CEILING PLANS.

DOOR SCHEDULE GENERAL NOTES

1. DOOR OFFSET TO BE 100mm FROM INTERIOR PARTITION UNLESS OTHERWISE NOTED.
2. COORDINATE W/ DOOR SCHEDULE FOR DOOR AND SCREEN DIMENSIONS.
3. COORDINATE W/ SPECIFICATION FOR APPROVED MANUFACTURERES. DIMENSIONS MAY VARY TO SUIT FRAME MATERIAL AND PROFILES AVAILABLE.
4. COORDINATE W/ DOOR SCHEDULE FOR TYPE OF GLAZING OR INSERTS.
5. REFER TO PLANS FOR DOORS SWING / OPERATION DIRECTION.
6. COORDINATE W/ HARDWARE SCHEDULE FOR HARDWARE AND OTHER ACCESSORIES.
7. COORDINATE W/ MECHANICAL DRAWINGS FOR LOCATIONS OF DOOR LOUVRES.
8. COORDINATE W/ ELECTRICAL FOR DEVICES REQUIRING POWER (I.E. OPERATORS, HOLD-OPENS, CARD ACCESS ETC.)
9. FOR ALL GLAZED SCREENS AND ALL DOOR FRAMES WITH SIDELITES, PROVIDE THIRD PARTY ENGINEERED SUPPORT AT SCREEN FRAME HEAD. FOR ALL SUSPENDED OR PARTIALLY SUSPENDED SCREENS, PROVIDE THIRD PARTY ENGINEERED SUPPORT AT FRAME HEAD AND AT PARTIAL HEIGHT WALL BELOW SCREEN.
10. PROVIDE SAFETY WINDOW FILM MARKING FOR ALL SCREENS AND GLAZED DOORS AS PER THE EXTENT NOTED ON DOOR LEGEND, SCREEN LEGEND, AND SAFETY WINDOW FILM DETAIL.
11. ALL DOOR UNDERCUTS TO BE 13mm.
12. REFER TO INTERIOR DESIGN DOCUMENTATION FOR ALL DOOR AND FRAME PAINT COLOURS.
13. REFER TO EXTERIOR ELEVATIONS FOR ALL DOOR / WINDOW FRAME PAINT COLOURS.

MATERIAL / FINISH ABBREVIATIONS

ACT	ACOUSTIC CEILING TILE
ALUM	ALUMINIUM
CHEM	CHEMICAL (EPOXY SYSTEM - SEE SPECIFICATION)
DMPRF	DAMPROOF (EXPOXY SYSTEM - SEE SPECIFICATION)
HM	HOLLOW METAL
HVY	HEAVY (EPOXY SYSTEM - SEE SPECIFICATION)
TH-COL	THROUGH COLOUR
LT	LIGHT (EPOXY SYSTEM - SEE SPECIFICATION)
PT	PAINT
TP	THERMOPLASTIC
VCT	VINYL COMPOSITE TILE

ELECTRIFICATION ABBREVIATIONS

CR	CARD READER
ES	ELECTRICAL STRIKE
PO	AUTOMATIC DOOR OPERATOR / POWER OPERATOR

HARDWARE GROUP ABBREVIATIONS

PB	PUSH BUTTON
AS	ASTRAGAL
CL	CLOSER
CO	COORDINATOR
DS	DOOR STOP
DT	DOOR TRIM
EXT	EXTERIOR
FB	FLUSH BOLT
H	HINGE
HM	HOLLOW METAL
HR	HOURS
INT	INTERIOR
IO	OPERATOR (PANIC BAR)
PT	PAINT
TH	THRESHOLD
WS	WEATHERSTRIPPING

DATE	NO.	REVISION
2025/03/05	3	ISSUED FOR ADDENDUM No. A01
2025/01/23	2	ISSUED FOR TENDER
2024/08/23	1	ISSUED FOR ECA APPROVAL

CONSULTANT:
EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL:613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

SUB-CONSULTANT:
C2 Architecture
C2 Architecture Inc.
415 Baseline Road West
Bowmanville, ON L1C 5M2
☎ 905.697.4464

CLIENT:
Greater Napanee
GREATER FOR MANY REASONS

PROJECT:
NEW NAPANEE WPCP

TITLE:
ROOM & DOOR SCHEDULES

SCALE: 1 : 1	JOB NO: 22001
DESIGNED BY: LC	DATE: 2025/01/23
DRAWN BY: BB / CH	DRAWING NO. A5003
CHECKED BY: JB	