ADDENDUM 6

PART 1 GENERAL

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

PART 2 INFORMATION/CLARIFICATION

2.1 PREQUALIFIED BIDDERS LIST

.1 Attached is the most up-to-date list of pre-qualified bidders for the Ingleside WWTP Upgrades – Phase 1.

General	Mechanical	Electrical
Bennett Construction Group	Bennett Construction Group	Industrial Electrical Contractors Brockville Limited
De Saulniers Construction Ltd.	Eastern Welding	Lamarche Electric Inc.
North American Construction	Rose Mechanical	Sheridan Electric Services
Maple Reinders Constructors Ltd.	North American Construction	North American Construction
Louis W. Bray Construction Limited	Maple Reinders Constructors Ltd.	
Pro Pipe Construction, a Division of Dalcon Construction	Oscar Ladouceur & Son Ltd.	
Rose Group	Pro Pipe Construction, a Division of Dalcon Construction	
Thomas Fuller Construction		

PART 3 DRAWINGS

3.1 ARCHITECTURAL

.1 Drawing A0001- Assembly Legends

.1 Refer to revised “Typical Exterior Wall Assemblies” wall types “EXW2a – Exterior Wall (Building 3000)” and “EXW2b - Exterior Wall (Building 3000)”. Z-bar size to be revised from 125mm to 162 mm.

.2 Drawing A3101 and A3102

.1 Tag in drawing A3101 was deleted.

.2 Keynote 11 – revised to read “Concrete pad, refer to Structural for extent of work”

.3 Wall tags added for Lower Bin Removal Room (H-3003).

.3 Drawing A3502 – Headworks Building – Room Finished Schedule.

.1 Add “Typical Interior Sign Detail” 6/A3502. Provide 9 interior signage, quantity to match rooms and number in room finished schedule/door schedule.

.4 Drawing A8401 and A8602:

.1 Refer to revised drawing A8601 “Demolition Keynotes” refer to revised notes 4, 5, 7 and 9. Refer to revised drawing A8401 detail “Enlarged Laboratory Floor Plan” 1/A8401 and “Renovation Keynotes” Note 12.

3.2 PROCESS

.1 Drawings P1601, P1602, P1603, and P1604 have been revised. See attached.

3.3 STRUCTURAL

.1 Drawing S0002 – Concrete Joint Details

.1 **Delete** Not Applicable in Phase 1 cross out on the Expansion Joint at Walls (Between New and Existing). Note this expansion joint detail is applicable as it is referenced on drawing S3101 between the new and existing concrete walls.

.2 Drawing S0003 – Typical Housekeeping Pad (larger pad)

.1 **Delete** reference to “300 MAX.” thickness and **replace** with “600 MAX.”.

.2 **Add** note: “Provide 15M @ 300 o.c. Each Way Bottom Where Slab Thickness Exceeds 300”.

3.4 MECHANICAL

.1 Drawing M3201

.1 Provide 2 new 150Ø hub drains FD3 where indicated. Coordinate exact location with process piping drawings prior to install. Refer to sketch ADD-M1-SK1, attached.

.2 **Amend** Drawing M8201 as follows:

.1 Plumbing modification in male and female washroom has been removed from scope.

3.5 ELECTRICAL

.1 Drawings E2002 and E2102 have been added to contract drawing set. See attached.

.2 Drawing E3101

.1 **Add** 120V-20A weatherproof duplex receptacle on East Wall of basement storage room (H3002) installed adjacent to the gas fire water heater for

connection of the influent composite sampler. Provide dedicated branch circuit for LP-3A1.

.2 **Add** 120V-20A housekeeping receptacle at base of link stairwell (H-3000). Connect to sludge thickening room receptacle circuit 3A1-8.

.3 **Add** 208V-20A-3ph connection to force flow heater FF-3002 at base of link stairwell (H-3000). Provide new branch circuit from LP-3A1.

.3 Drawing E3511

.1 **Add** 1P-20A breaker to LP-3A1 for new composite sampler receptacle.

.2 **Add** 3P-20A breaker for force flow heater FF-3002.

.4 Drawing E6101

.1 **Add** 120V-20A weatherproof duplex receptacle on South Wall of UV room (G6001) for connection of the effluent composite sampler.

.5 Drawing E6511

.1 **Add** 1P-20A breaker to LP-6A or new composite sampler receptacle.

PART 4 SPECIAL PROVISIONS

4.1 DIVISION 10

.1 Section 10 14 36 Interior Signage

.1 **Add** “Sign FX Inc” to section 2.2.1.6. See revised Specification Section 10 14 36.

.2 **Delete** Specification 10 75 00 Flagpole from the contract documents.

4.2 DIVISION 14

.1 **Add** Specification 14 66 00 Portable Gantry Crane

4.3 DIVISION 23

.1 Section 23 11 23 Piping, Valves & Fittings – Gas

.1 Section 2.1 Pipe

.1 **Add** “.2 Below grade polyethylene pipe: to CSA B137.4 and CSA B149.1 c/w coated aluminum AWG 14 tracer wire extended above grade at beginning and end. Magnetic tape is not acceptable

.1 Acceptable Material: Performance Pipe – Driscoplex 6500-PE2406”

.2 Section 23 73 11 Indoor Direct Fired Custom Air Handling Unit

.1 Item 2.1 General

.1 **Add** ".8 Provide full point single line wiring diagram for unit and control panel integration as part of shop drawing submission."

4.4 DIVISION 31

.1 Specification 31 23 16 Rock Removal

.1 **Add** "Section 1.5 Vibration Control

".1 Reduce ground vibrations to avoid damage to structures or remaining rock masses"

.2 **Amend** Section 3.1.2 " Monitor and repair any/all damage to surrounding infrastructure. ~~Monitor impacts as indicated in Vibration Monitoring section 01 35 43~~".

.2 Specification 31 23 33 Excavation, Trenching and Backfilling

.1 Section 3.8 Excavation

.1 **Amend** ".8 ~~Dispose of~~ **Stockpile** surplus and unsuitable excavated material ~~off site~~ **on-site within the designated area**."

.3 Specification 31 23 37 Bracing and Shoring

.1 **Delete** Section 3.4 Secant Pile Walls

.2 **Delete** Section 3.5 Solider Piles and Lagging

.4 Specification 31 32 25 Erosion and Sedimentation Control

.1 Section 1.1 Objectives

.1 **Amend** ".4 Prevent negative impacts on the ~~Napanee~~ **St. Lawrence** River. The ~~Napanee~~ **St. Lawrence** River is fish habitat and is not to be negatively impacted by construction operations."

.2 Section 1.4 References

.1 **Amend** ".2 MECP – Exclusion Fencing ~~https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing#:%7E:text=Concrete%2C%20metal%20or%20vinyl%20exclusion,concrete%20wall%20for%20complete%20exclusion~~ **https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing**"

4.5 DIVISION 32

.1 **Delete** Specification 32 17 28 Pavement Markings from the contract documents

.2 **Delete** Specification 32 32 48 Block Retaining Walls from the contract documents

4.6 DIVISION 33

.1 Specification 33 31 13

.1 Section 2.2 Forcemains

.1 **Amend** ".1 Polyvinyl Chloride (PVC) SDR ~~**26**~~ **25** to AWWA C905 and CSA B 137.3. Joints are to be bell and spigot with rubber gasket or mechanical joints to AWWA C110/A21.10."

.2 **Amend** ".3 High Density Polyethylene Pipe (HDPE) SDR 21 **or 32.5** to CSA B 137.1. Pipe shall be in accordance with NSF/ANSI 61."

PART 5 QUESTIONS

.1 **Q: Can an big extension be requested?**

A: The tender period has been extended. Refer to Addendum 5.

.2 Q: **Request for Clarification: Division 14 – Conveying Systems is listed on the schedule of values, but there are no specs.**

A: Refer to the attached specification 14 66 00.

.3 **Q: 31 23 33 .1.6 states to pay costs for relocating services that interfere. Is there any way to determine what needs to be relocated and what the cost will be? Maybe provide an allowance for this as this is completely unknown. As stated in 21 23 33.1.6.4, accuracy is not guaranteed. This cost should not be placed on the contractor to pay for.**

A: These are industry standard clauses. The site services are shown on the drawings and other supporting documents included in the tender package. The locations are not completely unknown as they are shown in the contract drawings and facility as-built drawings. This is part of the contractors scope.

.4 **Q: We are including a flagpole as per spec section 10 75 00. Is the flagpole to be supplied only or installed. If installed, please clarify where and if any footings are required. Also, we assume only one flagpole.**

A: This specification will be deleted from the scope.

.5 **Q: Reference Section 33 11 16 - 3.8 & Drawing C0401-OPSD 1109.011; Cathodic protection has been specified for the watermain however, it is not clear if the cathodic protection detail shown on drawing C0401 applies to any other buried services. Please confirm which buried services require cathodic protection.**

A: Similar to tracer wire, cathodic protection is required for all underground metallic appurtenances.

.6 **Q: Reference Section 33 31 13-2.2 and Drawings C0005 & C0006; Section 33 31 13-2.2 provides a HDPE specification and a PVC specification for the buried force mains. Drawings C0005 & C0006 specify the temporary outfall forcemain and the secondary effluent forcemain as HDPE but the other lines are not specified. Please confirm which buried forcemains are to follow the PVC forcemain specification and which buried services are to follow the HDPE forcemain specification.**

A: For convenience, drawings C0005 and C0006 will be re-issued as part of the next Addendum to clarify the underground piping materials.

.7 **Q: Reference Drawing C0002 & As Built Drawing G-5; A note on drawing C-0002 asks the contractor to "Temporarily re-route existing sodium bisulfate to new effluent manhole". Please provide additional information on the existing sodium bisulfite line as it is not shown on As Built Drawing G-5.**

A: The sodium bisulfate line is shown on drawings C0001 and C0002. The existing sodium bisulfate line is a 50mmØ HDPE pipe that runs between the existing biosolids building to the effluent channel. This pipe is insulated and installed above the existing ground surface. (See photos below).

.8 **Q:** **Drawing C0005 shows a NEW 500mmØ PRIMARY EFFLUENT from new headworks building to existing aeration tanks. What is the material of this pipe?**

A: New 500mmØ Primary Effluent pipe from the new headworks building to the existing aeration tanks to be HDPE DR 21.

.9 **Q:** **On detail 2/C005 at MH125 we have the following questions: - four (4) pipes are listed at MH125. On P2601 there are also two (2) 150mm pipes connecting to this MH. What are the inverts for the two (2) 150mm pipes connecting to this MH as noted on drawing P2601? - a note on states 'CONNECT NEW 300mm SUPERNATANT DRAIN PIPE INSTALLED BY DIV. 44 USING APPROVED COUPLER. INV. ELEV.: 75.15m' Is this work shown on the P drawings?**

A: The 150mmØ pipes connecting to this manhole are the existing decanting pipes indicated on 2/C0005. The as-built elevation at the existing wall is 76.20m, MH125 to allow for two (2) 150 mm penetrations at 76.20m. Contractor to verify invert elevations.

The 300mm supernatant drain pipe indicated on 2/C0005 should be indicated as 300mmØ as shown on P0013 (the Process piping inside the digesters is NIC). The new supernatant pipe will be capped ~1m from the building for future connection. Drawing C0005 will be amended to include the correct notes.

.10 **Q:** **On dwg C0005 at MH120 notes 'INV. W = 72.74m (200mmØ) (DROP)' Is the 200mm drop pipe on the 150mm forcemain? Please clarify.**

A: This is correct.

.11 **Q:** **A note on 1/C0006 states 'CONNECT NEW 150mmØ WATERMAIN PIPE TO PIPE INSTALLED BY DIV. 20 USING APPROVED COUPLING. INSTALL AS PER 6/C0301. INV. = 74.95m'. Please clarify the following: - Should this note refer to detail 9/C0301? - If the note**

should refer to 9/C0301, this detail shows a new gate valve but no coupler - please clarify. - does this detail apply to the watermain connections at the UV and Effluent Pumping Building?

A: This is correct, the note should be "refer to detail 9/C0301". This detail applies to all watermain connections at buildings.

.12 **Q: Detail 2/C0302 is a TYPICAL YARD HYDRANT DETAIL. Just want to confirm that there are no Yard Hydrants in Phase 1, just one Fire Hydrant per drawing C0006**

A: Add one Yard Hydrant to the scope of work. This will be located at the existing on-site sewage pumping station. Drawing C0006 will be re-issued in the next addendum to show the yard hydrant.

.13 **Q: Is the NEW 11.6m LONG - 150mmØ SANITARY SEWER at the Existing Administration Building as shown on C0006 capped at /or connected to the Existing Administration Building?**

A: Contractor to confirm the location of the existing sanitary lateral coming from the Administration Building and connect a new 150mmØ sanitary sewer between the Administration Building and MH160.

.14 **Q: Are the following pipes, as shown on C0005 and C0006, PVC or HDPE as per spec 33 31 13, at the contractor's discretion or HDPE/PVC as per the Process drawings: - the new 600mm RAW FM, or SDR 25 PVC (600-IN-DR1) as per P0004 - the new 200mm forcemain from the SPS to the New Headworks Building, or SDR 25 PVC (200-IN-DR1) as per P0004 - 150mm effluent water pipe, or DR 35 HDPE (150-SW-DR4) as per P011 - 150mm Digester sludge pipe, or DR 17 HDPE (150-DS-DR3) as pert P0014 - 350/400mm Biosolids pipes, or DR 17 HDPE (150-DS-DR3) as pert P0014**

A: For convenience, drawings C0005 and C0006 will be re-issued to include the pipe type.

.15 **Q: Is the 150mm potable watermain as shown on C005 and C006 PVC DR 18 as per spec 33 11 16 or DR 17 HDPE (150-PW-DR3) as per P0011**

A: The 150mmØ watermain indicated on C0005 and C0006 shall be PVC DR 18, as per specification 33 11 16. P0011 will be amended accordingly.

.16 **Q: Reference Specification Section 32 32 48 Block Retaining Walls. Since none can be found in the drawings, please confirm that there is no scope of work related to this specification section.**

A: Specification 32 32 48 Block Retaining Walls will be deleted from the scope. Refer to structural for the retaining wall construction requirements.

.17 **Q: Reference Specification section 31 23 16 clause 1.5.2. "Vibration monitoring shall be as per Specification 02 23 40. ". Please provide section 02 23 40.**

A: Delete clause 31 23 16 Section 1.5.2 and modify 3.1.2 " Monitor and repair any/all damage to surrounding infrastructure. ~~**Monitor impacts as indicated in Vibration Monitoring section 01 35 43**~~".

.18 **Q: Reference section 33 31 14, it was mentioned at the site visit that the owner/ engineers would provide a laydown area for the marine works, fabrication etc. Please confirm size and location of this laydown area.**

A: The laydown area for the marine works will be coordinated between the Township and the owners of the adjacent park, The St. Lawrence Parks Commission, without a schedule and space requirements we are not able to coordinate the area at this time; however, we will coordinate once the contractors details have been provided.

.19 **Q: Refer to question 10 of addendum #3. The specification section does not provide enough information to provide pricing for this work. The outfall as built drawings show that this may be a very complex operation involving divers and heavy machinery. Without a full detail depicting what is required, we are unable to fully determine what guidelines to bid to. For bidding purposes, please provide a full detailed design that depicts the existing condition and the desired final product.**

A: The sewage outfall piping details will be provided. Barging, divers and heavy machinery will be required.

.20 **Q: Can you point out where the Typical Yard Hydrant is located on the drawings?**

A: Drawing C0006 will be revised in the next addendum showing there is one yard hydrant included in Phase 1 located at the on-site pumping station.

.21 **Q: Section 33 31 14 Outfall Sewer - Can you clarify what pipe is to be replaced. The only pipe shown on the drawing is the new SE 500mm HDPE leaving the secondary clarifier #1, going to the new UV Building and to MH180.**

A: Refer to drawing C0100.

.22 **Q: On Drawing C0100 - It shows "New Anchors" on outfall pipe. Are these to be placed or are they in place already, as mentioned in the site visit.**

A: A revised Drawing C0100 will be issued in the next addendum.

.23 **Q: Section 32 32 48 – Block Retaining Walls - Please provide details and drawings and location for this.**

A: This specification is deleted via addendum.

.24 **Q: Section 32 17 28 – Pavement Markings - Please provide drawing showing the requirements for line painting**.

A: This specification is deleted via addendum.

.25 **Q: Please clarify where the RIC can be found on the drawings**

A: There are no Rigid Inclusion Columns. This section has been removed from the contract documents. Refer to Addendum 3.

.26 **Q: Request for Clarification: Section 05 14 10 – item 2.5 – states ACCESS LADDER (EXTERIOR) – AERATION (Not Applicable). But provides a description. Item 3.3.1 States install access ladders as noted and in accordance with reviewed shop drawings.** (47)

A: The only ladder is from the headworks interior second level to access the headworks roof.

.27 **Q: Reference drawing A3102 Headworks Upper Floor, shows hatch area over the channels within the screening room.**

a. **Please confirm that this is grating?**

b. Please advise material. Stainless, aluminum galvanized, FRP etc..

c. Please advise the thickness or the live loads required.

A: Refer to S3103 for aluminum grating and checkered plate areas and S0004 for details. Design by misc. steel supplier using Live Load = 6.0kPa for the Screening Room Area.

.28 **Q: Reference drawing A3102 Headworks Upper Floor shows diagonal lines over the channels within the screening room.**

a. Please confirm that these are checker plates?

b. Please advise material. Stainless, aluminum galvanized, FRP etc..

c. Please advise the thickness or the live loads required.

A: Refer to S3103 for aluminum grating and checkered plate areas and S0004 for details. Design by misc. steel supplier using Live Load = 6.0kPa for the Screening Room Area.

.29 **Q: Reference the Itemized Breakdown Schedule of Lump Sum Price (Item of Schedule of Items and Prices). Item 13 calls for "Division 14 - Conveying Systems"**

a. Please provide technical specifications as drawing S3105 makes reference to monorails.

A: Refer to attached Specification 14 66 00.

.30 **Q: Please provide drawings for Secant Pile Walls**

A: Secant pile walls are not required.

.31 **Q: Please provide drawings for soldier piles and lagging**

A: Soldier piles and lagging are not required.

.32 **Q: DWG S7101 shows that the foundation for P1 New Biosolids building shows that the foundation design is by others. We cannot provide a price for the Provisional Item if there are no details for this.**

A: The foundation design for the New Biosolids Storage Tank is to be provided by the tank supplier.

.33 **Q: Reference specification section 10 14 36 Interior Signage. Please provide a signage schedule that outlines quantities, sizes, material and wording.**

A: Area 3000 – Headworks Building, refer to revised drawing A3502, “Typical Interior Sign Detail” 6/A3502. No other buildings included in “Phase 1” scope of work require interior signage.

.34 **Q: Reference Note 7 on drawing A8601. Please detail which equipment is to be removed, protected and re-installed on the laboratory.**

A: Area 8000 – Admin Building, refer to revised drawing A8601 “Demolition Keynotes” refer to revised notes 4, 5, 7 and 9. Refer to revised drawing A8401 detail “Enlarged Laboratory Floor Plan” 1/A8401 and “Renovation Keynotes” Note 12.

.35 **Q: For wall assemblies EXW2a & EXW2b it shows 102mm rigid insulation and a 60mm airspace with a 125mm Z bar. Is there a component missing? A 125mm Z bar is too small to accommodate the 162mm required for the insulation and airspace.**

A: Drawing A0001 – Assembly Legends, refer to revised “Typical Exterior Wall Assemblies” wall types “EXW2a – Exterior Wall (Building 3000)” and “EXW2b - Exterior Wall (Building 3000)”.

.36 **Q: DWG A3101 Overall Plan Keynotes #11 – Concrete pad refer to process for extent of work. Concrete pads not shown on architectural or process drawings. Please clarify.**

A: Area 3000 – Headworks Building, see revised drawing A3101 and A3102 “Overall Plan Keynotes” note 11.

.37 **Q: Drawing A3102 – missing wall assembly for the lower bin removal room.**

A: Area 3000 – Headworks Building, wall tags have been added, see revised drawing A3101 and A3102.

.38 **Q: Can Sign FX Inc be added as an "Acceptable Manufacturer" for Signage in Section 2.2 Manufacturers of Section 10 14 36 ?**

A: Section 10 14 36, Add “Sign FX Inc” to section 2.2.1.6. See revised Specification Section 10 14 36.

.39 **Q: Reference section 44 05 50 clause 2.20 we are informed that this control valve requires clean dry air and power, neither of which are indicated on the drawings, please advise.**

A: There are no Low Pressure Control Valves included in current scope of the project. The PCV’s indicated in the P&ID drawings are Pressure Regulators as identified on P0001, with the standard of acceptance indicated in 44 05 50 2.19.

.40 **Q: Reference section 44 50 00, clause 1.1.2.3, please confirm this should say “Greaterio or H2Flow”.**

A: No, the wording is as indicated.

.41 **Q: Reference drawing P0020, we have a 600mm Plug valve not specified in section 44 05 50, please specify what you require.**

A: Refer to revised Section 44 05 50 in Addendum 6.

.42 **Q: Reference drawing P004, this has the DRN off each Cyclone as SS3, whereas the plans have it as SS1, pleases confirm which is correct.**

A: The arrangement drawings will be revised and re-issued.

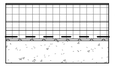
.43 **Q: Reference drawings P0004 & P0011, please provide the locations of the HW-SP-3001, Raw Sewage Composite Sampler and TRW-SP-6001, Effluent Composite Sampler.**

A: The raw sewage sampler (HW-SP-3001) is to be located on the main floor below the inlet channel, a floor penetration and fire stopping as per

detail PS-122-II/P01013. The effluent sampler (TRW-SP-6001) shall be located in Building 6000 above the final effluent reservoir (PWA-T-6050) adjacent to the outfall.

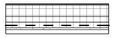
END OF SECTION

TYPICAL ROOF ASSEMBLIES



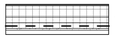
RO1 - ROOF 1 (BUILDING 3000)

- 2 PLY MODIFIED BITUMINIOUS ROOFING SYSTEM
- 6.3mm PROTECTION/RECOVERY BOARD
- SLOPED/TAPERED INSULATION. MIN. 2% (POLYISO)
- 2 LAYERS 75mm THK EACH RIGID INSULATION (POLYISO)
- VAPOUR RETARDER
- CONCRETE TOPPING, REFER TO STRUCTURAL
- PRECAST CONCRETE HOLLOWCORE ROOF STRUCTURE. REFER TO STRUCTURAL



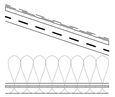
RO2 - ROOF 2 (BUILDING 3000 LINK ROOF)

- 2 PLY MODIFIED BITUMINIOUS ROOFING SYSTEM
- 6.3mm PROTECTION/RECOVERY BOARD
- SLOPED/TAPERED INSULATION. MIN. 2% (POLYISO)
- 2 LAYERS 50mm THK EACH RIGID INSULATION (POLYISO)
- VAPOUR RETARDER
- 16mm EXTERIOR GYPSUM SHEATHING
- ROOF DECK. REFER TO STRUCTURAL



RO3 - ROOF 3 (BUILDING 2000) **NOT INCLUDED IN PHASE 1**

- 2 PLY MODIFIED BITUMINIOUS ROOFING SYSTEM
- 6.3mm PROTECTION/RECOVERY BOARD
- SLOPED/TAPERED INSULATION. MIN. 2% (POLYISO)
- 2 LAYERS 50mm THK EACH RIGID INSULATION (POLYISO)
- VAPOUR RETARDER
- 16mm EXTERIOR GYPSUM SHEATHING
- EXISTING AND NEW METAL ROOF DECK. REFER TO STRUCTURAL



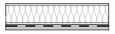
RO4 - ROOF 4 (BUILDING 6000)

- 24 ga. STEEL ROOFING
- 19mm x 89mm HORIZ. STRAPPING @ 610mm O.C. PERPENDICULAR TO ROOF TRUSS
- ICE & WATER SHIELD ENTIRE ROOF AREA
- 16mm TONGUE & GROOVE PLYWOOD SHEATHING
- PRE-ENGINEERED ROOF TRUSSES
- LOOSE FILL (BLOWN) INSULATION MIN. R-60
- 6MIL POLY VAPOR/AIR BARRIER (ALL EDGES TAPED)
- 19mm x 64mm STRAPPING @ 400mm O.C.
- 12.5mm PVC SOFFIT (TRUSSCORE BY AGWAY)

PO1 - PARAPET 1 (BUILDING 3000)

- 22mm HORIZONTAL PRE-FIN. METAL CLADDING
- 60mm AIR SPACE
- 102mm RIGID INSULATION C/W 125mm VERTICAL "Z" BARS
- AIR VAPOUR BARRIER
- 16mm EXTERIOR GRADE GYPSUM SHEATHING
- 152mm METAL STUD @ 400mm O.C. C/W SEMI RIGID INSULATION
- 19mm EXTERIOR P/T PLYWOOD SHEATHING

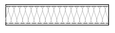
- REFER TO TYPICAL P/T PARAPET CAP CONSTRUCTION



PO1a - PARAPET 1a (BUILDING 3000)

- 16mm EXTERIOR GRADE GYPSUM SHEATHING
- 152mm METAL STUD @ 400mm O.C. C/W SEMI RIGID INSULATION
- 16mm EXTERIOR GRADE GYPSUM SHEATHING
- AIR VAPOUR BARRIER
- 50mm AIR SPACE FOR BUILDING EXPANTION JOINT
- REFER TO ROOF PLANS FOR LOCATIONS

- REFER TO TYPICAL P/T PARAPET CAP CONSTRUCTION



PO1b - PARAPET 1b (BUILDING 3000)

- AIR VAPOUR BARRIER
- 16mm EXTERIOR GRADE GYPSUM BOARD SHEATHING
- 152mm METAL STUD @ 400mm O.C. C/W SEMI RIGID INSULATION
- 19mm EXTERIOR P/T PLYWOOD SHEATHING

- REFER TO TYPICAL P/T PARAPET CAP CONSTRUCTION

PO2 - PARAPET 2 (BUILDING 3000)

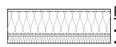
- 90mm MASONRY VENEER
- 60mm AIR SPACE
- 102mm RIGID INSULATION C/W MASONRY SUPPORT TIES. REFER TO STRUCTURAL
- AIR VAPOUR BARRIER
- 16mm EXTERIOR GRADE GYPSUM BOARD SHEATHING
- 152mm METAL STUD @ 400mm O.C. C/W SEMI RIGID INSULATION
- 19mm EXTERIOR P/T PLYWOOD SHEATHING

- REFER TO TYPICAL P/T PARAPET CAP CONSTRUCTION

PO3 - PARAPET 3 (BUILDING 2000) **NOT INCLUDED IN PHASE 1**

- 100mm INSULATED METAL PANELS (VERTICAL)
- 16mm EXTERIOR GRADEGYPSUM BOARD SHEATHING
- 152mm METAL STUD @ 400mm O.C. C/W SEMI RIGID INSULATION
- 19mm EXTERIOR P/T PLYWOOD SHEATHING

- REFER TO TYPICAL P/T PARAPET CAP CONSTRUCTION



PO4 - PARAPET 4 (BUILDING 2000)

- 16mm GYPSUM BOARD SHEATHING
- 203mm METAL STUD @ 400 O.C. C/W SEMI RIGID INSULATION
- 16mm EXTERIOR GRADE GYPSUM SHEATHING
- 64mm METAL STUD @ 400 O.C. C/W SEMI RIGID INSULATION
- AIR VAPOUR BARRIER

- REFER TO TYPICAL P/T PARAPET CAP CONSTRUCTION

PO5 - PARAPET 5 (BUILDING 2000)

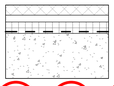
- 22mm HORIZONTAL PRE-FIN. METAL CLADDING
- 25mm AIR SPACE
- 102mm RIGID INSULATION C/W 125mm VERTICAL "Z" BARS
- AIR VAPOUR BARRIER
- 16mm EXTERIOR GRADE GYPSUM SHEATHING
- 152mm METAL STUD @ 400mm O.C. C/W SEMI RIGID INSULATION
- 19mm EXTERIOR P/T PLYWOOD SHEATHING

- REFER TO TYPICAL P/T PARAPET CAP CONSTRUCTION

TYPICAL P/T PARAPET CAP CONSTRUCTION

- PRE-FINISHED METAL CAP FLASHING c/w DRIP EDGE, BOTH SIDES, C/W 100mm WIDE HOLD DOWN METAL CLIPS @ 400mm O.C. FOR INTERIOR PARAPET SIDE, AND CONTINUOUS METAL HOLD DOWN CHANNEL ON EXTERIOR SIDE
- EXTERIOR SIDE PRE-FINISHED METAL FASCIA HEIGHT TO BE 150mm AND INTERIOR SIDE PRE-FINISHED METAL FASCIA HEIGHT TO BE 100mm.
- ROOFING MEMBRANE SYSTEM UP AND OVER P/T SLOPED CAP.
- 19mm THK. SLOPED P/T PLYWOOD SHEATHING AS SHOWN
- 19mm X 64mm STRAPPED P/T PERIMETER BLOCKING AT OUTER EDGE
- 19mm THK. P/T PLYWOOD SHEATHING

TYPICAL EXTERIOR WALL ASSEMBLIES

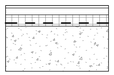


EXW1 - EXTERIOR WALL (BUILDING 3000)

- 90mm MASONRY VENEER
- 60mm AIR SPACE
- 102mm RIGID INSULATION C/W MASONRY SUPPORT TIES.
- REFER TO STRUCTURAL
- AIR VAPOUR BARRIER
- CIP CONCRETE. REFER TO STRUCTURAL

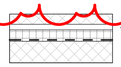
EXW2a - EXTERIOR WALL (BUILDING 3000)

- 22mm HORIZONTAL PRE-FIN. METAL CLADDING
- 60mm AIR SPACE
- 102mm RIGID INSULATION C/W GALV. 162mm VERTICAL "Z" BARS @ 400mm O.C.
- AIR VAPOUR BARRIER
- 240mm CONCRETE BLOCK MASONRY UNITS (CMU). REFER TO STRUCTURAL



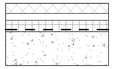
EXW2b - EXTERIOR WALL (BUILDING 3000)

- 22mm HORIZONTAL PRE-FIN. METAL CLADDING
- 60mm AIR SPACE
- 102mm RIGID INSULATION C/W GALV. 162mm VERTICAL "Z" BARS @ 400mm O.C.
- AIR VAPOUR BARRIER
- CIP CONCRETE. REFER TO STRUCTURAL



EXW3 - EXTERIOR WALL (BUILDING 6000)

- 90mm MASONRY VENEER
- 50mm AIR SPACE
- 102mm RIGID INSULATION C/W MASONRY SUPPORT TIES . REFER TO STRUCTURAL
- AIR VAPOUR BARRIER
- 190mm CONCRETE BLOCK MASONRY UNITS (CMU). REFER TO STRUCTURAL

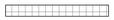


EXW4 - EXTERIOR WALL (BUILDING 3000)

- 90mm MASONRY VENEER
- 60mm AIR SPACE
- 102mm RIGID INSULATION C/W MASONRY SUPPORT TIES. REFER TO STRUCTURAL
- AIR VAPOUR BARRIER
- CIP CONCRETE. REFER TO STRUCTURAL

EXW5 - EXTERIOR WALL (BUILDING 2000)

- 22mm HORIZONTAL PRE-FIN. METAL CLADDING
- 50mm AIR SPACE
- 100mm RIGID INSULATION C/W MASONRY SUPPORT TIES. REFER TO STRUCTURAL
- AIR VAPOUR BARRIER
- 190mm CONCRETE BLOCK MASONRY UNITS (CMU). REFER TO STRUCTURAL



EXW6 - EXTERIOR WALL (BUILDING 2000) **NOT INCLUDED IN PHASE 1**

- 100mm INSULATED METAL PANEL SYSTEM
- EXISTING HORIZONTAL GIRTS

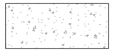
TYPICAL INTERIOR WALL ASSEMBLIES

INT1 - INTERIOR CMU WALL 190mm (1hr FRR)

- REFER TO ROOM FINISH SCHEDULE
- 190 CONCRETE MASONRY UNIT
- REFER TO ROOM FINISH SCHEDULE

INT2 - INTERIOR CMU WALL 240mm (1hr FRR)

- REFER TO ROOM FINISH SCHEDULE
- 240 CONCRETE MASONRY UNIT
- REFER TO ROOM FINISH SCHEDULE



INT3 - INTERIOR CIP WALL 400mm

- REFER TO ROOM FINISH SCHEDULE
- 400 CONCRETE MASONRY UNIT
- REFER TO ROOM FINISH SCHEDULE

INT4 - INTERIOR CIP WALL 300mm

- REFER TO ROOM FINISH SCHEDULE
- 300 CONCRETE MASONRY UNIT
- REFER TO ROOM FINISH SCHEDULE

TYPICAL FIRE RATED CEILING ASSEMBLIES

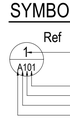
CL1 - GYPSUM CEILING (1hr FRR)

- 19 PLYWOOD SHEATHING (EXTEND OVER CMU WALL, PT)
- 16 GYPSUM BOARD 'TYPE X'
- 16 GYPSUM BOARD 'TYPE X'
- 152 METAL JOIST 406 O.C.
- 16 GYPSUM BOARD 'TYPE X'
- 16 GYPSUM BOARD 'TYPE X'
- REFER TO ROOM FINISH SCHEDULE

ABBREVIATION

ACT	ACOUSTICAL CEILING TILES
ADMIN.	ADMINISTRATION
A.F.F.	ABOVE FINISHED FLOOR
ALUM.	ALUMINUM
ANOD.	ANODIZED FINISH
AVB	AIR VAPOUR BARRIER
BF	BARRIER FREE
BLK.	BLOCK
CB	CATCH BASIN
CIP	CAST IN PLACE CONCRETE
CRM	CEMENTITIOUS REPAIR MORTAR
CG	CORNER GUARD
CJ	CONTROL JOINT
CL	CENTER LINE
COL.	COLOUR
C. CMU	COLOURED CONCRETE MASONRY UNIT
CMU	CONCRETE MASONRY UNIT
CBLK	CONCRETE BLOCK
COMM.	COMMUNICATION
CONC.	CONCRETE
CONTIN.	CONTINUOUS
C.R.	CARD READER
CT	CERAMIC TILE
CWT	CERAMIC WALL TILE
c/w	COMPLETE WITH
DH	DOG HOUSE
DIA.	DIAMETER
DWGS.	DRAWINGS
EA.	EACH
ELEC.	ELECTRICAL
ELEV.	ELEVATOR
EP	EPOXY
EQ	EQUAL
EXIST.	EXISTING
EX.	EXISTING
EXP.	EXPOSED STRUCTURE
EXT.	EXTERIOR
FC	FLASH COVE WALL BASE
F.R.R.	FIRE RESISTANCE RATING
FAAF	FLUID APPLIED ATHLETIC FLOORING
FD.	FLOOR DRAIN
FDN	FOUNDATION
FIN.	FINISH
FIP	FILL IN PLACE
FL.	FLOOR
FR	FRAME
GALV.	GALVANIZED
GC	GENERAL CONTRACTOR
GL	GLAZING
GWB	GYPSUM WALL BOARD
GWG	GEORGIAN WIRED GLASS
HDWD	HARDWOOD
H.M.	HOLLOW METAL
HORIZ.	HORIZONTAL
HR	HOUR
H.S.S.	HOLLOW STRUCTURAL STEEL
INSUL.	INSULATED
INT.	INTERIOR
JAN.	JANITOR
m	METERS
MAT'L	MATERIAL
MAX.	MAXIMUM
MECH.	MECHANICAL
MIC.	MICROWAVE OVEN
MIN.	MINIMUM
mm	MILLIMETERS
N.I.C.	NOT IN CONTRACT
NO.	NUMBER
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
O.H.D.	OVERHEAD DOOR
OWSJ	OPEN WEB STEEL JOIST
PART.	PARTITION
P.LAM	PLASTIC LAMINATE TYPE
PREFAB	PREFABRICATED
PREFIN.	PRE-FINISHED (BY MANUFACTURER)
PRMS	PRE-FINISHED METAL SIDING/CLADDING
P	PRIME
PT.	PAINT
P/PT	PRIME AND PAINT
P/T	PRESSURE TREATED WOOD
R	RADIUS
RBR	RUBBER BASE TO BE 100 mm HIGH x 3.2 THK
	MODEL TYPE TS BY JOHNSONITE OR APPROVED
	ALTERNATE
RCP	REFLECTED CEILING PLAN
RD.	ROOF DRAIN
REQ'D	REQUIRED
RM.	ROOM
RO	ROUGH OPENING
RSF1	RESILIENT SHEET FLOORING
S/A	SELF ADHERED
SCWD	SOLID CORE WOOD DOOR
S.H.	SEALER AND HARDENER
SIM.	SIMILAR
S.O.G.	SLAB ON GRADE
SPECS	SPECIFICATIONS
SP	SPANDREL PANEL
S.S.	STAINLESS STEEL
SS	DENOTES SOLID SURFACE TO BE ACRYLIC-MODIFIED POLYESTER SOLID SURFACE "CORIAN" SOLID SURFACE OR APPROVED ALTERNATE, REFER TO DRAWINGS FOR LOCATIONS
sq. m.	SQUARE METER
STOR.	STORAGE
STRC.	STRUCTURAL
T&T	TEMPERED AND THERMAL GLAZING
T-BAR	SUSPENDED ACOUSTICAL CEILING GRID SYSTEM
TEMP.	TEMPERED GLAZING
THERM.	THERMAL
THK.	THICK
TWF	THROUGH WALL FLASHING
TYP.	TYPICAL
u/s	UNDERSIDE OF STRUCTURE
U/NO	UNLESS NOTED OTHERWISE
URETH	URETHANE FINISH
VCT	VINYL COMPOSITE TILE (OR RESILIENT TILE FLOORING)
V.G.	VISION GLAZING
w/	WITH
WR	WASHROOM
WD	WOOD
"X"	FIRE RATED TYPE "X" GWB
+/-	SITE VERIFY

SYMBOLS



GENERAL NOTES:

1. ALL WORK TO COMPLY WITH THE ONTARIO BUILDING CODE. ONTARIO CONSTRUCTION SAFETY ACT, LOCAL CODES AND BYLAWS AND OTHER APPLICABLE REQUIREMENTS. THE BUILDING CODE COMPLIANCE INFORMATION PRESENTED IS TO BE READ IN CONJUNCTION WITH ALL OTHER ARCHITECTURAL AND ENGINEERING DOCUMENTS. PERFORM ALL WORK IN FULL ACCORDANCE WITH ONTARIO BUILDING CODE, INCLUDING ALL REVISIONS, OF APPLICABLE CODES AND REGULATIONS OF FEDERAL, PROVINCIAL, OR LOCAL APPLICATION. IN ANY CASE OF CONFLICT OR DISCREPANCY, THE MORE STRINGENT REQUIREMENTS SHALL APPLY. MEET OR EXCEED THE REQUIREMENTS OF SPECIFIED STANDARDS, CODES AND REFERENCED DOCUMENTS.
2. DO NOT SCALE DRAWINGS.
3. VERIFY ALL LINES, LEVELS, AND CENTERS ON SITE, PRIOR TO PROCEEDING WITH THE WORK. ENSURE THAT ALL DIMENSIONS AGREE WITH THE DRAWINGS AND THEIR CORRECT INTERRELATION. REPORT ANY DISCREPANCIES TO THE CONSULTANT.
4. COORDINATE AND ESTABLISH ON SITE THE EXACT LOCATION OF ALL OPENINGS IN WALLS, FLOORS AND ROOF PRIOR TO CONSTRUCTION. REFER ALSO TO STRUCTURAL, ELECTRICAL AND MECHANICAL AND MECHANICAL PROCESS DOCUMENTS.
5. PROVIDE POURED CONCRETE HOUSEKEEPING PADS FOR FLOOR MOUNTED MECHANICAL, ELECTRICAL AND MECHANICAL PROCESS EQUIPMENT AS INDICATED. REFER TO MECHANICAL, MECHANICAL PROCESS AND ELECTRICAL APPROVED SHOP DRAWINGS FOR EXACT LOCATION AND SIZE. REFER TO STRUCTURAL DRAWINGS FOR SIZE AND REINFORCEMENT.
6. FOR OPENINGS IN EXTERIOR WALLS INCLUDING BUT NOT LIMITED TO: LOUVERS, PIPES, HOSE BIBS, ETC., REFER TO MECHANICAL & ELECTRICAL DRAWINGS, AND PROCESS DRAWINGS. COORDINATE AND VERIFY EXACT SIZE AND LOCATIONS AND DIMENSIONS, PRIOR TO ANY FABRICATIONS AND CONSTRUCTION.
7. REFER TO MECHANICAL, ELECTRICAL AND MECHANICAL PROCESS DRAWINGS FOR SUPPORTS TO SUSPEND INCLUDING BUT NOT LIMITED TO: LIGHTS, SILENCER, FANS, EQUIPMENT, HEATERS, ACOUSTIC PANELS, ETC. FROM THE UNDERSIDE OF STRUCTURE.
8. ALL PRODUCTS, MATERIALS, EQUIPMENT INCORPORATED INTO WORK SHALL BE NEW AND OF BEST QUALITY (COMPATIBLE WITH REQUIREMENTS) FOR PURPOSES INTENDED. ENSURE QUALITY OF WORK IS OF HIGHEST STANDARD EXECUTED BY WORKERS EXPERIENCED AND SKILLED IN THEIR RESPECTIVE TRADE.
9. VISIT PROJECT SITE PRIOR TO SUBMITTING BID AND EXAMINE DRAWINGS, SPECIFICATIONS AND EXISTING CONDITIONS. NO CLAIM WILL BE ACCEPTED FOR EXTRA WORK DUE TO MISUNDERSTANDING OR IGNORANCE OF THE EXISTING CONDITIONS OR TERMS AND CONDITIONS OF THE CONTRACT.
10. SUBMIT SHOP DRAWINGS FOR ITEMS AS NOTED IN DOCUMENTS, OR WHERE COMPLEXITY AND COORDINATION ISSUES WARRANT.
11. ALL EXTERIOR AND INTERIOR FINISHES SHALL BE INSTALLED PLUMB, WITH ALL FASTENERS REGULARLY SPACED & IN TRUE ALIGNMENT, WITH NEAT CORNERS, TRANSITIONS & CLOSURES.
12. ALL EXTERIOR WORK TO BE WEATHER TIGHT USING FOAM IN PLACE INSULATION, BACKER ROD TO SUIT SIZE & SEALED THROUGHOUT. JOINT SEALANT COLOUR(S) TO BE DETERMINED BY CONSULATNT. SUBMIT JOINT SEALANT COLOUR SAMPLES PRIOR TO ANY INSTALLATIONS.
13. ALL INTERIOR DOOR FRAMES TO BE WRAP AROUND THE WALL TYPE.

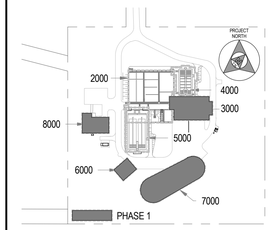
GENERAL ROOF NOTES:

1. CONTRACTOR TO VERIFY ALL DIMENSIONS ON SITE AND REPORT ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF WORK IN THE CONTRACT.
2. ROOFING CONTRACTOR IS RESPONSIBLE TO IDENTIFY THE LOCATION OF ELECTRICAL/MECHANICAL CONDUITS RUNNING INSIDE, ALONG, AND/OR THE UNDERSIDE OF THE STRUCTURAL DECK BEFORE ANY ROOFING COMPONENTS ARE MECHANICALLY SECURED. GENERAL CONTRACTOR/SUB-TRADES TO COORDINATE WORK PRIOR TO ANY FASTENERS INSTALLATIONS TO AVOID ANY INTERFERENCES.
3. CONTRACTOR IS RESPONSIBLE TO ENSURE ALL HEALTH AND SAFETY REGULATIONS ARE FOLLOWED DURING ROOF INSTALLATION AND SAFETY EQUIPMENT IS INSTALLED AND UTILIZED.
4. INSTALL ROOF ASSEMBLY IN STRICT ACCORDANCE WITH ROOFING, SPECIFICATIONS AND DETAILS.
5. PROVIDE 100 WIDE METAL CLEATS AT 400 O.C. FOR SUPPORT OF MAIN PREFINISHED CAP FLASHINGS FOR TOPS OF ALL PARAPETS AND UPSTANDS (TYP) FOR SIDES OF PARAPET. ON EXTERIOR SIDE OF PARAPETS PROVIDE CONTINUOUS SUPPORT CHANNEL, COUNTER FLASHING C/W DRIP EDGE.
6. BENEATH PREFINISHED METAL CAP FLASHINGS, EXTEND ROOFING MEMBRANES UP AND OVER CURBS AND UPSTANDS (I.E.) DO NOT TERMINATE ROOFING MEMBRANES AT THE BOTTOM OF ANY PARAPETS, UPSTANDS AND/OR EQUIPMENT/UNIT FLASHINGS), PROVIDE SPACE AS REQ'D BETWEEN PREFINISHED FLASHINGS AND THE FACE OF ANY EQUIP./UNIT CURBS TO ENSURE A WATERTIGHT SEAL.
7. ROOF PLAN DRAWING SHOWS THE APPROXIMATE NUMBER AND LOCATION OF ROOFING CONDITIONS DETAILED THAT WILL BE REQUIRED IN THE AREA OF ROOFING. DETERMINE THE EXACT NUMBER AND LOCATION OF EACH DETAIL REQUIRED ON SITE AND DRAWINGS, AND COORDINATE WITH CONTRACTOR., ROOFER, MECHANICAL, ELECTRICAL. AND PROCESS DOCUMENTS.
8. COMMENCEMENT OF ANY WORK IS ONLY TO BE STARTED WHEN CONTRACTOR HAS RECEIVED 'REVIEWED' AND/OR 'REVIEWED AS NOTED' ROOFING SHOP DRAWINGS FROM THE CONSULTANT. PROVIDE ENLARGED DETAILED SECTION VIEWS AT MIN. 1:10 SCALE OF ROOFING SHOP DRAWINGS, INCLUDING BUT NOT LIMITED TO; ROOF DRAINS, ROOF COWL, ROOF EXHAUST, MECHANICAL ROOF TOP UNIT CURBS, SLEEPERS, CURBS, CONTROL PARAPETS, HSS UNIT OR EQUIPMENT SUPPORTS, GAS PIPE SUPPORT, PERIMETER PARAPETS AND/OR CURBS, VENTS, FLASHINGS, SCUPPERS, AND ANY PENETRATIONS THRU NEW AND EXISTING ROOFING SYSTEM. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. PROVIDE TO THE CONSULTANT AN ENLARGED ASSEMBLY VIEW OF THE NEW ROOF SYSTEM FOR EACH TYPE OF ROOF ASSEMBLY. THIS SKETCH IS TO BE SUBMITTED IN COLOR FORMAT AND DESCRIBES ALL COMPONENTS OF THE ROOFING SYSTEM, INCLUDING BUT NOT LIMITED TO: CAP SHEET MEMBRANE, BASE SHEET MEMBRANE, FIBERBOARD PROTECTION/RECOVERY BOARD, SLOPED INSULATION, INSULATIONS, VAPOUR RETARDER, PRIMERS, ALL FASTENERS, ETC.. DIFFERENTIATE EACH ROOFING COMPONENT IN CONTRASTING COLOUR. ALSO, PROVIDE DATA OR CUT SHEETS OF EACH ROOFING COMPONENT LISTED.
9. PRIOR TO ROOF WORK PROVIDE ROOF SLOPED INSULATION SHOP DRAWINGS TO THE CONSULATNT FOR REVIEW.

GENERAL CEILING NOTES:

1. REFER TO ROOM FINISH SCHEDULE FOR FINISHES.
2. AT ALL EXPOSED CEILING AREAS, PRIME AND PAINT ALL STRUCTURAL EXPOSED STEEL BEAM AND COLUMNS AS WELL AS STRUCTURAL CONCRETE BEAMS AND COLUMNS, ETC. INCLUDING BUT NOT LIMITED TO: OWSJ'S, METAL DECK, CONCRETE DECK, MISC METALS, BRACKETS, ANGLES, DUCTWORK, PIPING, CONDUIT, SUPPORTS, BLOCKING, ETC. UNLESS NOTED OTHERWISE. NOTE: DO NOT PAINT PRE-PAINTED FACTORY APPLIED EQUIPMENT AND MATERIALS.

2025/04/24	5	ISSUED FOR ADDENDUM #6
2025/04/17	4	ISSUED FOR ADDENDUM #4
2025/03/13	3	ISSUED FOR TENDER
2025/02/28	2	ISSUED FOR 100% REVIEW
2025/02/14	1	ISSUED FOR PERMIT
DATE	NO.	REVISION



KEY PLAN

SCALE: N.T.S.

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CLIENT:

TOWNSHIP OF SOUTH STORMONT

PROJECT:

INGLESIDE WWTP UPGRADES PHASE 1

TITLE:

GENERAL NOTES, ABBREVIATIONS, ASSEMBLY LEGENDS AND DRAWING LIST

SCALE: As indicated	JOB NO: 209-00150-00
DESIGNED BY: DM	DATE: 2025/03/13
DRAWN BY: AS	DRAWING NO. A0001
CHECKED BY: AB	

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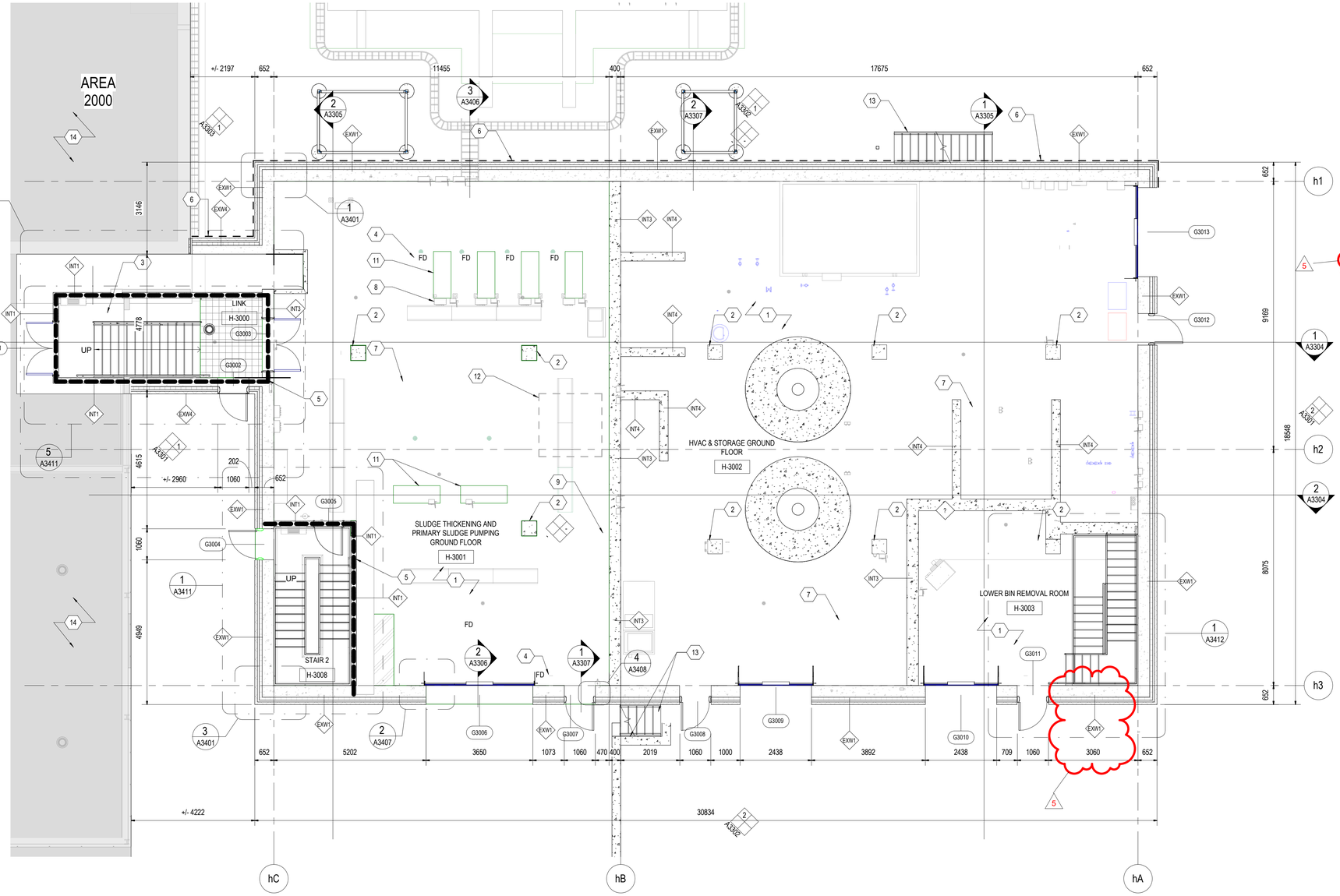

1 A3101 LOWER LEVEL PLAN
1 : 75

OVERALL PLAN KEYNOTES:

1. FOR FLOOR SLABS, FOUNDATIONS, COLUMNS, ETC. REFER TO STRUCTURAL DRAWINGS FOR EXTENT OF WORK.
2. PAINT ALL CONCRETE COLUMNS AND CONCRETE SUPPORT BEAMS, TYPICAL.
3. REFER TO DRAWINGS A2000 FOR EXTENT OF WORK.
4. SLOPE CONCRETE FLOOR TO FLOOR DRAINS. REFER TO STRUCTURAL DRAWINGS FOR EXTENT.
5. DASHED LINE DENOTES ONE HOUR FIRE SEPARATION.
6. DASHED LINE DENOTES SELF-ADHERING SHEET WATERPROOFING SYSTEM C/W 75MM RIGID INSULATION, REFER TO DETAIL 1/A3404
7. FOR PROCESS EQUIPMENT REFER TO PROCESS DRAWINGS FOR EXTENT OF WORK.
8. FOR ELECTRICAL EQUIPMENT, REFER TO ELECTRICAL DRAWINGS FOR EXTENT OF WORK.
9. HANDWASH STATION, PROVIDE SOAP DISPENSER, MIRROR, PAPER TOWEL DISPENSER AND WASTE DISPENSER.
10. FOR MECHANICAL EQUIPMENT, REFER TO MECHANICAL DRAWINGS FOR EXTENT OF WORK.
11. CONCRETE PAD, REFER TO STRUCTURAL FOR EXTENT OF WORK.
12. DASHED LINE DENOTES RECESSED FLOOR HATCH OPENING ABOVE. REFER TO SPECIFICATIONS
13. FOR ALL EXTERIOR STAIR DETAILS AND RETAINING WALL, REFER TO STRUCTURAL DRAWINGS.
14. SHADED AREA DENOTES "NOT APPLICABLE IN PHASE 1".

DATE	NO.	REVISION
2025/04/24	5	ISSUED FOR ADDENDUM #6
2025/04/17	4	ISSUED FOR ADDENDUM #4
2025/03/13	3	ISSUED FOR TENDER
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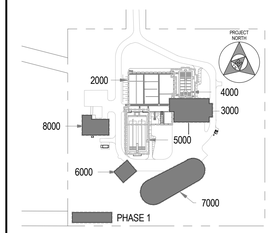

KEY PLAN

SCALE: N.T.S.

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PHONE: 613-727-5111 | FAX: 613-727-5115

CLIENT:

TOWNSHIP OF SOUTH STORMONT

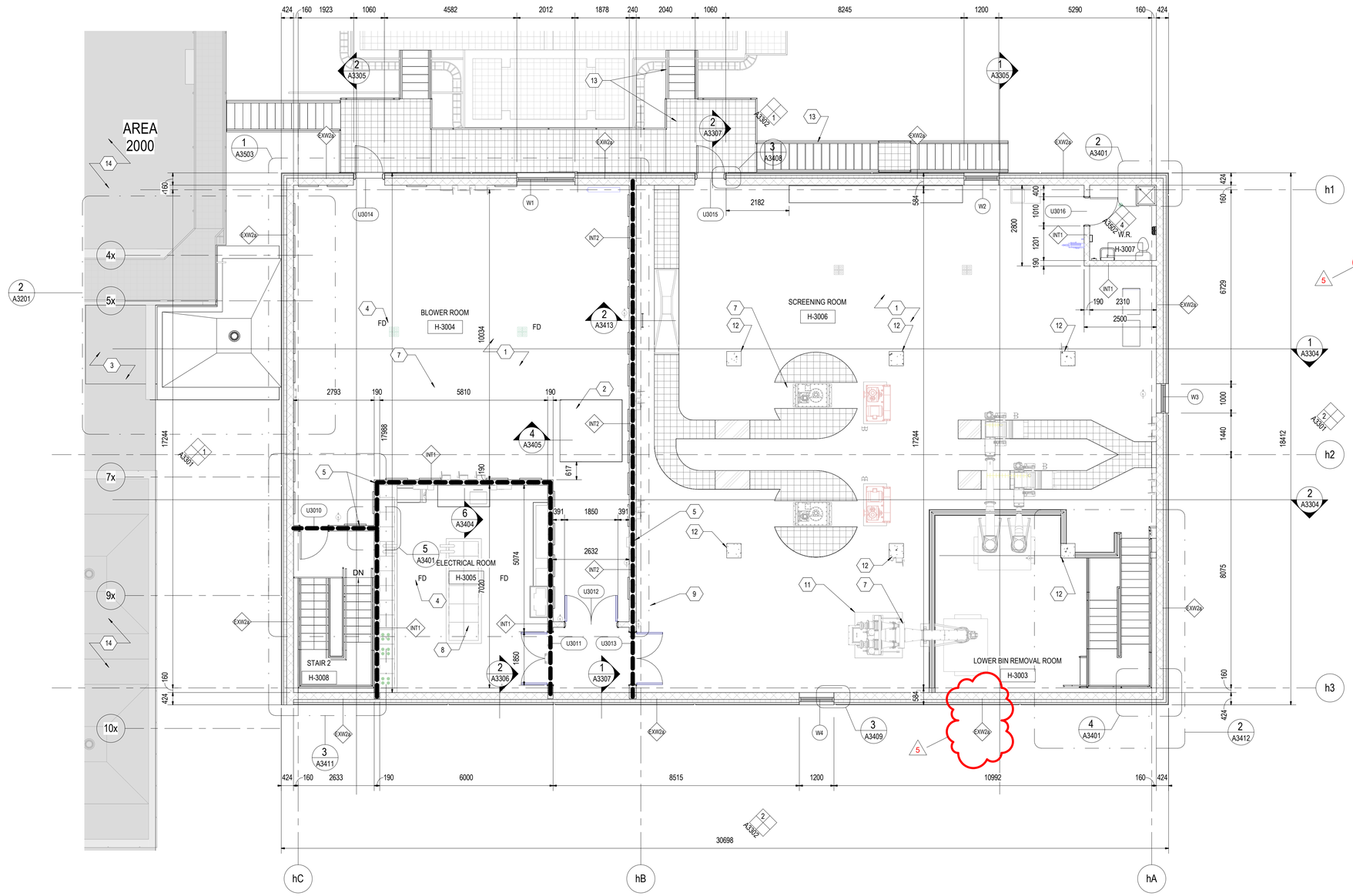
PROJECT:

INGLESIDE WWTP UPGRADES
PHASE 1

TITLE:

HEADWORKS BUILDING -
OVERALL LOWER LEVEL PLAN

SCALE: As indicated	JOB NO: 19070
DESIGNED BY: DM	DATE: 2025/03/13
DRAWN BY: AS	DRAWING NO. A3101
CHECKED BY: AB	

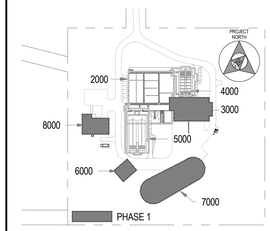


1 A3102 UPPER LEVEL PLAN
1 : 75

OVERALL PLAN KEYNOTES:

1. FOR FLOOR SLABS, FOUNDATIONS, COLUMNS, ETC. REFER TO STRUCTURAL DRAWINGS FOR EXTENT OF WORK.
2. RECESSED FLOOR HATCH. REFER TO TYP. FLOOR ACCESS HATCH DETAIL
3. REFER TO DRAWINGS A2000 FOR EXTENT OF WORK.
4. SLOPE CONCRETE FLOOR TO FLOOR DRAINS. REFER TO STRUCTURAL DRAWINGS FOR EXTENT.
5. DASHED LINE DENOTES ONE HOUR FIRE SEPARATION.
6. PROVIDE 75 RIGID INSULATION AT PERIMETER OF EXTERIOR WALLS.
7. FOR PROCESS EQUIPMENT REFER TO PROCESS DRAWINGS FOR EXTENT OF WORK.
8. FOR ELECTRICAL EQUIPMENT, REFER TO ELECTRICAL DRAWINGS FOR EXTENT OF WORK.
9. HANDWASH STATION, PROVIDE SOAP DISPENSER, MIRROR, PAPER TOWEL DISPENSER AND WASTE DISPENSER.
10. FOR MECHANICAL EQUIPMENT, REFER TO MECHANICAL DRAWINGS FOR EXTENT OF WORK.
11. CONCRETE PAD, REFER TO STRUCTURAL FOR EXTENT OF WORK.
12. PAINT ALL CONCRETE COLUMNS AND SOG CONCRETE SUPPORT BEAMS, TYPICAL.
13. FOR ALL EXTERIOR STAIRS AND GRATING DETAILS, REFER TO STRUCTURAL DRAWINGS.
14. SHADED AREA DENOTES "NOT APPLICABLE IN PHASE 1".

DATE	NO.	REVISION
2025/04/24	5	ISSUED FOR ADDENDUM #6
2025/04/17	4	ISSUED FOR ADDENDUM #4
2025/03/13	3	ISSUED FOR TENDER
2025/02/28	2	ISSUED FOR 100% REVIEW
2025/02/14	1	ISSUED FOR PERMIT



KEY PLAN

SCALE: N.T.S.

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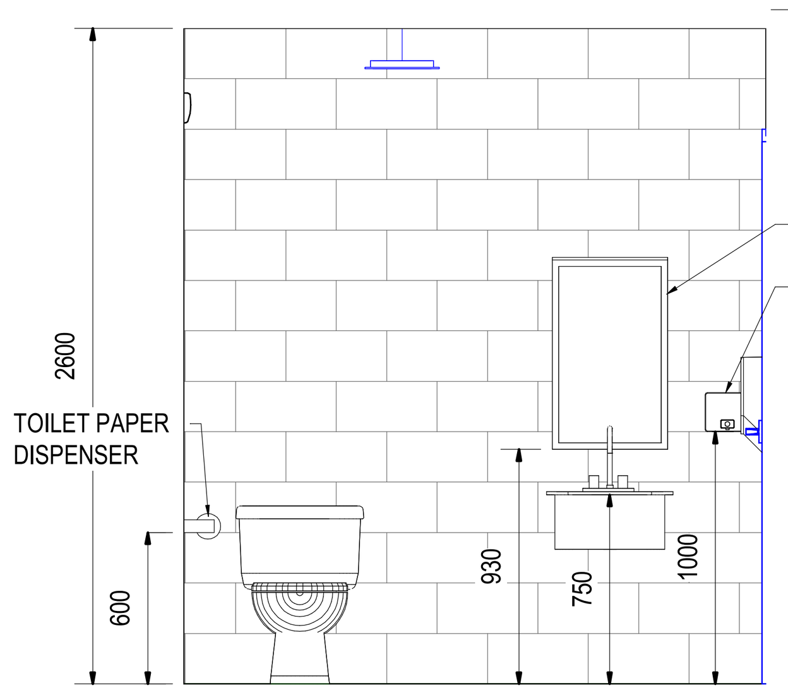
PHONE: 613-727-5111 | FAX: 613-727-5115

CLIENT:
TOWNSHIP OF SOUTH STORMONT

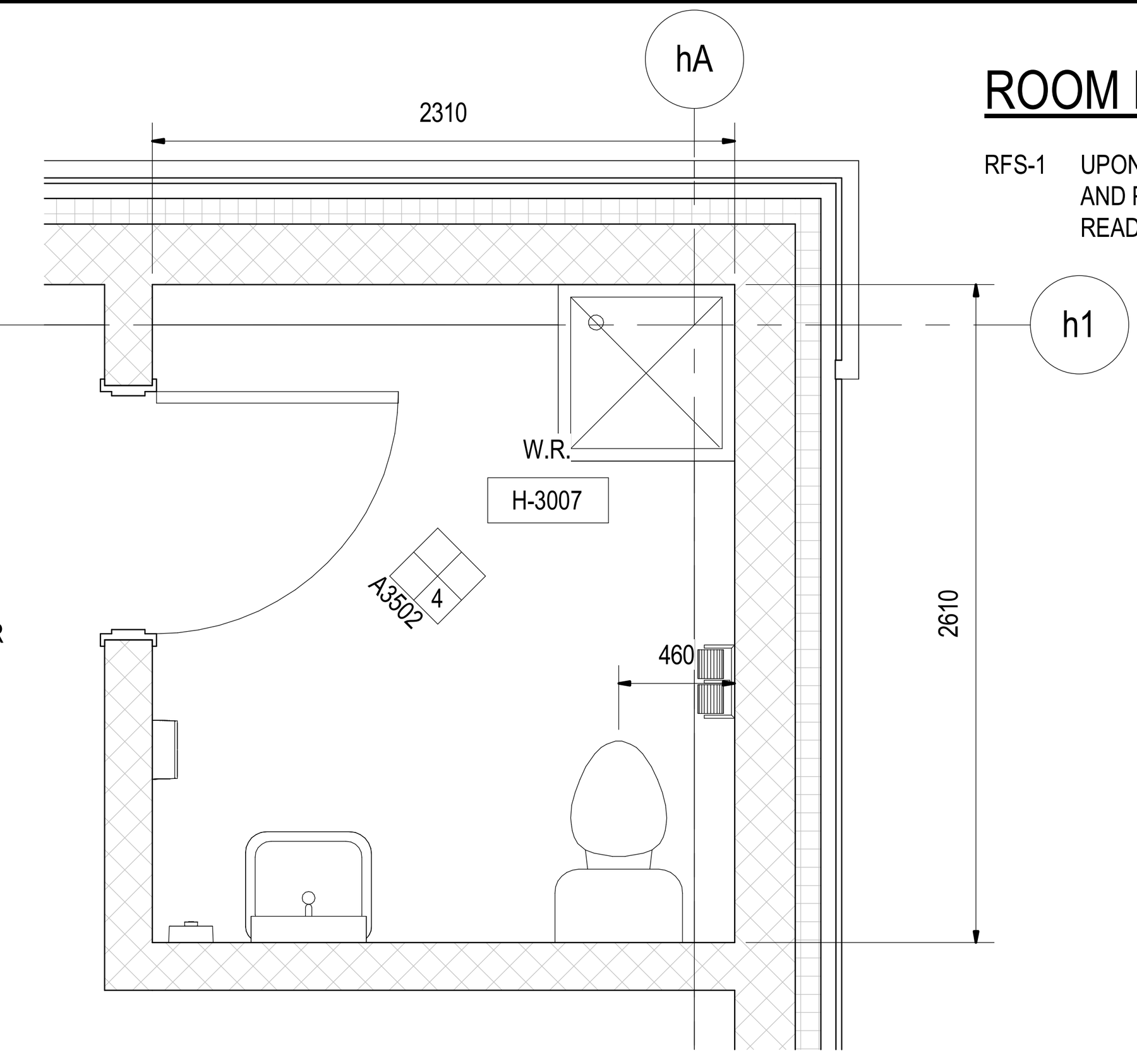
PROJECT:
INGLESIDE WWTP UPGRADES PHASE 1

TITLE:
HEADWORKS BUILDING - OVERALL UPPER LEVEL PLAN

SCALE:	JOB NO:
As indicated	19070
DESIGNED BY:	DATE:
DM	2025/03/13
DRAWN BY:	DRAWING NO.
AS	A3102
CHECKED BY:	
AB	



4 A3502 WASHROOM ELEV. 1
1 : 30



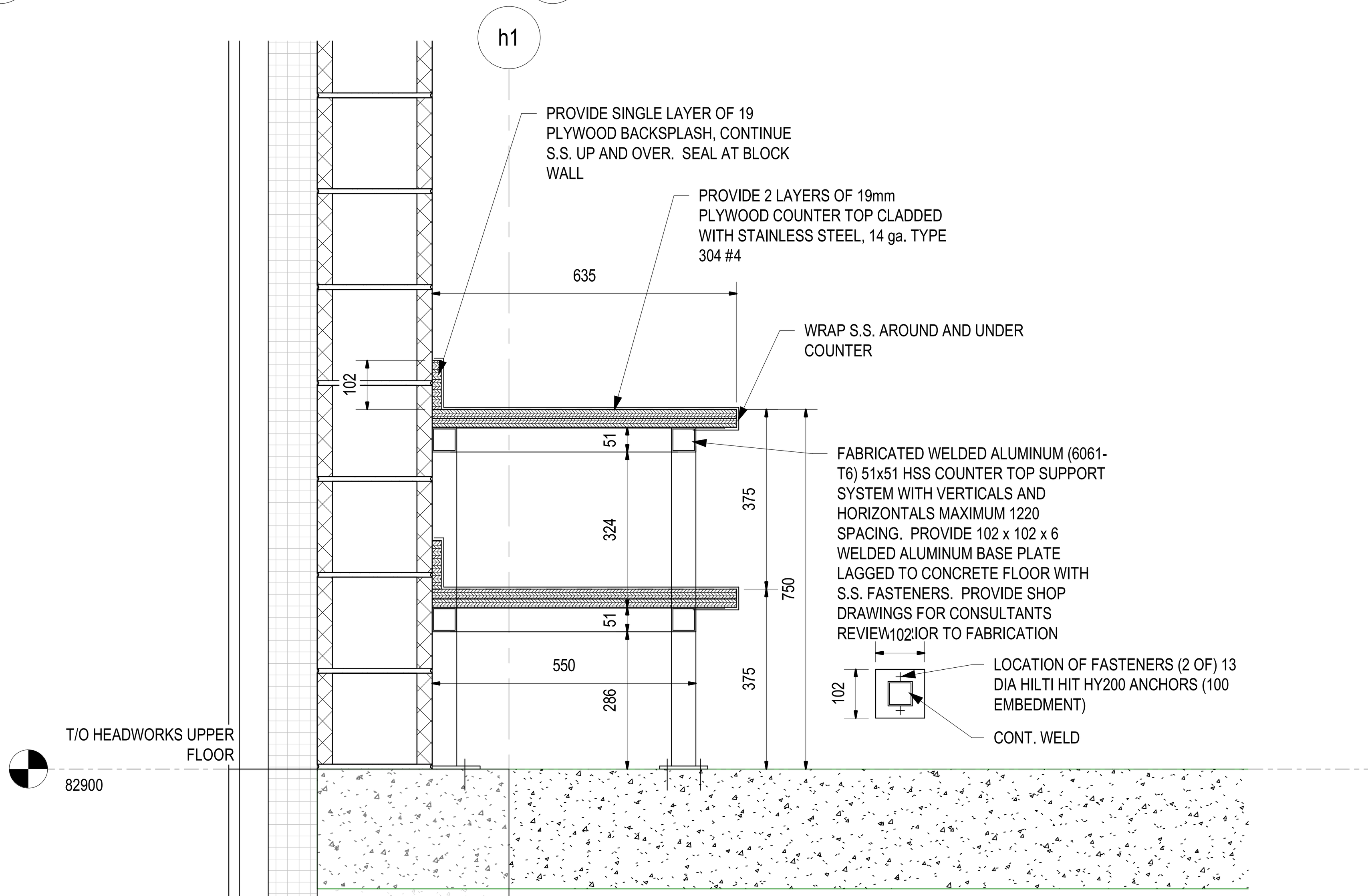
3 A3502 ENLARGED WASHROOMS FLOOR PLAN
1 : 30

ROOM FINISH SCHEDULE GENERAL NOTES

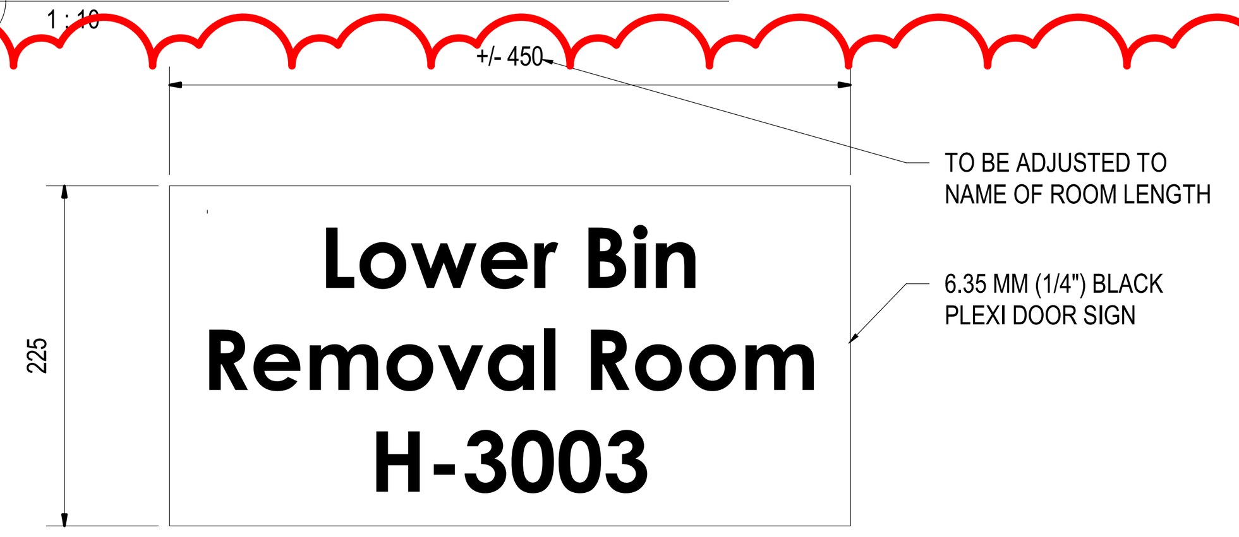
RFS-1 UPON EMOVALS OF MECHANICAL, ELECTRICAL, STRUCTURAL, AND PROCESS EQUIPMENT REPAIR EXISTING FLOOR AS REQUIRED READY TO RECEIVE NEW FINISH.

ROOM FINISH SCHEDULE - GROUND FLOOR

ROOM		FLOOR			WALLS								CEILING	
					NORTH		EAST		SOUTH		WEST			
NO.	NAME	MATERIAL	FINISH	BASE	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	MATERIAL	FINISH	CEILING MATERIAL	CEILING HEIGHT
H-3000	LINK	CONC	CRM/S&H/RFS1	RBR	CBLK	PT	CBLK	PT	CBLK	PT	CBLK	PT	F.R.R. GWB	3352 mm AFF
H-3001	SLUDGE THICKENING AND PRIMARY SLUDGE PUMPING GROUND FLOOR	CONC	S&H	RBR	CONC	PT	CONC	PT	CONC	PT	CONC	PT	CONC. EXP.	-
H-3002	HVAC & STORAGE GROUND FLOOR	CONC	S&H	RBR	CONC	PT	CONC	PT	CONC	PT	CONC	PT	CONC. EXP.	
H-3003	LOWER BIN REMOVAL ROOM	CONC	S&H	RBR	CBLK	PT	CBLK	PT	CBLK	PT	CBLK	PT	CONC. EXP.	-
H-3004	BLOWER ROOM	CONC	S&H	RBR	CBLK	PT	CBLK	PT	CBLK	PT	CBLK	PT	CONC. EXP.	-
H-3005	ELECTRICAL ROOM	CONC	S&H	RBR	CBLK	PT	CBLK	PT	CBLK	PT	CBLK	PT	CONC. EXP.	-
H-3006	SCREENING ROOM	CONC	S&H	RBR	CBLK	PT	CBLK	PT	CBLK	PT	CBLK	PT	CONC. EXP.	-
H-3007	W.R.	CONC	S&H	RBR	CBLK	PT	CBLK	PT	CBLK	PT	CBLK	PT	CONC. EXP.	-
H-3008	STAIR 2	CONC	S&H	RBR	CBLK	PT	CBLK	PT	CONC	PT	CONC	PT	CONC. EXP.	-



5 A3502 TYPICAL WORK BENCH DETAIL
1 : 10



5

SIGNAGE NOTES:

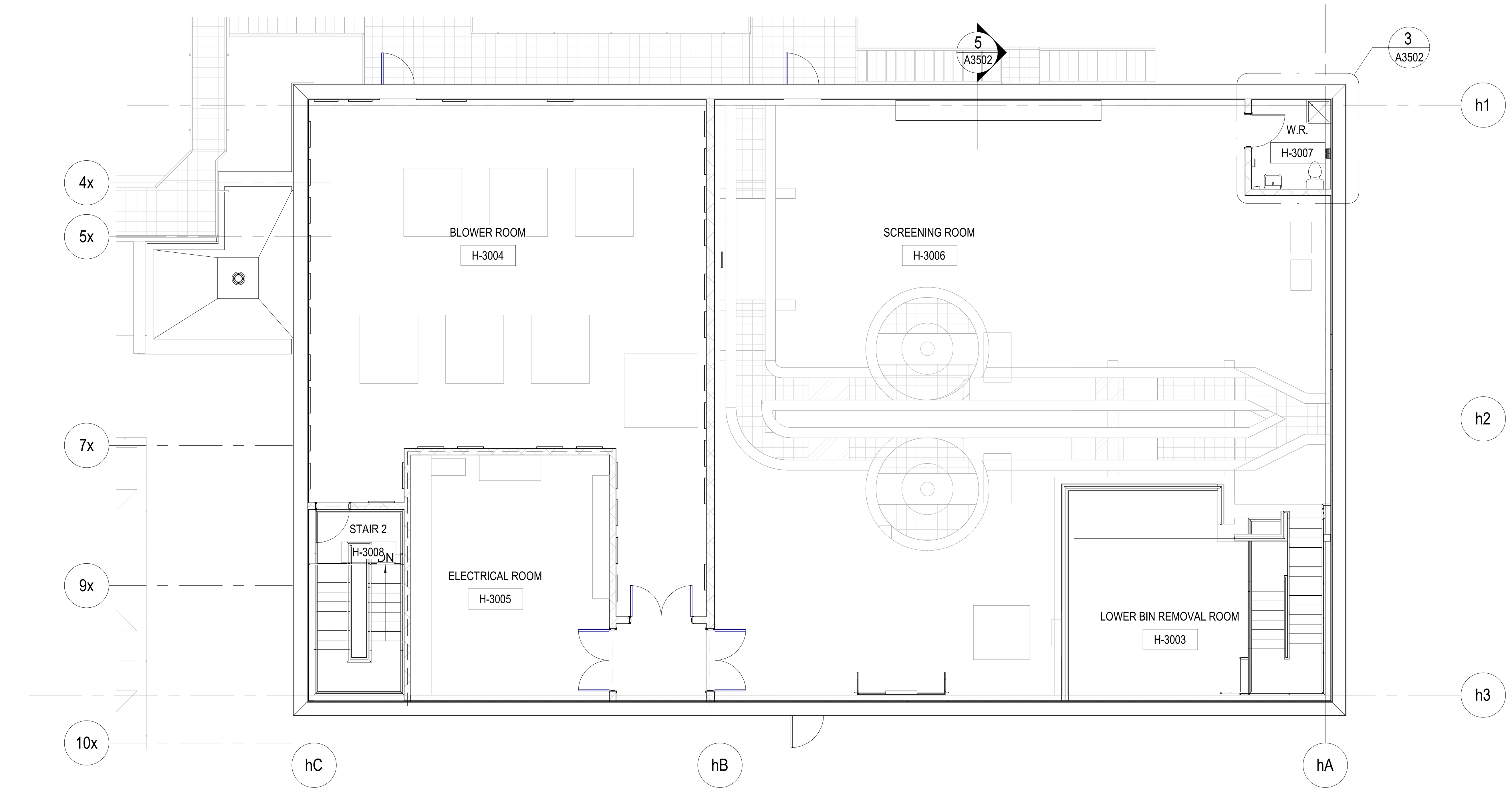
1. PROVIDE GENERAL DOOR SIGNS AS PER ROOMS LISTED IN THE HEADWORKS BUILDING 3000 AS PER ROOM FINISH SCHEDULE AS PER THE NAMES & NUMBERS SHOWN. LOCATION MOUNTING HEIGHT TO BE DETERMINED ON SITE. PROVIDE FOR 9 SIGNS. ROOM NAMES AND ROOM NUMBERING TO BE CONFIRMED BY OWNER DURING SHOP DRAWING STAGE.

2. FONT AND LETTERING TO BE AS FOLLOWS:
FONT: FUTURA LIGHT CONDENSED LIGHT BOLD
FONT HEIGHT: 38mm
TEXT/WORDING: TO BE APPROVED BY CONSULTANT AND OWNER, FONT COLOUR: WHITE
6.35 MM THICK (1/4") BLACK PLEXI DOOR SIGNS, WHITE LETTERING
VINYL LETTERS TO BE RAISED APPROXIMATELY 0.7mm ABOVE THE SURFACE.

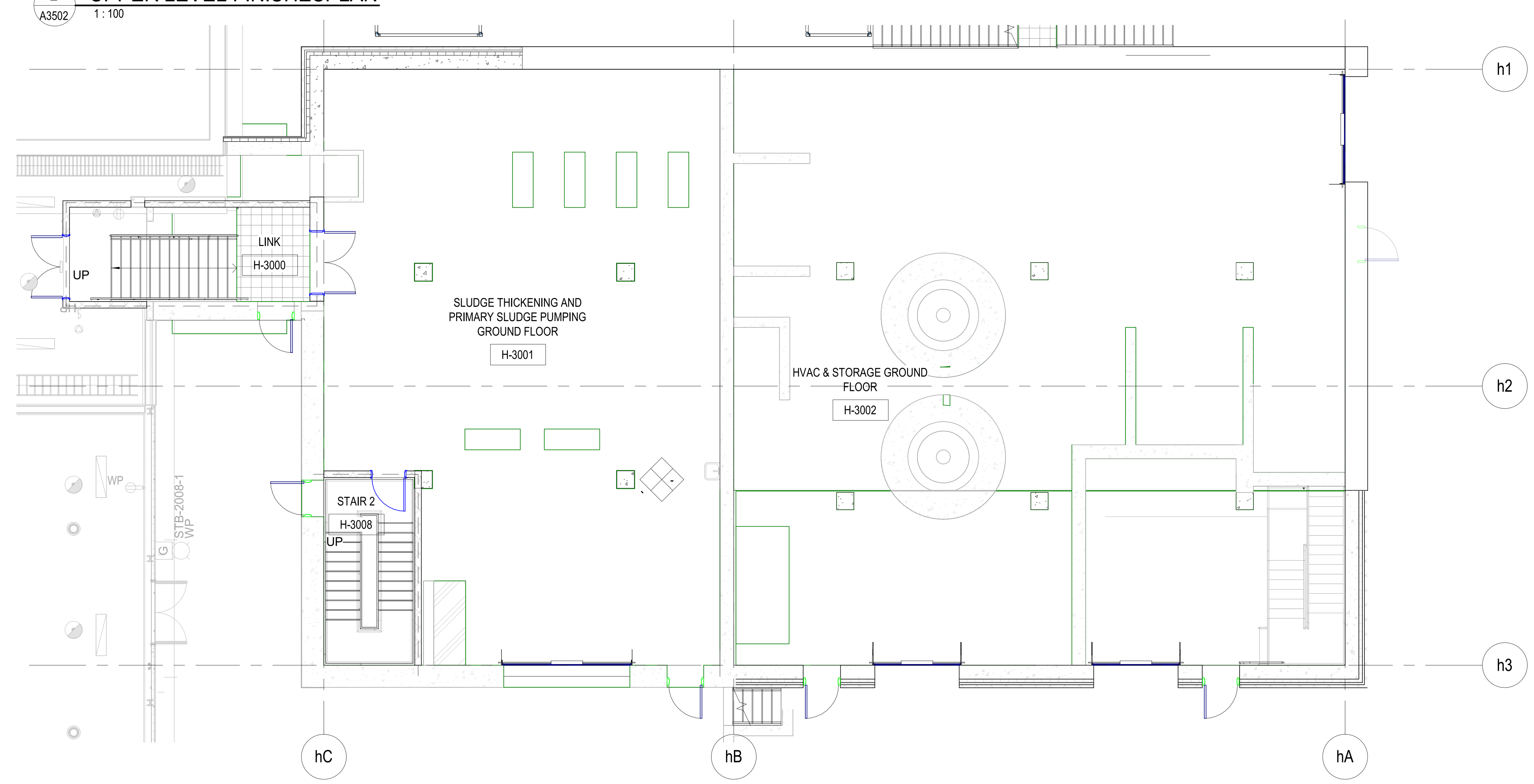
3. PROVIDE TYPICAL STAIR DOOR SIGNAGE (2 OF) FOR STAIR 2. SIGNAGE SIZE TO BE +/- 200 x 200 C/W 60 mm HEIGHT LETTERING AND NUMBERS. SIGNS TO READ "STAIR L-1" AND "STAIR U-2". EXACT LOCATION TO BE DETERMINED ON SITE.

4. SIGNS ARE TO BE MOUNTED ON THE WALL ADJACENT TO THE LATCH SIDE OF EACH DOOR PRIOR TO FASTENING SIGN.

6 A3502 TYPICAL INTERIOR SIGN DETAIL
1 : 5

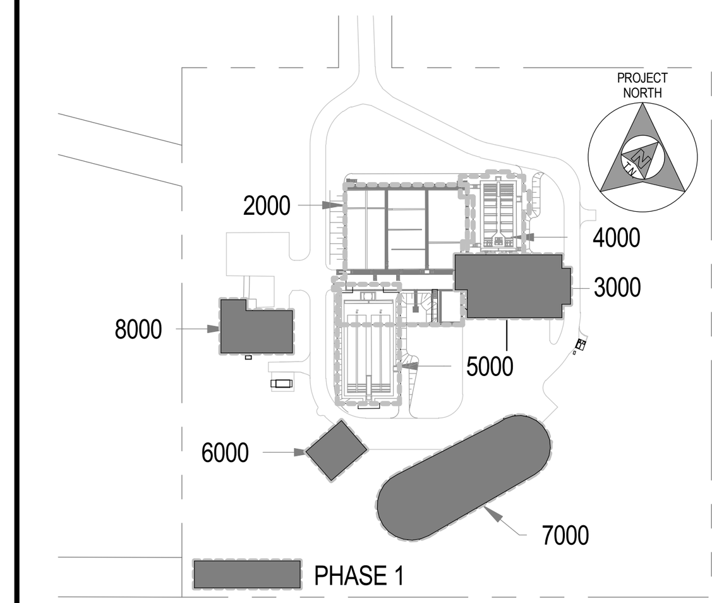


2 A3502 UPPER LEVEL FINISHESPLAN
1 : 100



1 A3502 LOWER LEVEL FINISHES PLAN
1 : 100

DATE	NO.	REVISION
2025/04/24	5	ISSUED FOR ADDENDUM #6
2025/04/17	4	ISSUED FOR ADDENDUM #4
2025/03/13	3	ISSUED FOR TENDER
2025/02/28	2	ISSUED FOR 100% REVIEW
2025/02/14	1	ISSUED FOR PERMIT



KEY PLAN
SCALE: N.T.S.

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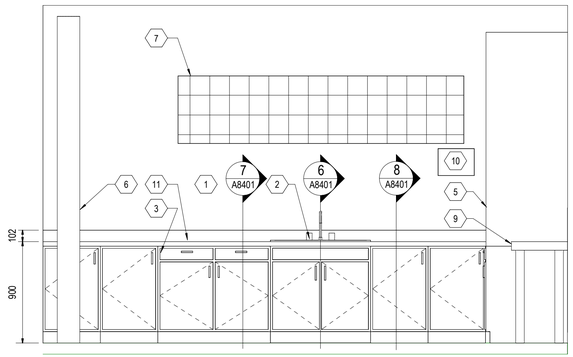
PHONE: 613-727-5111 | FAX: 613-727-5115

CLIENT:
TOWNSHIP OF SOUTH STORMONT

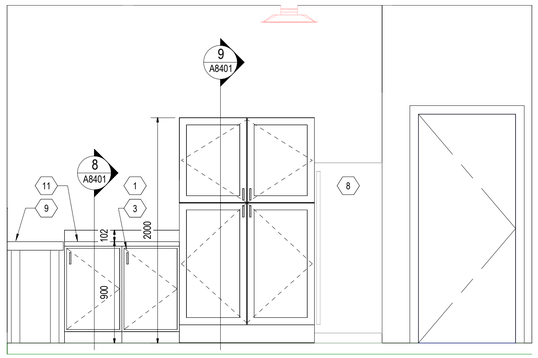
PROJECT:
INGLESIDE WWTP UPGRADES PHASE 1

TITLE:
HEADWORKS BUILDING - ROOM FINISH SCHEDULE

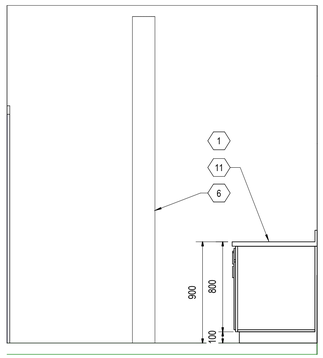
SCALE: As indicated	JOB NO: 19070
DESIGNED BY: DM	DATE: 2025/03/13
DRAWN BY: AS	DRAWING NO. A3502
CHECKED BY: AB	



4 A8401 LABORATORY MILLWORK ELEV. 3
1 : 25



2 A8401 LABORATORY MILLWORK ELEV. 1
1 : 25



5 A8401 LABORATORY MILLWORK ELEV. 4
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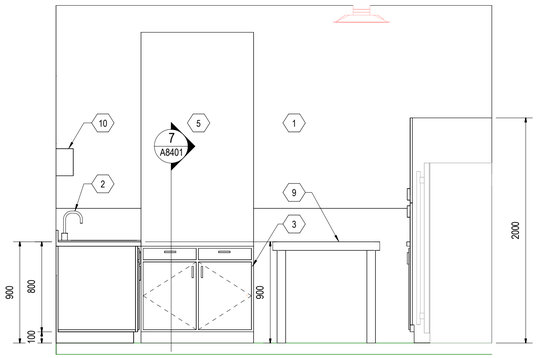
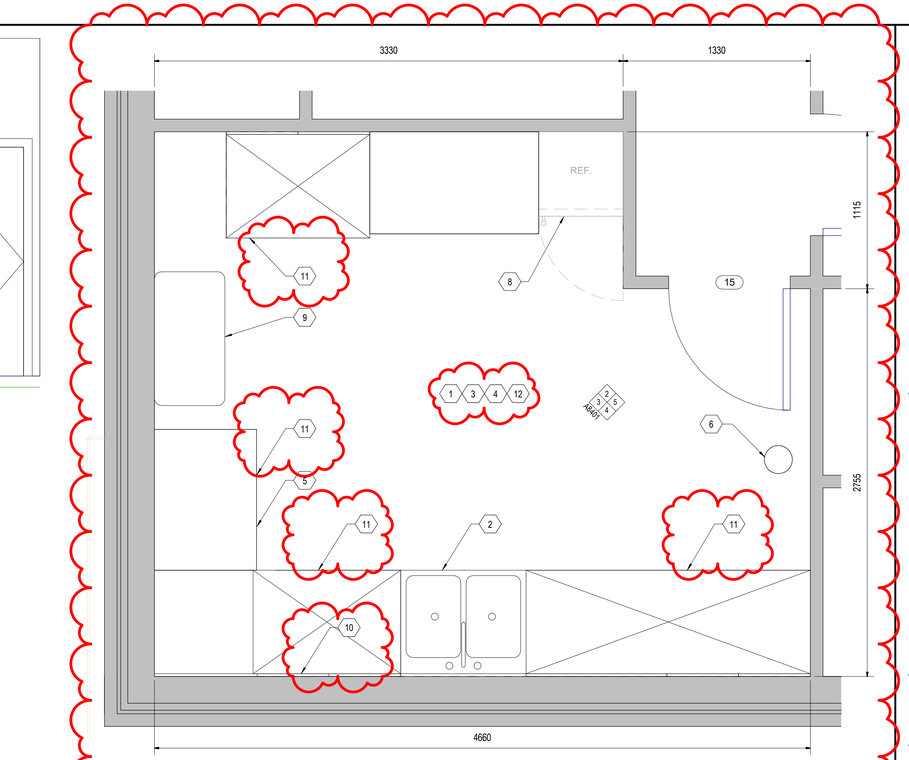
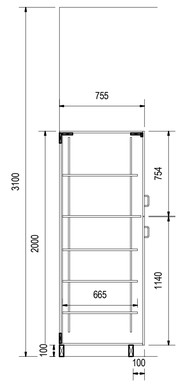


3 A8401 LABORATORY MILLWORK ELEV. 2
1 : 25

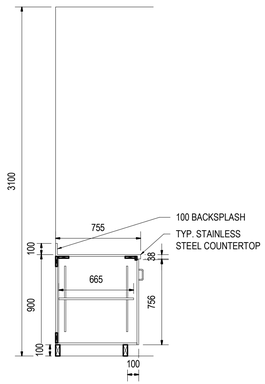


1 A8401 ENLARGED LABORATORY FLOOR PLAN
1 : 20

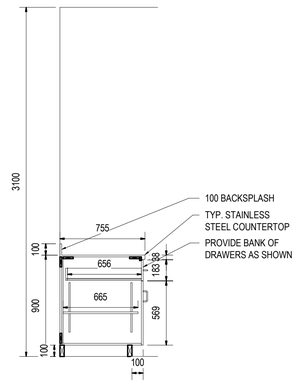
5



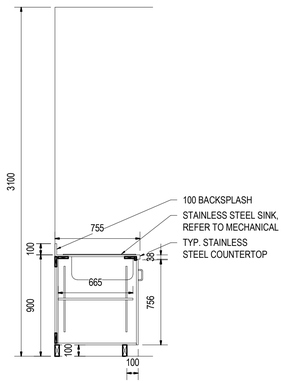
9 A8401 TYPICAL TALL CABINET
1 : 25



8 A8401 TYPICAL BASE CABINETS
1 : 25



7 A8401 TYPICAL CABINET WITH DRAWER
1 : 25



6 A8401 TYPICAL CABINET SINK IN BASE
1 : 25

RENOVATION KEY NOTES:

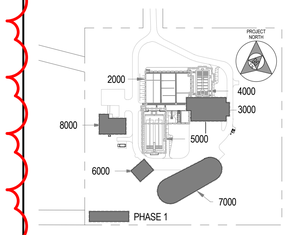
1. PROVIDE FOR NEW PAINTING OF ALL EXISTING WALLS AND GB/PLASTER. REFER TO SPECIFICATIONS AND ROOM FINISH SCHEDULE.
2. REFER TO MECHANICAL DRAWINGS FOR NEW INSTALLATIONS OF FIXTURES, LAVS, ETC.
3. PROVIDE NEW METAL CASEWORK AS SHOWN. REFER TO METAL CASEWORK DRAWINGS AND SPECIFICATIONS.
4. PROVIDE FOR NEW FLOORING. ALL FLOORING TO BE INSTALLED UNDERSIDE OF ALL BASE, CABINETS, AND APPLIANCES. REFER TO SPECIFICATIONS AND ROOM FINISH SCHEDULE.
5. UPON MILLWORK COMPLETION FUME HOOD TO BE REINSTALL AT EXISTING LOCATION.
6. EXISITNG EMERGENCY SHOWER STATION.
7. EXISTING GLASS BLOCK WINDOW.
8. EXISTING REFRIGERATOR TO REINSTALL AT EXISTING LOCATION. N.I.C.
9. PROVIDE NEW WEIGHT TABLE.
10. PROVIDE NEW PAPER TOWEL DISPENSER.
11. PROVIDE NEW STAINLESS STEEL COUNTERTOPS.
12. UPON COMPLETION REINSTALL ALL EXISTING EQUIPMENT AS NOTED IN DRAWING A8602 "DEMOLOTION KEYNOTES.

5

LABORATORY MILLWORK GENERAL NOTES:

1. ALL NEW FURNITURE TO BE STANDARD "SIGMA SYSTEMS FURNITURE" BY MOTTLAB OR APPROVED ALTERNATE.
2. ALL COUNTER TOPS TO BE 25mm STAINLESS STEEL.
3. BACK/SIDESPLASHES (WHERE SHOWN ON DRAWING) ARE SAME MATERIAL AS ADJOINING TOP.
4. COLOUR: BY OWNER FROM LAB SUPPLIER'S STANDARD COLOUR CHART.
5. HANDLES ARE BLACK FLUSH PVC PULLS.
6. HINGES ARE BLACK.
7. SINK AREAS ARE ALL STAINLESS STEEL, 610mm DEEP TOPS.
8. COAT RACK, SHELF AND END GABLE SUPPORT PANEL ALL BY LAB SUPPLIER. IT WILL BE SUPPLIED AND INSTALLED BY LAB SUPPLIER.
9. PROVIDE AUTOCAD VERSION SHOP DRAWINGS CLEARLY INDICATING ENLARGED DETAILS OF INCLUDED BUT NOT LIMITED TO: UPPER AND LOWER BASE CABINET CASEWORK SHOWING PLAN, ELEVATION AND SECTION DETAILS AT 1:20 SCALE, CONNECTIONS, PROFILES, REAGENTS, ELECTRICAL CHASES, FASTENERS, JOINTS, TOE KICKS, ETC. FOR OWNER AND CONSULTANT REVIEW. SHOW LABORATORY UPPER & LOWER BASE CABINETS & COUNTERTOP LOCATION, DETAILS OF CONSTRUCTION FEATURES AND SPECIAL CONDITIONS AND RELATIONSHIP TO MATERIALS AS REQUIRED TO COMPLETE THE WORK. LABORATORY CABINETRY SUPPLIER/INSTALLER TO SITE VERIFY ALL DIMENSIONS PRIOR TO ANY FABRICATIONS AND/OR INSTALLATIONS.
10. PRIOR TO FABRICATION OF LABORATORY CABINETRY AND/OR COUNTERTOP, CONFIRM WITH MECHANICAL EXACT SIZE AND LOCATION OF ANY ASSOCIATED PLUMBING/PIPES. IT IS THE LABORATORY CABINETRY SUPPLIER/INSTALLER'S RESPONSIBILITY TO ENSURE THE EXACT SIZE AND LOCATIONS OF PLUMBING/FIXTURES HAVE BEEN RECEIVED AND DIMENSIONS CONFIRMED PRIOR TO FABRICATIONS OR INSTALLATIONS. REPORT ANY DISCREPANCIES TO THE CONSULTANT PRIOR TO FABRICATION.

DATE	NO.	REVISION
2025/02/14	1	ISSUED FOR PERMIT
2025/02/28	2	ISSUED FOR 100% REVIEW
2025/03/13	3	ISSUED FOR TENDER
2025/04/17	4	ISSUED FOR ADDENDUM #4
2025/04/24	5	ISSUED FOR ADDENDUM #6



KEY PLAN
SCALE: N.T.S.

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PHONE: 613-727-5111 | FAX: 613-727-5115

CLIENT:
TOWNSHIP OF SOUTH STORMONT

PROJECT:
INGLESIDE WWTP UPGRADES
PHASE 1

TITLE:
EXISTING ADMINISTRATION BUILDING - LABORATORY FLOOR PLAN AND MILLWORK DETAILS

SCALE: As indicated	JOB NO: 209-00150-00
DESIGNED BY: DM	DATE: 2025/03/13
DRAWN BY: AS	DRAWING NO. A8401
CHECKED BY: AB	

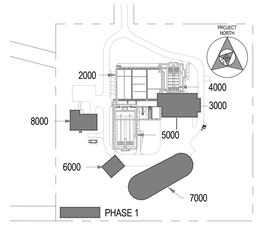
2025-04-24 12:44:40 PM Autodesk Docs://Ingleside WWTP - Upgrades- R19\19070-8000-Admin Building.rvt

1 A8601 DEMOLITION PLAN
1 : 75

DEMOLITION KEYNOTES:

1. CAREFULLY REMOVE EXISTING MILLWORK AND ALL ASSOCIATED HARDWARE. PREPARE EXISTING SURFACES READY TO RECEIVE NEW MILLWORK/PAINTING. REFER TO RENOVATION FLOOR PLAN.
2. REFER TO MECHANICAL DRAWINGS FOR EXTENT OF REMOVALS OF FIXTURES, LAVATORIES, ETC.
3. REMOVE EXISTING FLOORING AND BASE MATERIAL AS REQUIRED, PREPARE FLOOR SURFACES READY TO RECEIVE NEW FLOORING. PREPARE WALL SURFACES READY TO RECEIVE NEW WALL BASE.
4. CONTRACTOR TO CAREFULLY REMOVE AND RE-INSTALL ALL EXISTING LIGHT FIXTURES, GRILLES, AND ANY T-BAR CEILING SUPPORTING DEVICES, ETC. PROTECT AND STORE AT A LOCATION DETERMINED BY OWNER DURING THE CONSTRUCTION. ANY DAMAGE TO EXISTING ACCESORIES TO BE REPLACED AT NO COST TO THE OWNER.
5. CAREFULLY REMOVE AND PROTECT ANY EXISTING EQUIPMENT INCLUDING, REFRIGERATOR, FIRE EXTINGUISHER, WALL MOUNTED SHELVES, EMERGENCY SHOWER STATION, AND WALL CLOCKS. CAREFULLY STORE ON SITE AT LOCATION TO BE DETERMINED BY OWNER. UPON COMPLETION OF WORK, REINSTALL ALL EQUIPMENT.
6. PREPARE EXISTING WALL SURFACES READY TO RECEIVE NEW PAINTING. REFER TO RENOVATION FLOOR PLAN.
7. CAREFULLY REMOVE EXISTING FUMEHOOD, DISCONNECT FUMEHOOD AND DEVICES AND UPON MILLWORK COMPLETION TO BE REINSTALL AT EXISTING LOCATION. PROPERLY STORE FUME HOOD, LOCATION TO BE DETERMINED BY OWNER.
8. REMOVE EXISTING T-BAR CEILING.
9. REMOVE EXISTING PAPER TOWEL DISPENSER.

DATE	NO.	REVISION
2025/04/24	5	ISSUED FOR ADDENDUM #6
2025/04/17	4	ISSUED FOR ADDENDUM #4
2025/03/13	3	ISSUED FOR TENDER
2025/02/28	2	ISSUED FOR 100% REVIEW
2025/02/14	1	ISSUED FOR PERMIT



KEY PLAN
SCALE: N.T.S.

CONSULANT:
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PHONE: 613-727-5111 | FAX: 613-727-5115

CLIENT:
TOWNSHIP OF SOUTH STORMONT

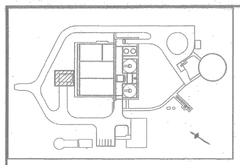
PROJECT:

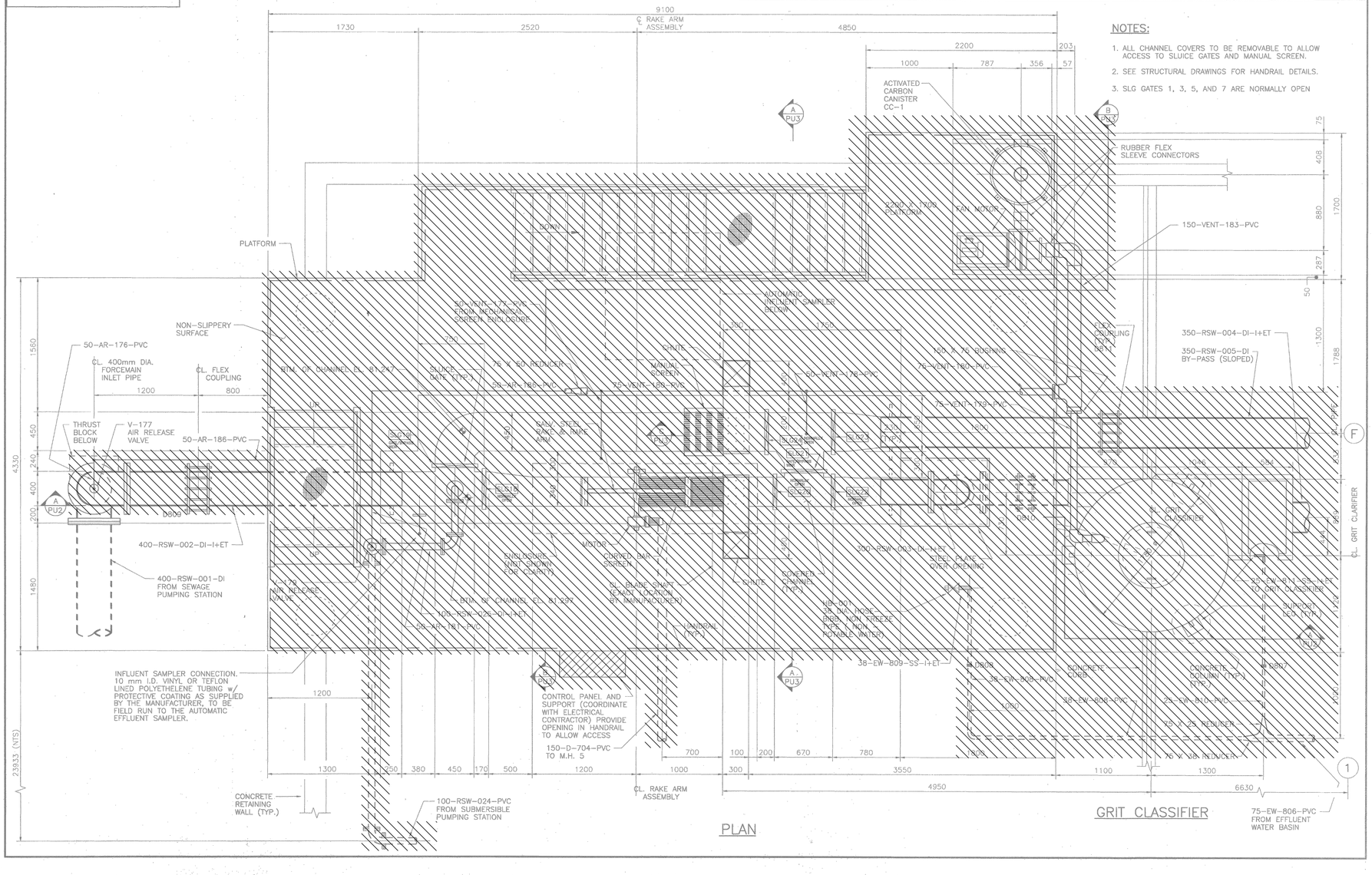
INGLESIDE WWTP UPGRADES PHASE 1

TITLE:

EXISTING ADMINISTRATION BUILDING - DEMOLITION FLOOR PLAN

SCALE: As indicated	JOB NO: 209-00150-00
DESIGNED BY: DM	DATE: 2025/03/13
DRAWN BY: AS	DRAWING NO. A8601
CHECKED BY: AB	





NOTE

THIS DRAWING DOES NOT REPRESENT AS-BUILT CONDITIONS.

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No.	Date	Revision
3	OCTOBER/95	ISSUED FOR TENDER
2	SEPT 15/95	ISSUED FOR REVIEW
1	JAN. 16/95	ISSUED FOR M.O.E.E. APPROVAL

H.A. Ibrahim
OCT6/95

D.W. Lishman
OCT6/95

McNEELY
ENGINEERING
CONSULTANTS LTD.

Owner TOWNSHIP OF OSNABRUCK

Project INGLESIDE
SEWAGE TREATMENT PLANT
O.C.W.A. SEWAGE WORKS PROJECT No. 40-0797

Title HEADWORKS
PLAN

Design	H.A.I.	Scale	AS SHOWN	Proj. No.	M2544-4	Dwg No.	PU-1
Drawn	G.M.	Check	H.A.I.	Date	SEPT 15/95		

NOTES:

1. ALL CHANNEL COVERS TO BE REMOVABLE TO ALLOW ACCESS TO SLUICE GATES AND MANUAL SCREEN.
2. SEE STRUCTURAL DRAWINGS FOR HANDRAIL DETAILS.
3. SLG GATES 1, 3, 5, AND 7 ARE NORMALLY OPEN

PLAN

GRIT CLASSIFIER

LEGEND:

▨	HATCH INDICATED EQUIPMENT, PIPING, ETC. TO BE DEMOLISHED

DATE	No.	REVISION
2025/04/25	5	ISSUED FOR ADDENDUM 6
2025/03/20	4	ISSUED FOR TENDER
2025/03/13	3	ISSUED FOR TENDER
2025/02/28	2	ISSUED FOR 100% REVIEW
2025/02/14	1	ISSUED FOR PERMIT

KEY PLAN

SCALE: N.T.S.

2025/03/13

C:\Users\Ken.White\OneDrive - EVB ENGINEERING\Documents\Ken\Jamie Baker Stamp\JB Stamp.jpg

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SUB-CONSULTANT :

Goodkey Weedmark
Consulting Engineers

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PHONE: 613-727-5111 | FAX: 613-727-5115

CLIENT:

TOWNSHIP OF SOUTH STORMONT

PROJECT:

INGLESIDE WWTP UPGRADES
PHASE 1

TITLE:

PROCESS: REMOVAL PLAN
(HEADWORKS)

SCALE: N.T.S.	JOB NO: 19070
DESIGNED BY: J.B.	DATE: 2025/03/13
DRAWN BY: K.B.W.	DRAWING NO. P1601
CHECKED BY: J.B.	

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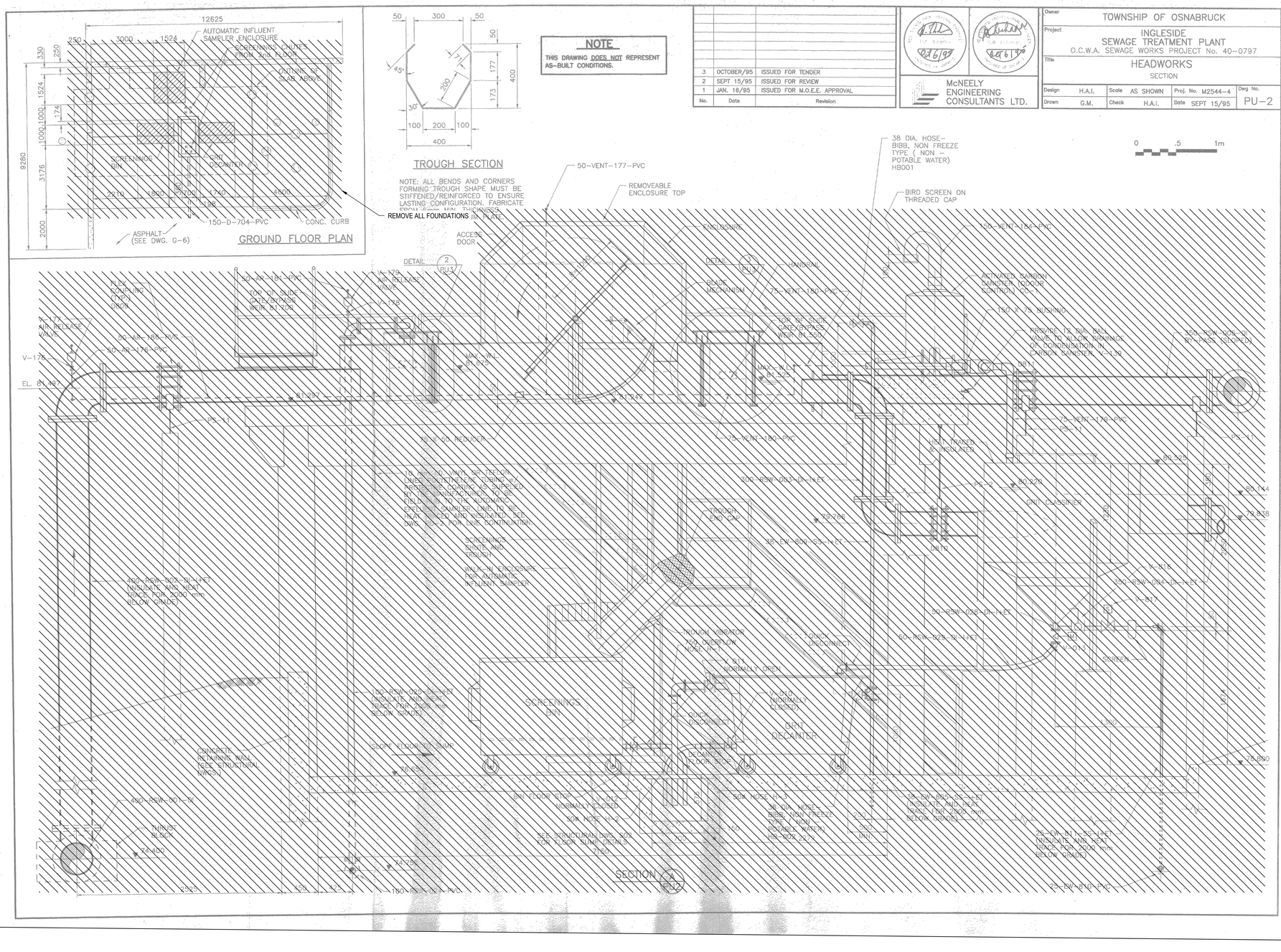

LEGEND:

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KEY PLAN

SCALE: N.T.S.

2025/03/13

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CLIENT:

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PROJECT:

INGLESIDE WWTP UPGRADES
PHASE 1

TITLE:

PROCESS: REMOVAL PLAN
(HEADWORKS)

SCALE:	JOB NO:
N.T.S.	19070
DESIGNED BY:	DATE:
J.B.	2025/03/13
DRAWN BY:	DRAWING NO.
K.B.W.	P1602
CHECKED BY:	
J.B.	

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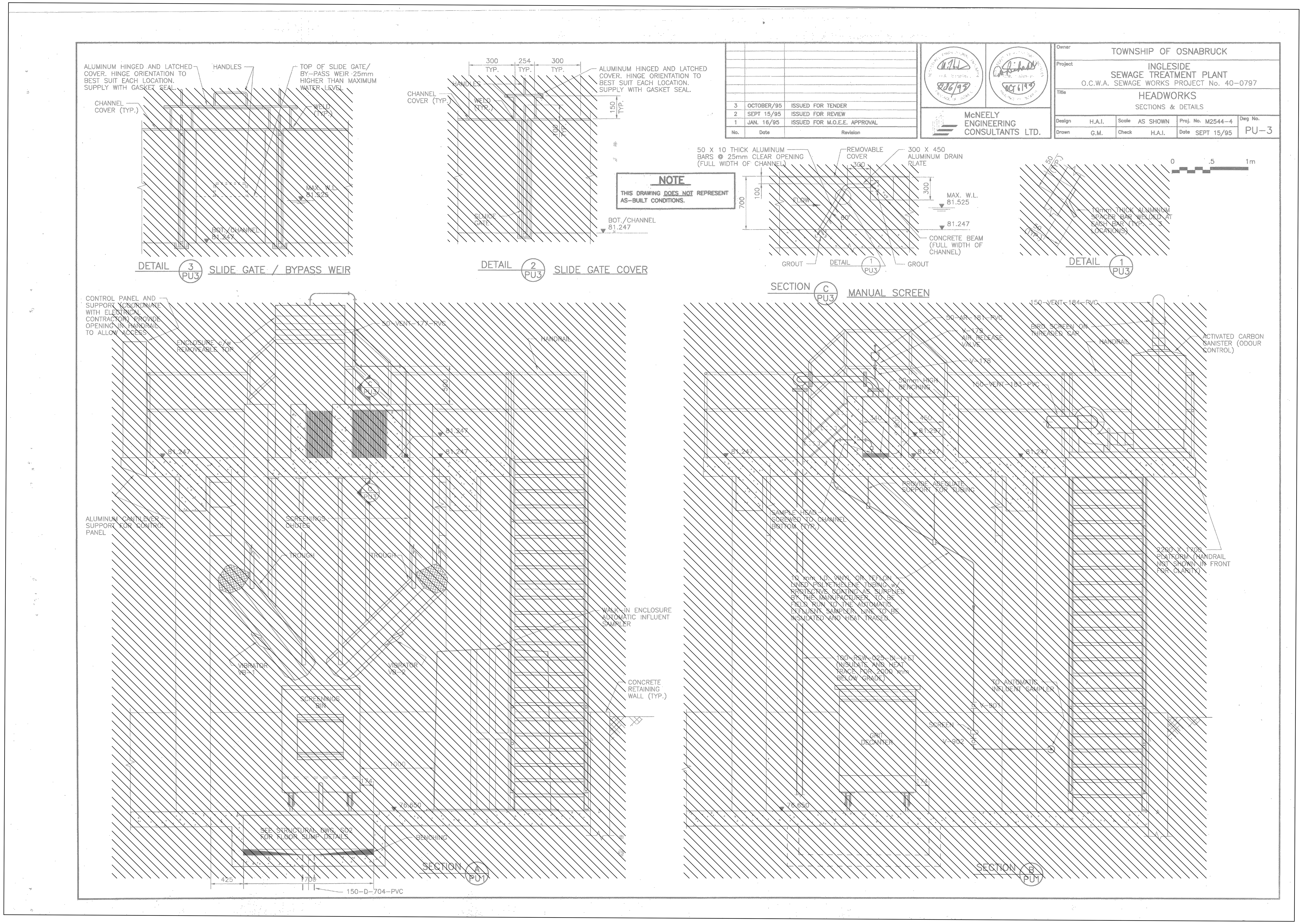

LEGEND:

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DATE	No.	REVISION
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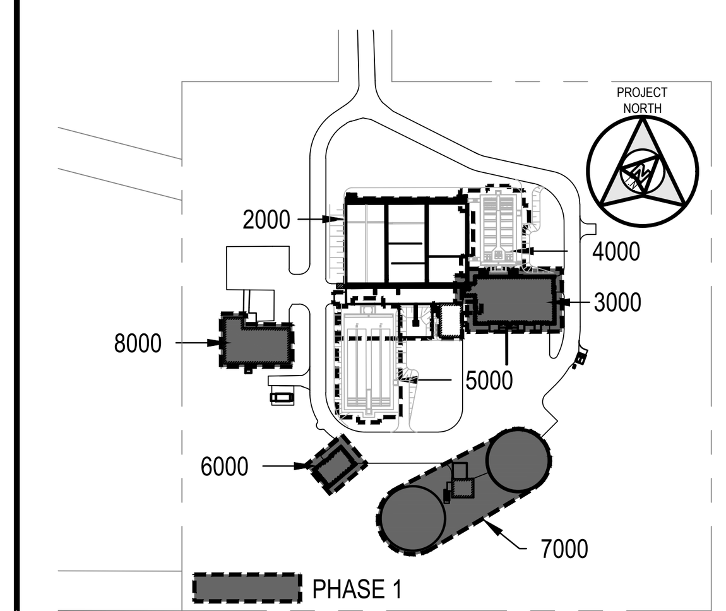

KEY PLAN

SCALE: N.T.S.

2025/03/13

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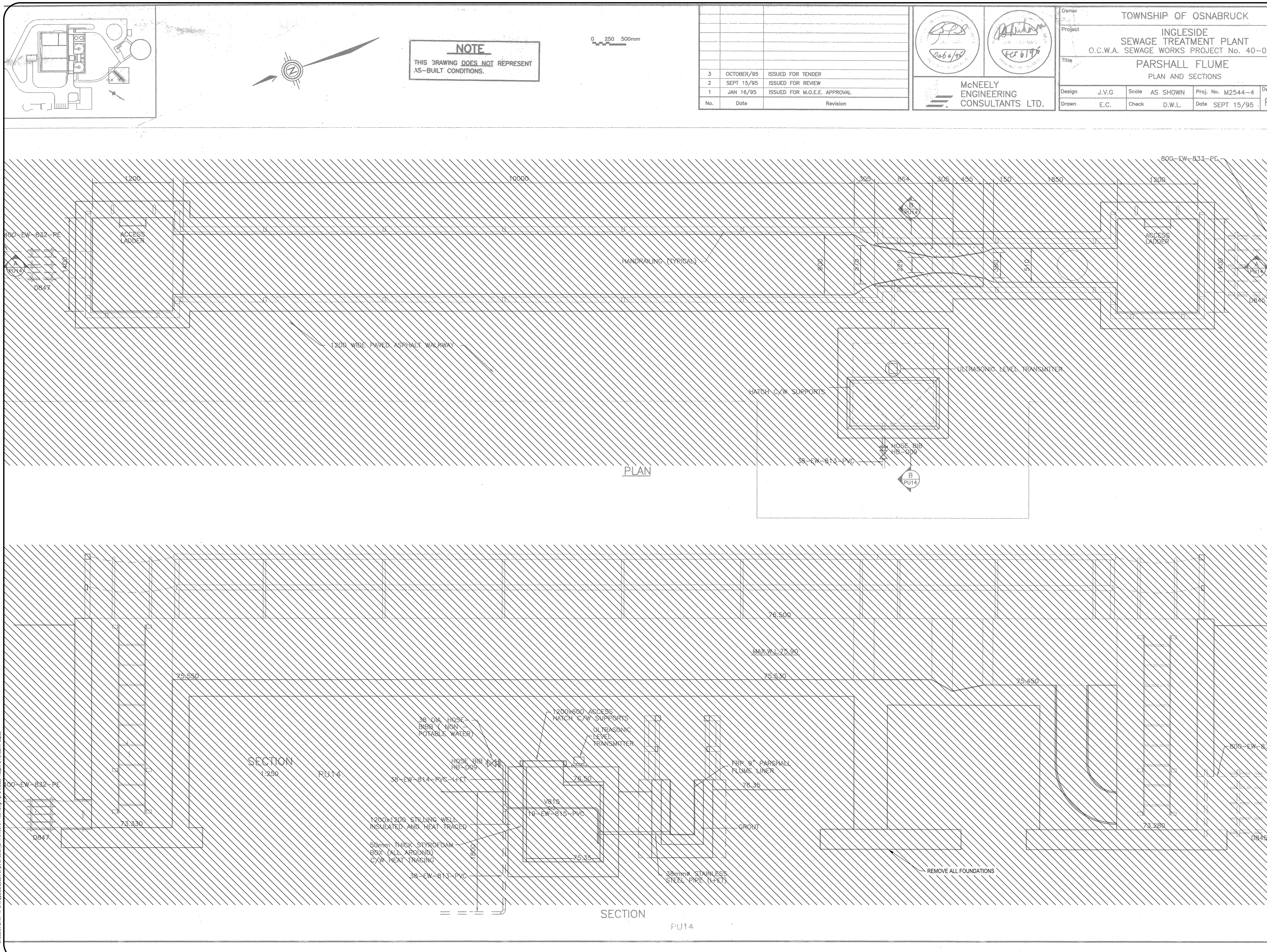
CLIENT:
TOWNSHIP OF SOUTH STORMONT

PROJECT:
INGLESIDE WWTP UPGRADES PHASE 1

TITLE:
PROCESS: REMOVAL PLAN (HEADWORKS)

SCALE: N.T.S.	JOB NO: 19070
DESIGNED BY: J.B.	DATE: 2025/03/13
DRAWN BY: K.B.W.	DRAWING NO.
CHECKED BY: J.B.	P1603



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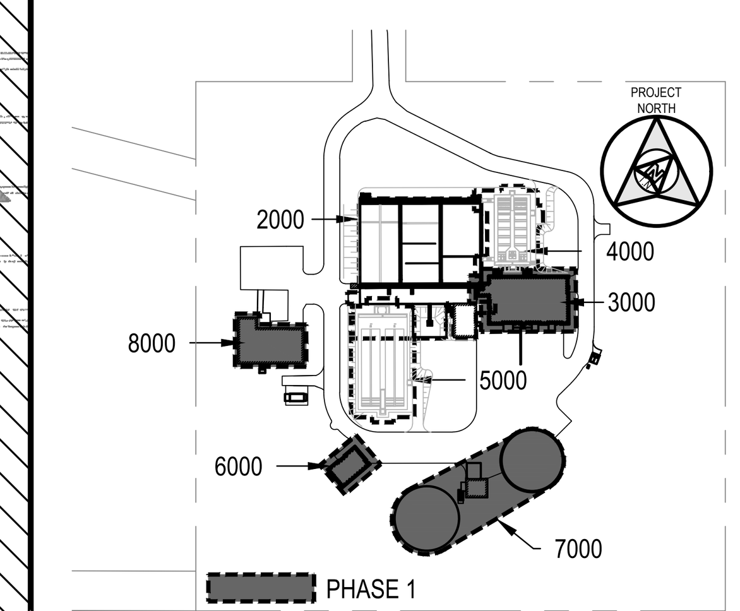
2025/02/14	1	ISSUED FOR PERMIT



KEY PLAN
SCALE: N.T.S.

2025/03/13

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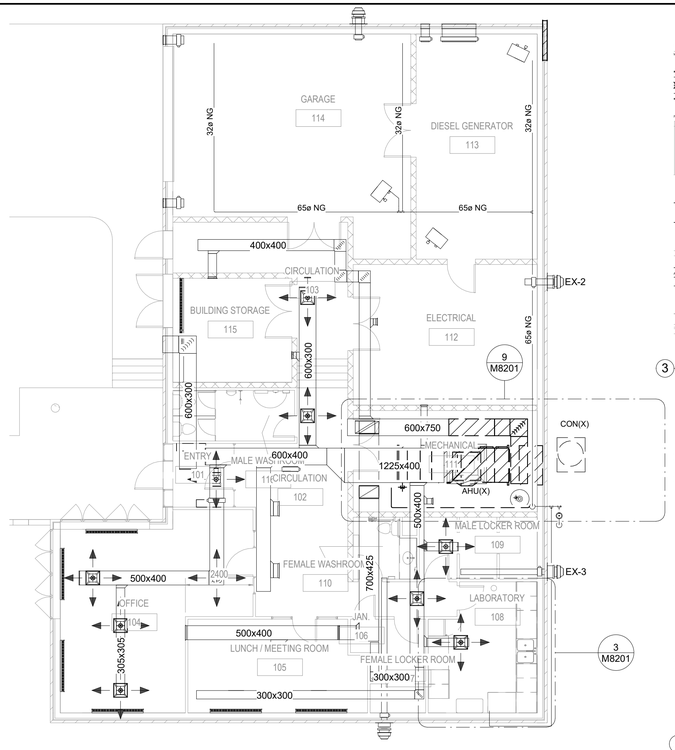
CLIENT:
TOWNSHIP OF SOUTH STORMONT

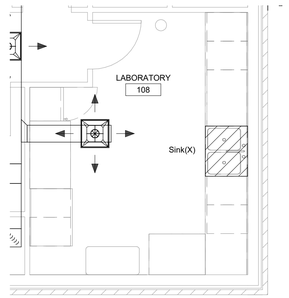
PROJECT:
INGLESIDE WWTP UPGRADES PHASE 1

TITLE:
PROCESS: REMOVAL PLAN (PARSHALL FLUME)

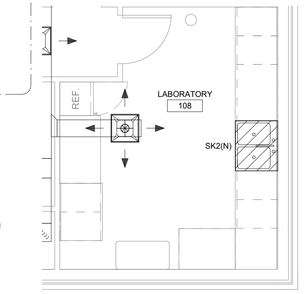
SCALE: N.T.S.	JOB NO: 19070
DESIGNED BY: J.B.	DATE: 2025/03/13
DRAWN BY: K.B.W.	DRAWING NO.
CHECKED BY: J.B.	P1604



1 GROUND FLOOR REMOVALS
1 : 100



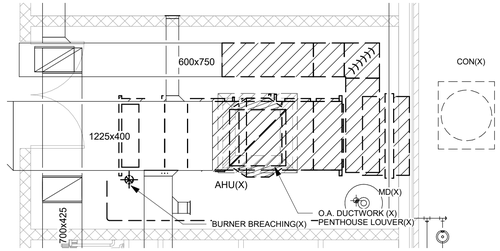
3 LABORATORY REMOVALS
1 : 50



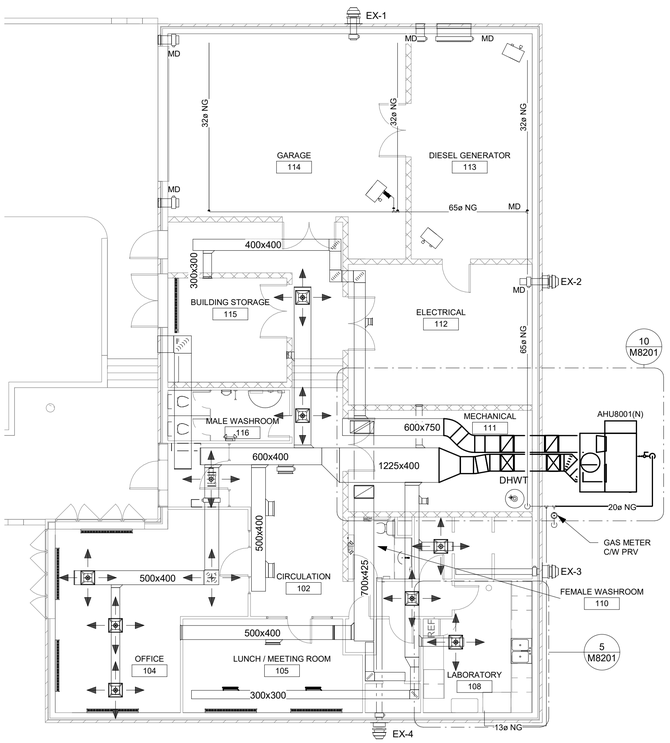
5 LABORATORY NEW WORK
1 : 50

DESCRIPTION OF WORK
-DEMOLITION:
1. CONTRACTOR TO REMOVE PLUMBING FIXTURES IN LABORATORY. KEEP DOMESTIC WATER PIPING AND SANITARY DRAINAGE PIPING FOR NEW WORK.
2. PRIOR TO AHU REMOVAL, CONTRACTOR IS TO MEASURE AIR FLOW OF SUPPLY AND RETURN DUCTWORK. AIR FLOW VALUES TO BE PROVIDED TO ENGINEER.
3. CONTRAC TO REMOVE AHU, DUCTWORK, GAS PIPING, FLUE EXHAUST VENTING, CONTROLS AND ACCESSORIES. CAP OUTSIDE AIR INTAKE AT ROOF LINE.
4. CONTRACTOR TO REMOVE EXTERIOR CONDENSOR C/W REFRIGERENT PIPING, CONTROLS AND ACCESSORIES.

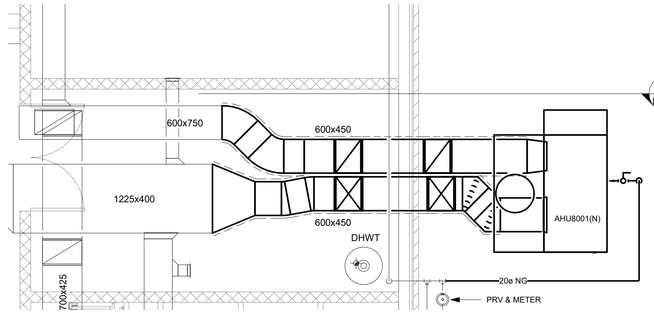
DESCRIPTION OF WORK
-NEW WORK:
1. CONTRACTOR TO PROVIDE NEW PLUMBING FIXTURES IN LABORATORY. EXTENED DOMESTIC WATER PIPING AND SANITARY DRAINAGE PIPING.
2. CONTRACTOR TO PROVIDE NEW ROOF TOP UNIT C/W FLAT BOTTOM CURB. UNIT TO BE INSTALLED AT GRATE ON CONCRETE SLAB. CONTRACTOR TO UTILISE CURB CAVITY FOR SUPPLY AND RETURN PLENUM.
3. CONTRACTOR IS TO PROVIDE NEW SUPPLY AND RETURN DUCTWORK. REUSE THE EXISING WALL LOUVER OPENING TO ROUTE DUCTWORK. EXISITNG ROOF CONNECTIONS FOR OUTSIDE AIR IS TO BE CAPPED AT ROOF LINEAND INSULATED. ALL NEW DUCTWORK IS TO BE INSULATED.
4. CONTRACTOR TO ADJUST THE NEW ROOF TOP UNIT'S SUPPLY AIR TO MATCH THE INITAL FLOW RATE OF THE PREVIOUS AHU. SUBMIT REPORT TO ENGINEER FOR REVIEW.



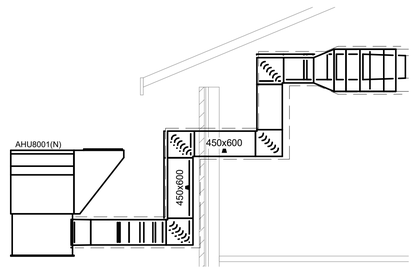
9 MECHANICAL ROOM REMOVALS
1 : 50



2 GROUND FLOOR NEW WORK
1 : 100

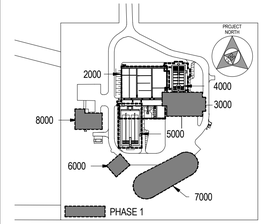


10 MECHANICAL ROOM NEW WORK
1 : 50



11 AHU ELEVATION VIEW
1 : 50

2025-04-23	4	ISSUED FOR ADDENDUM M1
2025/03/13	3	ISSUED FOR TENDER
2025/02/28	2	ISSUED FOR 100% REVIEW
2025/02/14	1	ISSUED FOR PERMIT
DATE	N0.	REVISION



KEY PLAN

SCALE: N.T.S.

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CLIENT:
TOWNSHIP OF SOUTH STORMONT

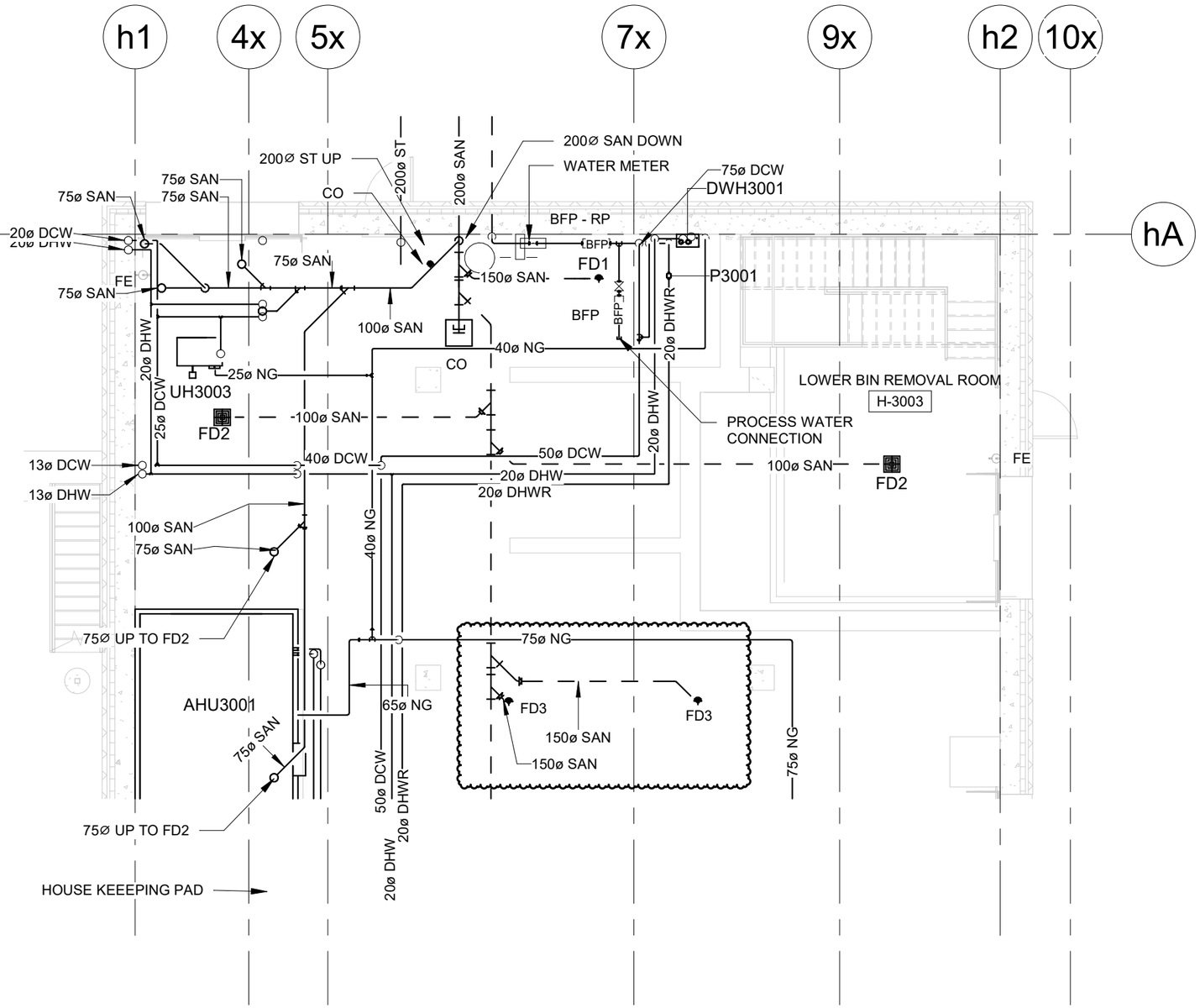
PROJECT:

INGLESIDE WWTP UPGRADES PHASE 1

TITLE:

8000 BUILDING MECHANICAL GROUND FLOOR REMOVALS AND NEW WORK

SCALE: AS NOTED	JOB NO: 2021-150
DESIGNED BY: P. LABELLE	DATE: 2025/03/13
DRAWN BY: P.LABELLE	DRAWING NO. M8201
CHECKED BY: R. LEFEBVRE	



LOWER LEVEL PLUMBING & UTILITIES FLOOR PLAN

1 : 100

REFERENCE DRAWING M3201

DESCRPTION OF WORK

1.PROVIDE NEW 150Ø HUB DRAIN FD3 WHERE INDICATED.REFER TO PLUMBING SCHEDULE FOR DETAILS. COORDINATE EXACT LOCATION WITH PROCESS PIPING DRAWINGS.

Client

DATE	REVISION	REF
2025-04-23	ADDENDUM M1	

Goodkey Weedmark
Consulting Engineers

GOODKEY WEEDMARK & ASSOCIATES LIMITED

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Ottawa Ontario 613-727-5115 Fax
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Project/Projet

3000 BUILDING INGLESIDE WWTP UPGRADES

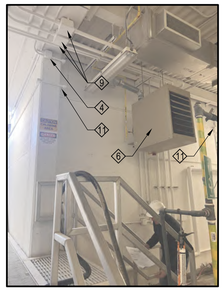
Drawing title/Titre du dessin

NEW HUB DRAIN ADDITION

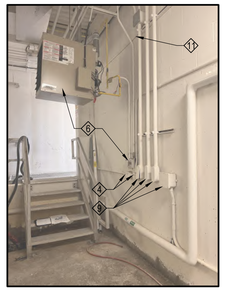
Scale / Échelle	1 : 100
Design by / Conçu par	P. LABELLE
Drawn by / Dessiné par	A.THANKACHAN
Project no./ No.du projet	2021-150
Reviewed by / Examiné par	R. LEFEBVRE
DWG. No. / No. DESSIN	ADD-M1-SK1
Date	2025/04/23

1 E2002 PHOTO #1
SCALE: NTS

2 E2002 PHOTO #2
SCALE: NTS



3 E2002 PHOTO #3
SCALE: NTS



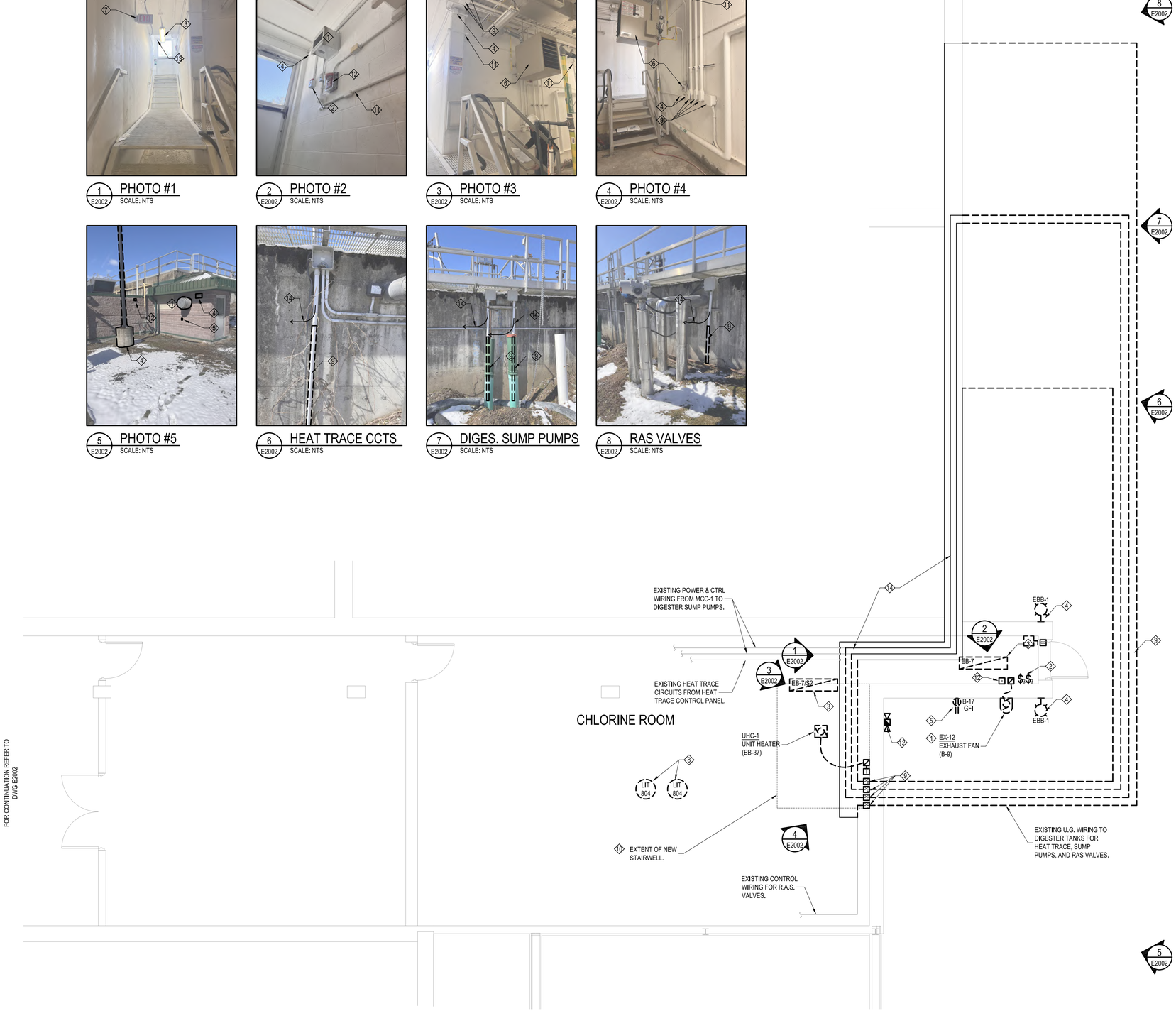
4 E2002 PHOTO #4
SCALE: NTS

5 E2002 PHOTO #5
SCALE: NTS

6 E2002 HEAT TRACE CCTS
SCALE: NTS

7 E2002 DIGES. SUMP PUMPS
SCALE: NTS

8 E2002 RAS VALVES
SCALE: NTS



DEMOLITION NOTES

1. EXHAUST FAN TO BE REMOVED BY OTHER. DISCONNECT AND REMOVE ASSOCIATED ELECTRICAL WIRING.
2. DISCONNECT AND REMOVE LIGHT SWITCHES. PROVIDE NEW SWITCHES AT BASE OF NEW STAIRWELL AND RECONNECT TO EXISTING LIGHTING CIRCUIT.
3. DISCONNECT AND REMOVE EXISTING LIGHT FIXTURE.
4. DISCONNECT AND REMOVE EXISTING EXTERIOR LIGHT FIXTURES AND ASSOCIATED WIRING WITH DEMOLITION EXTENTS, RE-ROUTE WIRING OUTSIDE OF STAIRWELL AREA AS REQUIRED TO ANY FIXTURES TO REMAIN.
5. DISCONNECT AND REMOVE EXTERIOR RECEPTACLE.
6. UNIT HEATER TO BE REMOVED BY AND REPLACED IN SOUTH EAST CORNER OF BASEMENT BY MECH. EXTEND EXISTING 120VAC CIRCUIT TO NEW LOCATION.
7. DISCONNECT AND REMOVE EXIT SIGN.
8. ALUM STORAGE TANKS TO BE REMOVED BY OTHER. DISCONNECT AND REMOVE LEVEL TRANSMITTERS AND ASSOCIATED WIRING BACK TO EXISTING PLC PANEL.
9. REMOVE UNDERGROUND CONDUIT AND WIRING TO DIGESTER TANKS.
10. DISCONNECT, REMOVE AND RE-ROUTE ALL WIRING WITHIN EXTENTS OF NEW STAIRWELL. REFER TO STRUCTURAL/ARCHITECTURAL DRAWINGS FOR EXACT DEMOLITION EXTENTS AND ARRANGMENT OF NEW STAIRWELL.
11. DISCONNECT AND REMOVE 120VAC WIRING TO EXHAUST FAN AND EXTERIOR RECEPTACLE BACK TO NEAREST JUNCTION POINT OUTSIDE OF DEMOLITION AREA.
12. DISCONNECT AND REMOVE FIRE ALARM DEVICE AND ASSOCIATED WIRING WITHIN DEMOLITION EXTENTS. MAKE GOOD REMAINING CIRCUITS.
13. DISCONNECT AND REMOVE SECURITY SYSTEM DOOR CONTACTS. MAKE GOOD REMAINING CIRCUITS.
14. RE-REOUTE EXISTING WIRING TO DIGESTERS TANKS IN PVC CONDUIT ALONG EXTERIOR OF TANK WALLS AND INTO BASEMENT AND RE-ESTABLISH CONNECTION TO INTERIOR CONDUIT SYSTEM OUTSIDE OF STAIRWELL EXTENTS.

LEGEND:

- EXISTING EQUIPMENT TO REMAIN
- EXISTING EQUIPMENT TO BE REMOVED
- NEW EQUIPMENT

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2025/03/13	3	ISSUED FOR TENDER
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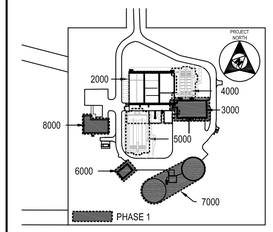

KEY PLAN
SCALE: N.T.S.

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CLIENT:
TOWNSHIP OF SOUTH STORMONT

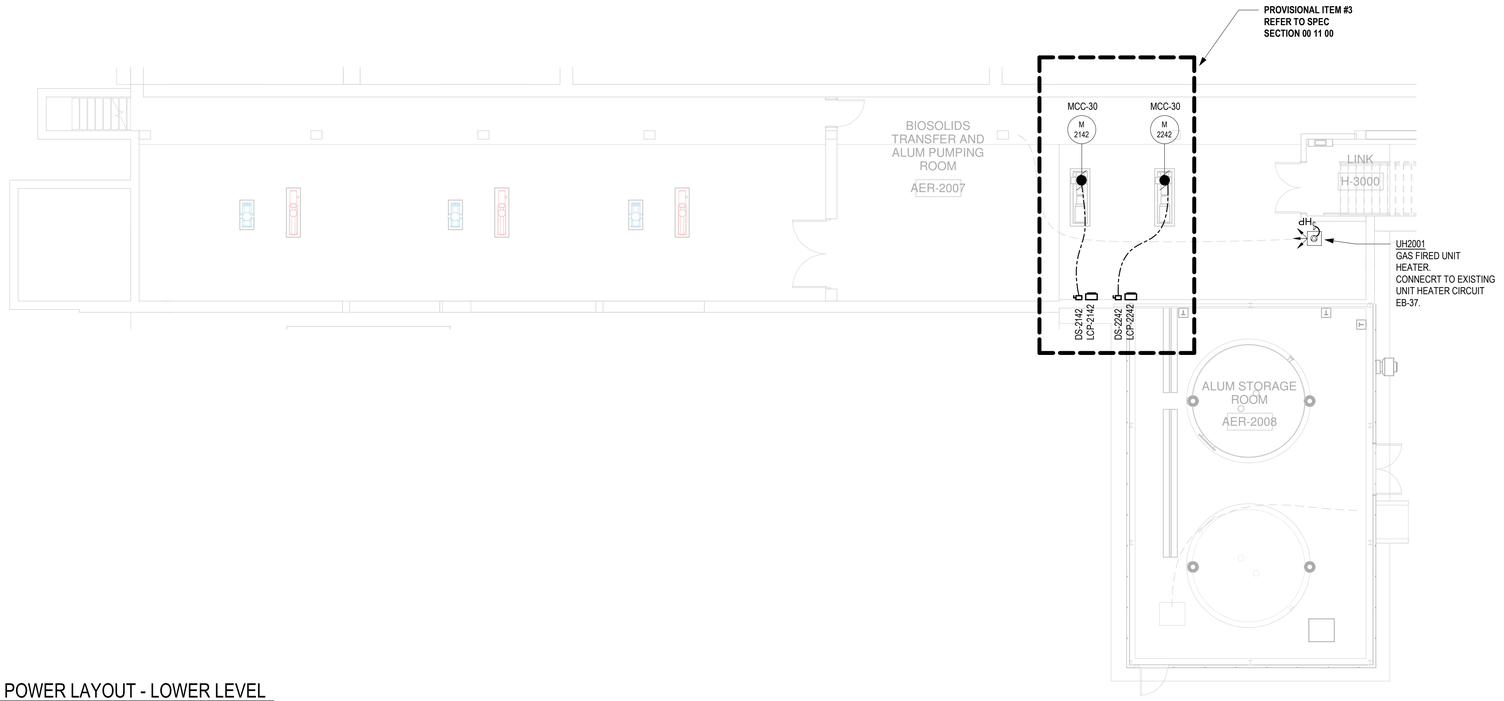
PROJECT:

INGLESIDE WWTP UPGRADES PHASE 1

TITLE:

ELECTRICAL DEMOLITION PLAN - CHLORINE ROOM

SCALE: 1:50	JOB NO: 19070
DESIGNED BY: B.M.	DATE: 2025/03/13
DRAWN BY: B.M.	DRAWING NO. E2002
CHECKED BY: J.S.	



1 E2102 POWER LAYOUT - LOWER LEVEL
SCALE: 1 : 100

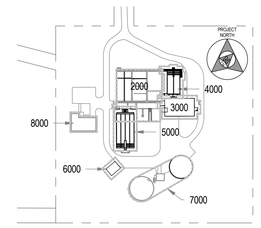
GENERAL NOTES:

1. REFER TO DRAWING E0001 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS APPLICABLE TO ALL CONTRACT DRAWINGS.
2. REFER TO SINGLE LINE DIAGRAM FOR EQUIPMENT RATINGS AND WIRING METHODS.
3. REFER TO DRAWING E2152 FOR CABLE TRAY LAYOUT.

DRAWING NOTES:

1. THERMOSTAT PROVIDED, INSTALLED AND WIRED BY MECHANICAL CONTRACTOR (DIVISION 20).
2. EXTEND WIRING TO MOTORS OVERHEAD WITHIN CABLE TRAY. PROVIDE C-CHANNEL SUPPORT FOR CABLE DROPS TO MOTORS. SEE **DETAIL 2/E0401** FOR TYPICAL ARRANGMENT.

DATE	NO.	REVISION
2025/04/25	2	ISSUED FOR ADDENDUM 6
2025/02/14	1	ISSUED FOR PERMIT



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SCALE: N.T.S.

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CLIENT:
TOWNSHIP OF SOUTH STORMONT

PROJECT:
INGLESIDE WWTP
UPGRADES

TITLE:
AREA 2000 - POWER LAYOUT - LOWER LEVEL

SCALE:	JOB NO:
AS NOTED	19070
DESIGNED BY:	DATE:
B.M.	2020/06/30
DRAWN BY:	DRAWING NO.
B.M.	E2102
CHECKED BY:	
J.S.	

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Complete manufacture and installation of interior signage.

.2 Related Requirements:

.1 Section 06 10 00 – Rough Carpentry

1.2 REFERENCES

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

.1 ASTM D635-22, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

.2 ASTM D1929-23, Standard Test Method for Determining Ignition Temperature of Plastics.

.3 ASTM E84-24, Standard Test Method for Surface Burning Characteristics of Building Materials.

.4 ASTM E2072-24, Standard Specification for Photoluminescent (Phosphorescent) Safety Marketing.

.5 ASTM E2073-24, Standard Test Method for Photopic Luminance of Photoluminescent (Phosphorescent) Markings.

.2 Underwriters Laboratories (UL):

.1 UL 94-23 (R2024), Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

.2 UL 723-18 (R2023), Test for Surface Burning Characteristics of Building Materials.

1.3 PERFORMANCE REQUIREMENTS

.1 Provide signage that conforms to the requirements of all regulatory agencies holding jurisdiction.

.2 Requirements:

.1 Comply with all applicable provisions of the latest ADA Standard for Accessible Design.

.2 Character Proportion: Refer to drawings and details for letters and numbers on signs.

.3 Colour Contrast: Refer to drawings and details for characters and symbols must contrast with their background - either light characters on a dark background or dark characters on a light background.

.4 Raised Characters or Symbols: Refer to drawings and details for letters and numbers on signs must be raised 1/32 in (0.8 mm) minimum and be sans serif characters. Raised characters or symbols must be at least 5/8 in (16 mm) high but no higher than 2 in (50 mm). Symbols or pictograms on signs must be raised 1/32 in (0.8 mm) minimum.

.5 Symbols of Accessibility: Accessible facilities required to be identified must use the international symbol of accessibility.

.6 Braille: Grade I with accompanying text.

.3 Fire Performance Characteristics:

.1 Provide signage with surface burning characteristics that consist of a flame spread of 75 and a smoke development of 120 when tested in accordance to UL 723 (ASTM E 84).

.2 Self-Extinguishing: Provide signage with a CC1 classification for .060 in thick material when tested in accordance with the procedures in ASTM D 635, Standard Test Method for Rate of Burning and/or Extent and Time of Burning Plastics in a Horizontal Position.

.3 Vertical Burn: Provide material that is classified as 94V-2 for material .118 in thick or greater and 94HB for material .118 in thick or less when tested in accordance with UL 94, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

.4 Self-Ignition Temperature: Provide material that has a self-ignition temperature of 800 degrees Fahrenheit (427 degrees Celsius) when tested in accordance with ASTM D 1929.

1.4 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Action Submittals:

.1 Product Data: Manufacturer's data sheets on each product to be used, including:
- .1 Preparation instructions and recommendations.
- .2 Storage and handling requirements and recommendations.
- .3 Installation methods.

.2 Shop Drawings:
- .1 Submit shop drawings, catalogue sheets and full-size templates.
- .2 Indicate materials, thicknesses, sizes, finishes, colours, construction details, removable and interchangeable components, mounting methods, schedule of signs.
- .3 Submit drawn-to-scale details for signage indicating word and letter spacing.

.3 Message List: Signage report indicating signage location, text and sign type.

.4 Samples:
- .1 Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and available pictograms, characters, and Braille indications.

.2 Verification Samples: For each finish product specified, two samples, representing actual product, color, and typical pictograms, characters, and Braille indications.

.3 Informational Submittals:

.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.5 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Minimum 2 years documented experience in work of this Section.

.2 Installer Qualifications: Minimum 2 years documented experience in work of this Section.

.3 Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

.1 Furnish signs designated by Consultant.

.2 Do not proceed with remaining work until workmanship, colour, and sheen are approved by Consultant.

.3 Refinish mock-up area as required to produce acceptable Work.

1.6 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for illuminated signs for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials in unopened factory packaging.

.3 Inspect materials at delivery to verify there are no defects or damage.

.4 Store products in manufacturer's original packaging until ready for installation in climate-controlled location away from direct sunlight.

.5 Waste Management: separate waste materials in accordance with Section 01 74 20 – Construction/Demolition Waste Management and Disposal.

.6 Store and dispose of solvent-based materials, and materials used with solvent-based materials in accordance with requirements of local authorities having jurisdiction.

Part 2 Products

2.1 PROJECT CONDITIONS

.1 Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

2.2 MANUFACTUERERS

.1 Acceptable Manufacturers:

.1 Wintle Signs: Box 642 Osgooge Ontario, K0A 2W0, Ph:613-826-0811, Cell: 613-552-1046.

.2 Acumen Visual Group, 30 Riviera Drive Markham ON Canada L3R 5M1 Phone: +1 905-947-0770 Web: www.ideasbuilt.ca

.3 Marvel Sign and Display, Inc., 99 Rodinea Road, Unit 1, Vaughan, Ontario L6A 1R3, Canada. Phone: (905) 856-6920 Email: alan@marvelsigns.ca, Web: www.marvelsigns.ca

.4 WSI Sign System Ltd. & KING Architectural Products, 31 Simpson Road, Bolton - Ontario L7E 2R6. Phone: (905) 857-2804. Web: www.king-ap.com.

.5 Nova Polymers, Inc. which is located at: 8 Evans St. Suite 201; Fairfield, NJ 07004; Toll Free Tel: 888-484-NOVA (6682); Email:request info (info@novapolymers.com); Web:www.novapolymers.com

.6 Sign FX Inc. 106 Tansley Dr, Carp, Ontario K0A 1LO. Phone: (613) 831-9622. Web: signfx.ca

2.3 SIGNAGE - GENERAL

.1 It is the intent of these specifications to establish a sign standard for the Owner including but not limited to, wall-mounted directional signs, primary room identification, restrooms, conference rooms and all code compliant Braille signage.

.2 Comply with all applicable provisions of the 2010 ADA Standard for Accessible Design codes that apply to the State and Local jurisdiction of the project.

.3 If required text and graphics are not indicated in specification or on drawings, obtain Owner's instructions as to text and graphics prior to preparation of shop drawings.

.4 Typography: See Drawings. Copy shall be a clean and accurate reproduction of typeface(s) specified. Upper and lower case and all caps as indicated in Sign Type drawings and Signage Schedule. Letter spacing to be set by manufacturer.

.5 Arrows, symbols and pictograms will be provided in style, sizes, colors and spacing as indicated in drawings for each sign system.

.6 Braille:

.1 Grade 1 Braille.

.7 Design:

.1 Text/Graphics Placement: As indicated on details.

.2 Font: As indicated on the details.

2.4 INTERIOR SIGNAGE

.1 Panel Material:

.1 6.35 mm thick (1/4”) black plexi door signs, white lettering.

.2 Graphics to be 0.7 mm thick vinyl

.3 Type and Colour: To be selected from manufacturer's full colour range by Consultant.

.4 Edges to be bevelled and polished

.5 Barrier Free washroom signs to have symbol and braille

.6 Size: as per details.

.7 Mounted using screws and caps.

.8 Surface burning characteristics: Flame spread/smoke developed rating less than 75/120, tested to ASTM E84 and UL 723.

.9 Rate of burning: Tested to ASTM D635 at nominal 1.5 mm (0.060 inch) thickness with resulting Classification CC1.

.10 Vertical burning: Tested to UL 94, classified as 94V-2 in thickness of 3.0 mm (0.118 inch) or greater and 94HB in thicknesses less than 3.0 mm (0.118 inch).

.11 Self-ignition temperature: 427 degrees Celsius (800 degrees Fahrenheit), tested to ASTM D1929.

2.5 ACCESSORIES

.1 Fasteners: Stainless steel screws.

2.6 FABRICATI0N

.1 Fabricate panel material in accordance with manufacturer's instructions and approved shop drawings.

.2 Characters:

.1 Height: Refer to Drawings.

.2 Style: Refer to Drawings.

.3 Width to height ratio: Refer to Drawings.

.4 Stroke width to height ratio: Refer to Drawings.

.3 Pictograms: Refer to Drawings.

.4 Provide Braille Grade indications for each character.

Part 3 Execution

3.1 EXAMINATION

.1 Do not begin installation until substrates have been properly prepared.

.2 If substrate preparation is the responsibility of another installer, notify Consultant of unsatisfactory preparation before proceeding.

3.2 PREPARATION

.1 Clean surfaces thoroughly before installation.

.2 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, data sheets and approved shop drawings.

.2 Erect and secure signs plumb and level at elevations as directed by Consultant.

3.4 SYSTEM DEMONSTRATION

.1 Provide on-site demonstration and review of sign components to ensure signs are in full functional working order prior to completion of Work.

3.5 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Leave signs clean.

.3 Remove debris.

.4 Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

PORTABLE GANTRY CRANE AND HOISTS

PART 1 GENERAL

1.1 INTENT

.1 This section covers supply, delivery, supervision of installation and commissioning of portable and adjustable gantry cranes, chain hoists and related accessories.

1.2 RELATED SECTIONS

.1 Division 01 – General Requirements

.2 Division 11 – Equipment

1.3 OPERATING CONDITIONS

.1 The following site operating and water quality conditions must be assumed for all design calculations:

.1 35^{o}C maximum/-40^{o}C minimum ambient air temperature.

.2 95% maximum relative humidity (non-condensing).

.2 Refer to the Contract Drawings for further details.

1.4 REFERENCES

.1 ASME HST-4-2021 - Performance Standard for Overhead Electric Wire Rope Hoists

.2 ASME B30.2-2022 - Overhead and Gantry Cranes.

.3 CSA W47.2-11 (R2020) - Certification of Companies for Fusion Welding of Aluminum

.4 Ontario Occupational Health and Safety Act and Regulations.

1.5 SUBMITTALS

.1 Submit the Shop Drawings for review in accordance with Section 01 33 00 – Submittals.

.2 The shop drawing submission shall include, but not be limited to, the following:

.1 Provide sufficient detail to show the general construction pertinent to the proper review of the equipment and of the description of the materials of construction, including;

.1 Details of vertical, diagonal, and horizontal members, chains suspension fittings, safety stops and bumpers.

.2 Manual hoist technical details from the manufacturer.

.3 General assembly drawings of the components.

.4 The Supplier shall indicate a list of spare parts which they would recommend be purchased and individual prices for each item.

.5 All ancillary equipment to be provided by the Supplier shall be listed.

.6 Special accessories or tools for the adjustment or removal of parts required for any piece of equipment shall be listed and furnished as part of the supply.

.7 Shop drawings shall be stamped and signed by an engineer registered to practice in Ontario.

.3 Submit load testing plans and certified test results.

1.6 QUALIFICATIONS

.1 The Supplier shall have a minimum of five (5) years of recent experience in the manufacturing of portable hoists.

1.7 MAINTENANCE DATA

.1 Maintenance manual shall be supplied and shall be submitted in accordance with the submittals section. Refer to section 01 77 00 – Closeout Procedures. Equipment designations used shall correspond to those indicated on the drawings.

.2 Maintenance manuals shall include the following:

.1 Equipment function, and limiting conditions.

.2 Assembly, installation, alignment, adjustment, and checking instructions.

.3 Parts lists and predicted life of parts subject to wear

.4 The maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered.

PART 2 PRODUCTS

2.1 GENERAL

.1 All lifting systems shall be capable of overcoming the initial dislodging force, overcoming friction including pump and lifting chain weight (the sum of all of these weights is referred to as the minimum weight) with a minimum factor of safety of 4.0 minimum.

.2 Portable systems shall be manufactured from materials that are compatible and shall not corrode, and will operate safety, in all weather conditions.

2.2 PORTABLE GANTRY CRANE

.1 Provide one (1) portable and adjustable gantry crane to the following specifications:

.1 Lightweight, corrosion-resistant, all aluminum alloy construction, with anodized powder coated finish.

.2 Minimum 1100 kg lifting capacity.

.3 Minimum 2.0 m clear span between supporting legs, adjustable to 6.0 m, clear span with a maximum lifting height of 3.10 m from the ground.

.4 Adjustable beam span and support leg height.

.5 Extruded hollow aluminum alloy box beam.

.6 Fittings

.1 Provide all fittings; include all structural aluminum hangers, braces and all connection hardware.

.2 Provide adequately sized fabricated fittings for the indicated loads and factor of safety.

.3 Provide proper bracing to prevent movement of rail beam during operation.

.7 Safety Stops and Bumpers

.1 Fit open ends of the crane beam with safety stops or bumpers to prevent trolley from running off the ends.

.8 Bolts, Nuts and Clamps

.1 Provide screwed-on, painted and weatherproof nameplates indication crane capacity, as approved by the Engineer.

.9 Gantry base with four caster wheels with 360 swivel and locking casters.

.10 The gantry crane shall be supplied complete with a beam trolley, as supplied by EME Model 2200LW or approved equivalent.

.11 The gantry crane shall be supplied with one (1) manual chain hoist). Hoist capacity shall be equal to the lifting capacity of the portable crane specified and be supplied with 10 m of galvanized chain.

2.3 PORTABLE LIFTING DAVIT AND ACCECCORIES

.1 Provide one (1) light weight, portable lifting davit as specified herein and shown on the contract drawings. Davit shall be:

.1 Lightweight, corrosion-resistant, aluminum alloy construction, with power coated finish.

.2 Minimum 1,000 kg lifting capacity.

.3 Minimum 2,030 mm lifting height.

.4 Minimum 1,270 mm turning radius.

.5 Total assembled weight shall be less than 86 kg.

.6 Lifting davit to be supplied with three (3) side mount sockets and one (1) 1,067 mm socket extenders. Extenders to be constructed of mild steel tube and have power coated surface finish.

.7 Lifting davit to be equipped with an electric winch with 1,000 kg lifting capacity, with minimum 30' of wire rope, equipped with push button pendant controls, and suitable for supply from a 120V, 60 Hz, 20A standard receptacle.

.8 Lifting davit shall be supplied with grip eye.

.9 A storage box shall be supplied for the winch.

2.4 TROLLEY AND HOIST

.1 A Trolley and Hoist shall be provided for each of the lifting beams (2 of) identified in the Structural design package, one for the screening room area and one for the future blower room, both on the second floor of the new Headworks Building (Area 3000).

.2 Chain Hoists (2 of)

.1 Capacity: 2 Tonne.

.2 Hoist Type: Kito hand chain model CF-020 (or approved equivalent)

.3 Trolly Type: Manual Trolley TSP 005 by O'Brien Source

.4 Lifting Height: 8000mm or as shown on the design drawings.

.5 Method of Control: Manual.

.6 Monorail Beam: W310X67 refer to Structural design drawings.

.3 The lifting tackle shall consist of a lower block and hook, necessary sheaves and wire rope, made especially for hoisting service. Wire rope shall be as recommended by the rope manufacturer for use on the specified drum. The lower block shall be of the safety type with guarded sheaves. The sheaves shall have antifriction or sleeve type bearings.

.4 Hooks: Each load hook shall be slow opening, non-fracturing, forged steel and shall be provided with a safety latch. The hooks shall be mounted on antifriction bearings to permit easy turning.

.5 Self-Locking Worm Gears: Each hoist shall be equipped with self-locking worm gears.

.6 Chain wall hooks shall be provided to maintain the chain/cable out of the travelled areas when not in use.

2.5 WARRANTY

.1 The manufacturer shall provide a two (2) year warranty on all components against defects in workmanship and materials from the data of startup. All components shall be fully tested prior to shipping.

2.6 ACCEPTABLE MANUFACTURERS

.1 Equipment must be supplied from the following acceptable Manufacturer:

.1 EME – Easily Moved Equipment.

.2 O'Brien Source.

.2 Devices whose Manufacturer does not have substantiated test data from recognized and independent testing facilities for exact design being provided, shall not be allowed.

PART 3 EXECUTION

3.1 INSTALLATION AND INSPECTION

.1 The hoist system shall be installed as indicated on the Contract Drawings, in accordance with the Manufacturer's recommendations and as approved by the Engineer.

.2 Provide the services of a factory trained representative to inspect, operate, test, adjust, and troubleshoot the installation.

.3 Provide and install all lubricants and liquids necessary for initial operation of the equipment.

.4 Inspection to include checking for:

.1 Cracks and other damaged or defective parts. Each system, as well as accessories, must be undamaged, without cracks and free of defective parts.

.2 Completeness of installation as specified and as recommended by the Manufacturer.

.3 Correctness of setting, alignment and relative arrangement of various parts of the system.

.5 Provide for additional supervision of installation by Equipment Supplier as required. Arrange with the Engineer a mutually agreeable date when the representative should be on site.

.6 Submit a report, signed by the Manufacturer's representative, describing in detail the inspection, tests, and adjustments made, quantitative results and suggestions for precautions to be taken to ensure proper maintenance. The report must verify that the equipment conforms to all specifications.

3.2 MECHANICAL TESTING AND CERTIFICATION

.1 After startup and prior to final acceptance, the Contractor shall conduct Engineer witnessed performance tests on the equipment.

.2 The field service representative will cause the hoist system mechanism to perform all mechanical functions that the mechanism is designed to perform. Tests will be scheduled with the Engineer at least two (2) weeks prior to the planned test date.

.3 The field service representative shall submit to the Engineer a written report stating that the equipment has been checked and is suitable for operation.

3.3 SUPERVISION OF INSTALLATION AND COMMISSIONING

.1 Test and commission the equipment in accordance with Section 01810 – Testing and Commissioning.

.2 At the completion of satisfactory installation, each unit shall be started by the General Contractor under the supervision of the Supplier and in conjunction with plant operating conditions. All controls and alarms shall be checked and tested to ensure proper control and equipment protection.

.3 Equipment shall only be accepted after receipt of a satisfactory report submitted by the Manufacturer's representatives.

.4 Modify or replace equipment or materials failing required tests.

.5 Perform additional testing required due to changes of materials, and/or failure of materials or construction to meet specifications at no extra cost to the Owner.

3.4 TESTING

.1 Test all equipment after installation in the presence of the Engineer to verify that it meets the stated specifications, local codes and Ministry of Labour requirements.

.2 After installation has been completed and before being placed into service, the portable lifting systems shall be operated manually and tests carried out to provide the following:

.1 All clearances and alignments are in order.

.2 All protective devices operate satisfactorily.

.3 After the above has been completed, the portable lifting systems will be tested with the hook carrying:

.1 Rated load: During these tests, the equipment shall show itself capable of dealing with the overload without difficulty. Load test to 125% of the rated load.

.2 All test weights and slings shall be provided.

.3 Where the equipment does not meet the specifications, it is to be revised, replaced or readjusted to the satisfaction of the Engineer until it does meet the specifications.

.4 A written test report shall be sent to the Engineer and be included in the maintenance manual.

3.5 TRAINING

.1 Operator instruction and training on equipment shall be provided. The training will give a complete overview of all equipment, testing, adjusting, and maintenance procedures.

3.6 STORAGE

.1 The equipment and accessories shall be stored indoors in a dry area, in accordance with the Manufacturer's recommendations.

3.7 MAINTENANCE

.1 Provide maintenance on Supplier's material as required by the Supplier from the date of delivery to the initial startup.

END OF SECTION

PIPING, VALVES & FITTINGS - GAS

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 This section shall be read in conjunction with specification Section 20 05 01 - Mechanical General Requirements, all mechanical sections, and all other disciplines related to the project.

1.2 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.5-2020, Pipe Flanges and Flanged Fittings, NPS ½ through NPS 24, Metric/Inch.

.2 ASME B16.20-2023, Metallic Gaskets for Pipe Flanges.

.3 ASME B16.21-2021, Nonmetallic Flat Gaskets for Pipe Flanges.

.4 ASME B18.2.1-2012 (R2021), Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series).

.5 ASME BPVC.IV-2023, 2023 ASME Boiler and Pressure Vessel Code, Section IV: Heating Boilers.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM A47/A47M-99(2022)e1, Specification for Ferritic Malleable Iron Castings.

.2 ASTM A53/A53M-24, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.

.3 Canadian Standards Association (CSA)

.1 CSA B149.1-20, Natural Gas and Propane Installation Code.

.2 CSA B149.2:20, Propane Storage and Handling Code

.3 CSA W47.1:19 (R2024), Certification of Companies for Fusion Welding of Steel Structures.

1.3 PRODUCT DATA

.1 Submit product data in accordance with Section 20 05 01 - Mechanical General Requirements.

.2 Indicate on manufacturers catalogue literature following: - valves.

1.4 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in Section 20 05 01 - Mechanical General Requirements.

PART 2 PRODUCTS

2.1 PIPE

.1 Above ground steel pipe: to ASTM A 53/A 53M, Grade B Schedule 40, Electric-resistance welded (non-seamless) as follows:

.1 NPS ½ to 2, screwed outside, with socket welded within the building.

.2 NPS ½ to 2, screwed, socket welded where concealed within the building.

.3 NPS 2½ and over, welded.

.2 **Below grade polyethylene pipe: to CSA B137.4 and CSA B149.1 c/w coated aluminum AWG 14 tracer wire extended above grade at beginning and end. Magnetic tape is not acceptable.**

.1 **Acceptable material: Performance Pipe - Driscoplex 6500-PE2406.**

2.2 JOINTING MATERIAL

.1 Screwed fittings: pulverized lead paste.

.2 Welded fittings: to CSA W47.1.

.3 Flange gaskets: to ASME B16.21 or ASME B16.20.

2.3 FITTINGS

.1 Steel pipe fittings, screwed, flanged or welded:

.1 Malleable iron: screwed, banded, Class 150.

.2 Steel pipe flanges and flanged fittings: to ASME B16.5.

.3 Steel butt-welding fittings.

.4 Unions: malleable iron, brass to iron, ground seat, to ASTM A47/A47M.

.5 Bolts and nuts: to ASME B18.2.1.

.6 Nipples: Schedule 40, to ASTM A53/A53M.

2.4 VALVES

.1 Provincial Code approved, lubricated plug or ball type as per specification Section 23 05 23 - Valves.

2.5 ROOF PIPE SUPPORTS

.1 Non seismic, surface mounted 300 x 300 x 65 mm high wide body 100% recycled rubber base, UV resistant, pipe supports with 14-gauge galvanized steel strut & strut pipe clamp, two (2) 13 mm dia. electro zinc plated all threaded rod risers (200-400 mm high rods). Maximum load: 364 kg (800 lbs.). Provide tape between pipe & strut clamps. Acceptable material: Mifab C-Port #CEW.

.2 Seismic supports, as per CSA B149.1 and as per Section 20 05 49.01 - Seismic Restraint Systems (SRS) for Mechanical Systems.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install in accordance with ASME BPVC.IV, regulations of Province having jurisdiction, except where specified otherwise, and manufacturers recommendations.

.2 Make required piping connections recommended by equipment manufacturer.

.3 Maintain clearances as indicated or if not indicated, as recommended by manufacturer installation instruction for operation, servicing and maintenance without disruption of operation of any other equipment/system.

.4 All equipment, venting and gas assembly work shall be installed & certified by a provincially certified gas fitter I Level mechanic.

3.2 PIPING

.1 Install in accordance with applicable Provincial/Territorial Codes.

.2 Install in accordance with CSA B149.1 and CSA B149.2.

.3 Assemble piping using fittings manufactured to ASME standards.

.4 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.5 Slope piping down in direction of flow to low points as per Gas Utilization Code.

.6 Install drip points:

.1 At all low points in piping system.

.2 At each connection to equipment.

.7 Use eccentric reducers at pipe size change installed to provide positive drainage.

.8 Provide clearance for access and for maintenance.

.9 Ream pipes, clean scale and dirt, inside and out.

.10 Install piping to minimize pipe dismantling for equipment removal.

.11 Install buried piping within sand backfilled compacted trench with tracer wire (minimum AWG 14 and coated) extend up above grade at both ends of run. Allow for 3rd party inspection prior to backfill.

.12 Relief valve piping shall terminate outdoors with clearances to openings, intakes, etc. in accordance with CSA B149.1

3.3 VALVES

.1 Install valves with stems upright or horizontal unless otherwise approved by Engineer.

.2 Install valves at all branch take-offs to isolate each piece of equipment, and as indicated.

.3 Vent reliefs at pressure regulating valves to outdoors and minimum 3 metres for intakes.

.4 All valves on exterior of building or where prone to vandalism, install lubricated plug type valve, regardless of size.

.5 Shut off valves shall be installed at each kitchen equipment (in addition to main kitchen shutoff) upstream of gas connector. Shut off valves should be visible, easily accessible and installed at eye level in accordance with Gas Code.

3.4 TESTING

.1 Test system in accordance with CSA B149.1 and CSA B149.2.

.2 On new natural gas service authority having jurisdiction shall conduct a field review of all new equipment appliance venting & piping systems and submit a certificate of acceptance from a Certified G-1 Gas Fitter.

3.5 PURGING

.1 Purge after pressure test in accordance with CSA B149.1 and CSA B149.2.

.2 Following testing, purge air from all natural gas lines to all new and existing equipment including boilers, water heaters, rooftop units, etc. Start-up all new and existing equipment to ensure operational.

3.6 PRE-START-UP INSPECTIONS

.1 Check vents from regulators, control valves, terminate outside building in approved location, protected against blockage, damage.

.2 Check gas trains, entire installation is approved by authority having jurisdiction.

3.7 CLEANING AND START-UP

.1 In accordance with requirements of CSA B149.1 & CSA B149.2.

END OF SECTION

INDOOR DIRECT FIRED CUSTOM AIR HANDLING UNIT

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 This section shall be read in conjunction with specification Section 20 05 01 - Mechanical General Requirements, all mechanical sections, and all other disciplines related to the project.

1.2 RELATED SECTIONS

.1 This section shall be read in conjunction with specification Section 20 05 01 - Mechanical General Requirements, all mechanical sections, and all other disciplines related to the project.

1.3 REFERENCES

.1 American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE 52.1-1992, Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

.2 ASHRAE 52.2-2017, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

.2 Canadian Standards Association (CSA).

.1 CSA C22.2 No. 236-15, Heating and Cooling Equipment.

1.4 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 20 05 01 - Mechanical GeneralRequirements.

1.5 MAINTENANCE DATA

.1 Provide maintenance data for incorporation into manual specified in Section 20 05 01 - Mechanical GeneralRequirements.

1.6 MANUFACTURED ITEMS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or thoseordered by him from independent testing agency signifying adherence to codes and standards in force.

PART 2 PRODUCTS

2.1 GENERAL

.1 Air Handling Units shall be built to the level of quality as herein specified and to the description of the Air Handling Unit Schedule.

.2 Substitution of any product other than that specified, must assure no deviation below the stated capacities, air flow rate, heat transfer rate, filtration efficiency and air mixing quality. Power requirements must not be exceeded, and where specifically defined, sound power levels must not be exceeded. Applications for "equal" or "alternate" must address these factors.

.3 Unless stated otherwise, air handling units are to be shipped to the job in two pieces, factory assembled.

.4 Modular units assembled to achieve a close proximation to the intent of this specification will not be considered equal. All equipment shall where specified and applicable, be pre-wired, and factory certified by an approved testing agency such as CETL, ETL, UL, CSA prior to shipment.

.5 Prewired air handling units shall bear an approved label with all the necessary identification marks, electrical data, and any necessary cautions as required by the National Electric Code, Part 2 (Canada).

.6 Provide a system of motor control, including all necessary terminal blocks, motor contactors, motor overload protection, grounding lugs, control transformers, auxiliary contactors and terminals for the connection of external control devices or relays.

.1 Gas fired units shall also include high limit and combustion airflow switch.

.2 Factory installed and wired non-fused disconnect switch in CEMA/NEMA 3 weatherproof configuration.

.7 The air handling units and major components shall be products of manufacturers regularly engaged in the production of such equipment and with a minimum of fifteen continuous years of proven production experience.

.8 **Provide full point to point single line wiring diagram for unit and control panel integration as part of shop drawing submission.**

2.2 UNIT CONSTRUCTION

.1 Unit Base:

.1 Structure:

.1 Unit bases shall be constructed with structural steel perimeter channels and cross supports of structural steel channel or formed heavy gauge steel. Cross support frequency must be such that floor deflection shall not exceed 1/4” [6.4 mm] per 198” [5 m] span. Manufactures shall comply to CSA Standard W47.1 for welding of steel Air Handling Unit base structures, and be certified to that standard by a qualified independent certification body. All bare metal surfaces, welds, lifting lugs, shall be coated with epoxy paint to prevent corrosion. AHU3001-AHU-1 and AHU3001-AHU-2 must have their own independent equipment base.

.2 Lifting Lugs:

.1 Removable lifting lugs shall provide intermediate lifting points where applicable for balanced lifting (minimum 4 per unit). Removable lifting lugs shall be certified and applicable drawings with structural engineer's stamp shall be made available to the consultant or owner upon request.

.3 Floors:

.1 Shall be minimum 16-gauge galvanized steel, all seams shall be continuously welded and floor shall be stitch welded to the base frame structure as necessary to prevent 'oil canning'. Provide a 1.5" [38 mm] fully welded perimeter water dam with no penetrations at component attachment points such as isolators or other floor mounted equipment. All pipe and duct openings through the unit floor shall incorporate the same perimeter water dam. Auxiliary floor drains are provided in outside air intake, cooling coil, and humidifier sections, and shall be minimum 1-1/4" [31.8 mm] pipe with NPT threaded connection extended to the unit exterior. "P" trap sizing for drains shall be provided either as part of the manufacturer's submission or included with the Operation and Maintenance Manual. Floors shall be painted with non-slip epoxy paint.

.4 Insulation & Liner:

.1 All base frames must be insulated to prevent condensation with fiberglass, with a minimum density of 3 lb./cu.ft. [48 kg./cu.m.] Fiberglass base insulation shall be covered with minimum 22 gauge [0.84 mm] galvanized metal liner mechanically fastened to the unit base cross supports.

.5 Mounting:

.1 Unit base shall be self-supporting, and be suitable for mounting on a concrete pad as specified herein or on the schedule. AHU3001-AHU-2 must contain additional structural support on the roof of the equipment to support the weight of AHU3001-AHU-1.

.2 Casing:

.1 Wall and Roof Panels:

.1 Panels shall be made with 18-gauge satin coat steel, and be rigid two break construction with widths not to exceed 24" [610 mm]. All wall and roof joints shall be broken inward except outdoor unit roof panels which shall be constructed of a three-break outward roof rib to inhibit water infiltration. All panel assembly joints shall be made with butyl gasket and sheet metal screws, and unit seams shall be sealed with caulking to eliminate air leakage and water infiltration. Any casing penetrations made for electrical, controls, etc. shall be sealed with grommets or other suitable fitting to achieve an air tight seal. Units operating at static pressure greater than 5.0" w.c. [1250 Pa] shall have maximum 18" [457 mm] panel widths and be reinforced with internal bracing designed not to exceed maximum

panel deflection of 1/202" [0.126 mm]. All outdoor units wider than 60" [152 mm] shall have roof slope of minimum 1" [25.4 mm] sloped away from the access door side.

.2 Internal Walls:

.1 Internals walls and subfloors shall be galvanized steel with gauge to match exterior wall and roof panels at a minimum. Sealing of internal walls and subfloors shall be ensured by attachment to exterior wall ribs, or to solid metal liner. Air bypass from sealing to perforated liner is unacceptable.

.3 Insulation and Liner:

.1 All walls must be insulated to prevent condensation with fiberglass, with a minimum density of 3 lb./cu.ft. [48 kg./cu.m.] Fiberglass insulation shall be covered with minimum 22 gauge [0.84 mm] galvanized solid metal liner mechanically fastened.

.3 Access Doors:

.1 Provide access doors in each section to allow servicing. Ensure that doors are sufficiently sized to permit removal of filters and motors from their respective access sections. Doors shall be insulated double wall solid steel, with construction to match casing and, given available space, shall open against pressure. Doors that open with pressure shall come with a safety catch device. All doors shall seal against a neoprene foam seal. Doors shall come with a minimum of two handles, and model shall be Allegis PA6. Doors shall have a minimum 2 heavy duty steel hinges. Doors for use on outdoor units shall come with rain gutters installed above them.

.4 Drain Pans:

.1 Provide a 16 gauge [1.59 mm] 304 stainless steel drain pan under all cooling coils. Drain pans must extend a minimum of 6" [152mm] downstream of the coils to ensure any moisture carryover is captured within the pan. Ensure drain pans are double sloped to allow proper drainage, and that they extend under all coil return bends and headers. With stacked coil arrangements, provide a suitably sized standpipe to the bottom most drain pan. Provide a 1-1/4" [31.8 mm] sized drain extended to the exterior of the unit with threaded NPT pipe connection. "P" trap sizing for drains shall be provided either as part of the manufacturer's submission or included with the Operation and Maintenance Manual.

.5 Unit Finish:

.1 Manufacturer shall finish all Air Handling Units with a corrosion resistant two stage coating process to a dry thickness no less than 3.5 mils. To ensure adequate surface adhesion, unit must be properly prepared and cleaned prior to application of epoxy primer, and top coat of acrylic / polyester urethane. Color shall be RAL9002.

.6 Recovery Coil:

.1 General:

.1 Coil casing shall be minimum 16-gauge galvanized steel and shall be located on a raised track/drain pan stand offs to aid removal. Blank off plates shall be provided to seal coils, and prevent air bypass. Allowance for coil removal is required and shall be made through a removable, insulated access panel secured with sheet metal screws. Piping, valves, expansion tanks, pump for run around loops are provided by piping contactor.

.2 Construction:

.1 Coils shall be of counter flow design, and be constructed with 5/8" diameter, 0.020" wall thickness copper tubes which are expanded to mechanically bond to fins for maximum heat transfer. Fins shall be aluminum with die-formed collars in a staggered pattern, and be either flat, sine-wave or waffle patterned accordingly to meet performance requirements. Maximum coil face velocity shall not exceed 500 fpm [2.54 m/s]. Coil fins per inch (FPI) shall not exceed 12, and air side pressure drop shall not exceed maximum of 1" w.g. [248. 8 Pa]. Coil header material shall match tube material, and come with integral 1/4" [6.4 mm] vent and drain to withstand test pressure. Coils shall be designed to withstand maximum operating pressure of 300 psig [2.07 mPa] at a maximum temperature of 250°F [121.1°C], and shall be factory leak tested at no less than 550 psig [3.79 mPa] test pressure. Coil connections shall be MPT copper with piping extended through to the exterior of the Air Handling Unit casing, and all penetrations sealed with grommets.

2.3 FANS & MOTORS

.1 Centrifugal (Airfoil – Supply fan only):

.1 Fan shall be twin housed centrifugal fan with backward curved airfoil blades. Inlet cone and housing shall be galvanized. The inlet cone shall contain forefinger device to reduce the effects of recirculation air to improve fan noise and operating efficiency. Fans shall be licensed to bear the AMCA seal per the AMCA Certified Ratings Program, with fan factory testing and procedures in accordance to AMCA bulletins 211, and fan performance certified to AMCA 210. Factory testing to ensure fans are statically and dynamically balanced to grade of G=2.5 shall also be completed by fan manufacturer. Fans shall be equipped with self-aligning, single row, deep groove ball type bearings with pillow block cast housings, and all shall be rated L10 life rating of 200,000 Hrs at peak performance. Fan shafts shall be provided with rust inhibitor coating. Fan assemblies shall be provided with vibration isolation supported in four corner locations with 1" [25.4 mm] static deflection spring isolation. In seismic zones, the isolation spring assembly shall be rated accordingly with seismic housings. Fan isolators shall be factory set (floated), and fan shipping restraints shall be provided to prevent transport damage. Fan discharge shall be attached to wall panels with a heavy neoprene flexible connection for further vibration isolation. Fan shall be capable of 50% turndown of airflow during unoccupied modes.

.2 Motors shall be design shall be NEMA design code A and be rated for continuous duty. Fan motors shall be TEFC and shall be premium efficiency type with insulation class F. Motor shall be manufactured to NEMA MG1 Part 31.4.4.2 with a minimum IP 44 ingress protection. Stainless steel nameplate with CSA certification shall be included on motor.

.3 Fan drives shall be designed for a minimum of 1.5 service factor and shall be factory mounted with final adjustment to be made by the contractor after installation of the unit. Sheaves and belts assembly shall be complete with protective belt guard including a tachometer port located at the fan shaft. Variable pitch sheaves on motors 5 Hp [3.63 Kw] and smaller and fixed pitch sheaves for 7.5 Hp [5.6 kW] and larger motors shall be provided.

.2 Plenum (Direct Drive -Exhaust fan only):

.1 Fan type shall be unhoused plenum with non-overloading aluminum airfoil blades. Panels and framework shall be constructed of galvanized steel to provide a rigid structure to support the shaft and bearings and reduce low frequency vibration. Wheels shall be statically and dynamically balanced to balance grade G6.3 per ANSI S2.19. D. Wheel hubs shall be cast of 319 aluminum alloy. Fans shall be licensed to bear the AMCA seal per the AMCA Certified Ratings Program, with fan factory testing and procedures in accordance to AMCA bulletins 211, 311, and fan performance certified to AMCA 210. Fan assemblies shall be provided with vibration isolation supported in four corner locations with 1" [25.4 mm] static deflection spring isolation. Fan inlet shall be attached to wall panels with a heavy neoprene flexible connection for further vibration isolation. Plenum fan assemblies shall come complete with protective guards installed around the fan outlet or guards at fan access points. Fan shall be capable of 50% turndown of airflow during unoccupied modes.

.2 Motors shall be design shall be NEMA design code B and be rated for continuous duty. The motor shall be rated in IEEE Std. 841-2021. Non-IEEE841 motors are not acceptable. Fan motors shall be TEFC enclosure with insulation class F. Motor shall be manufactured to NEMA MG1 Part 31.4.4.2 with a minimum IP 56 ingress protection. d stainless steel nameplate with CSA certification shall be included on motor. Motors shall be rated for Class I, Division II, Group A, B, C, D area classification

.3 Airflow Monitoring:

.1 Each fan shall contain a piezo ring for the use of air flow monitoring. The piezo ring measures the differential pressure of the fan and be converted into a 4-20 mA control signal using a pressure transducer. The control signal will be monitored by a remote HVAC control panel.

2.4 DIRECT FIRED HEATING MODULE

.1 General:

.1 Direct gas-fired heat module shall be manufactured as a recognized component to the current edition of ANSI Z83.4 / CSA 3.7 Standard for "Non-Recirculating Direct Gas-Fired Heating and Forced Ventilation

Appliances for Commercial and Industrial Application." The heating modules shall be installed in accordance with the CSA-B149 Heating module shall provide 100% efficiency of combustion and a minimum thermal efficiency of 92%. All electrical components shall be listed or recognized by a NRTL (ETL, UL, CSA, etc.). Heat modules and burners provided are for use on natural gases as specified. Manifold and gas train built to ANSI, FM, UL, IRI/GAP, or local codes as specified. Heating module shall have a rating label mounted on the front shroud indicating the type of gas for which the heater is equipped, external static design conditions, maximum and minimum Btu input ratings, maximum and minimum gas supply pressures, output at maximum input, supply voltage, and maximum amp rating.

.2 Burner:

.1 Direct gas-fired heating module provided shall have a stainless-steel burner with aluminum burner head casting. Burner assembly shall be mechanically secured to vestibule panels and design shall be suitable to operate as low as 0.68" differential pressure range or air velocity as low as 1500 to 3500 fpm. The gas module shall employ the following:

.1 Gas burners, with integral carryovers, capable of operation at 30:1 turndown with modulating controls.

.2 A profile plate opening sized according to specific application requirements.

.3 Burner circulating air pressure switch to prove air supply for combustion and operation.

.4 Flame Safeguard of the gas burners with integral flame sensing to prove carryover across burner assembly.

.5 Listed Gas Valve(s) incorporating electric safety shut-off valves, and/or manual shut-off, and/or proof of closure, and/or visual indication, and/or gas regulator.

.6 An automatic reset type high limit switch set to 185oF.

.7 Class II step down transformer(s) to provide 24 VAC control voltage at selected supply voltage.

.8 A 1/8" NPT tapped test gauge connection in the gas train for measuring gas manifold pressure.

.9 A 1/8" NPT tapped test gauge connection in the gas train for measuring inlet supply gas pressure.

.10 A union fitting upstream and downstream of gas control to facilitate installation and service.

2.5 FILTERS

.1 General:

.1 Filter shall be mounted in frames to allow proper servicing of the filters. Filters removed through access doors shall be removed from one side of the unit. All filters shall be tested and rated as per ASHRAE Test Standard 52. Filters frames shall be designed to prevent air bypass. Filter velocity must not exceed 500 fpm [2.5 m/s]. Sizes shall be noted on drawings or other supporting materials. A Magnehelic filter gauge shall be provided for each filter bank, range shall be 0-1" w.g. [0-250 Pa] for pre filter banks.

.2 Filters:

.1 Air filters shall be 2" [51 mm] medium efficiency ASHRAE pleated panels consisting of cotton and synthetic media, welded wire media support grid, and beverage board enclosing frame. Filters shall have a Minimum Efficiency Reporting Value of MERV 8 when evaluated under the guidelines of ASHRAE Standard 52.2. The media shall maintain or increase efficiency over the life of the filter. Initial resistance to airflow shall not exceed 0.31" w.g. [77.1 Pa] at an airflow of 500 fpm [2.54 m/s] on 2" [51 mm] depth filters. The filter shall be classified by Underwriters Laboratories as UL Class 2.

2.6 DAMPERS

.1 General:

.1 Dampers shall be AMCA certified, and frames shall be securely screwed to the air-handling unit. Damper blades shall be parallel blade orientation. Electric damper motors shall be supplied and wired by the manufacturer with outside air dampers to include spring return to fail closed. Damper actuator shall be rated for area classification.

.2 Outdoor Air Dampers and Exhaust Air Dampers:

.1 Damper blades shall be thermally insulated, low leakage airfoil shape galvanized steel double skin construction and be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Blade edge seals shall be TPE suitable for -40°F [-40°C] to 250°F [121°C] and bearings shall be synthetic (acetal) sleeve rotating in polished extruded holes in the 16 ga damper frame. Linkage shall be plated steel. Jamb seal material shall be stainless steel. B. Dampers shall bear the AMCA Certified Ratings Seal for Air Performance Air Leakage in accordance with AMCA 511

.3 Return Air Dampers and Supply Air Dampers:

.1 Damper blades shall be airfoil shape galvanized steel double skin construction and be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Blade edge seals shall be TPE suitable for -40°F [-40°C] to 250°F [121°C] and bearings shall be synthetic (acetal) sleeve rotating in polished extruded holes in the 16 ga damper frame. Linkage shall be plated steel. Jamb seal material shall be stainless steel. Dampers shall bear the AMCA Certified Ratings Seal for Air Performance Air Leakage in accordance with AMCA 511.

2.7 EQUIPMENT NAMEPLATE / LAMACOID LABELS

.1 Equipment Nameplate:

.1 All equipment shall come with stainless steel laser etched identification nameplate that will withstand outdoor duty and remain legible over time. Nameplate shall be permanently attached to the equipment casing with high bond double sided adhesive tape and screws. Nameplate shall include the following information at a minimum:

.1 Equipment certifications (ETLC, CSA, ULC, etc.)

.2 Equipment tag

.3 Project name

.4 Manufacturers model and serial numbers

.5 Equipment capacities

.6 Electrical circuits information as required by certification body (Volts/Phase/Hertz, MCA, etc.)

.7 Electrical component information as required by certification body (FLA, HP, etc.)

.2 Lamacoid Labels:

.1 Identification of all access sections, sensors, control panels, actuators, and unit tagging shall be done with phenolic plastic labels (lamacoids) with white face and black lettering. Text shall be minimum ¼" [6 mm] high and labels shall be adhered to unit surfaces with high bond double sided adhesive tape. Sticker labels are not acceptable.

2.8 VARIABLE FREQUENCY DRIVES

.1 General:

.1 Each air handling unit shall have VFD shipped loose. The model shall be Danfoss VLT HVAC FC101 with NEMA 1 enclosure. The VFD shall have electronic thermal motor protection against overload and temperature monitoring of the heatsink ensures that the adjustable frequency drive trips in case of overtemperature. VFD shall include DC link reactor to protect against short circuits.

2.9 ELECTRICAL / CONTROLS

.1 Remote HVAC Control Panel:

.1 Both air handling units Supply and Exhaust shall be controlled via a remote HVAC panel. The control panel shall be provided from the same manufacturer as the air handling units. The remote HVAC control panel shall have a NEMA 4 enclosure and HMI LCD screen for equipment

statuses and alarm navigation. The remote HVAC control panel shall have, but not limited to the following interlocks with the air handling units:

.1 Supply AHU:

.1 O/A damper end switch

.2 S/A damper end switch

.3 O/A temperature sensor signal

.4 Recovery coil leaving temperature sensor signal

.5 S/A temperature sensor signal

.6 Supply fan status via airflow switch

.7 Clogged filter switch

.8 Pressure transducer for airflow monitoring

.2 Exhaust AHU:

.1 R/A damper end switch

.2 E/A damper end switch

.3 R/A temperature sensor signal

.4 E/A temperature sensor signal

.5 Supply fan status via airflow switch

.6 Clogged filter switch

.7 Pressure transducer for airflow monitoring

.8 The remote HVAC control panel will monitor these interlocks and operate both air handling units in occupied and unoccupied modes. The remote HVAC control panel shall have, but not limited to the following interlocks with the BAS panel:

.9 Occupied/Unoccupied dry contact

.10 Equipment run statuses

.11 Equipment common alarms

.2 The remote HVAC control panel will also enable the pump (supplied by others) and control valve (supplied by others) for the glycol run around system.

.2 Electrical – Supply AHU:

.1 All power and control wiring shall be run in flexible metal conduit and run internal to the unit casing whenever possible, external conduit runs are to be avoided. Wiring must be clearly labeled at junction points to facilitate reconnection. The electrical installation must comply with CSA 22.1 No. 236 and bear certification mark. All end devices shall be wired to a terminal block. All electrical and control panels shall be recessed inside a vestibule.

A non-fused NEMA 4 disconnect shall be supplied and installed on the exterior of the equipment.

.3 Electrical – Exhaust AHU:

.1 All power and control wiring shall be run in rigid aluminum conduit and run internal to the unit casing whenever possible, external conduit runs are to be avoided. Wiring must be clearly labeled at junction points to facilitate reconnection. The conduit fittings must be rated for Class I, Division II. The electrical installation must comply with CSA 22.1 No. 236. The equipment shall be certified for area classification of Class I, Division II, Group D, T3. All end devices shall be wired to a terminal block. The electrical panel shall have an enclosure rated for NEMA 7. A non-fused NEMA 7 disconnect shall be supplied and installed on the exterior of the equipment.

END OF SECTION

ROCK REMOVAL

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedure.

.2 Section 01 35 43 – Environmental Protection

.3 Section 01 56 00 - Temporary Barriers and Enclosures.

.4 Section 01 35 29.06 - Health and Safety Requirements.

.5 Section 02 23 40 – Vibration Monitoring.

.6 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 DEFINITION

.1 Rock: any solid material in excess of 2.0m^3 and which cannot be removed by means of mechanical excavating equipment having 1.95m^3 bucket. Frozen material not classified as rock.

1.3 MEASUREMENT PROCEDURES

.1 Rock removal quantities for building excavation, trench excavation, etc. will be considered inclusive to the work and will not be measured for any other purpose other than documenting as-built conditions.

.2 Contractors shall provide all survey equipment needed and provide assistance to Owner's Representative in taking cross sections. Sections shall be taken at 5 m intervals for mass and trench rock excavation. Sections will be submitted to contractor's site representative for verification. Additional sections shall be taken at points or significant change in elevation or at any other locations as determined by Owner's Representative. Contractor to schedule work to allow sufficient time for Owner's Representative to take necessary sections.

1.4 SUBMITTALS

.1 Submit to Owner's Representative and local authorities having jurisdiction for approval, written proposal of operations for removal of rock by mechanical means, blasting will not be accepted.

1.5 VIBRATION CONTROL

.1 Reduce ground vibrations to avoid damage to structures or remaining rock mass.

~~.2 Vibration monitoring shall be as per Specification 02 23 40.~~

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION

3.1 PROTECTION

.1 Prevent damage to surroundings and injury to persons in accordance with Section 01 56 00 - Temporary Barriers and Enclosures. Sound warnings and display signs when blasting to take place.

.2 Monitor and repair any/all damage to surrounding infrastructure. ~~Monitoring impacts as indicated in Vibration Monitoring section 01 35 43.~~

3.2 ROCK REMOVAL

.1 Co-ordinate this Section with Section 01 35 29.06 - Health and Safety Requirements.

.2 Remove rock to alignments, profiles, and cross sections in order to install work as indicated.

.3 Explosive blasting is not permitted.

.4 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.5 Excavate rock to horizontal surfaces.

.6 Scale, pressure wash and broom clean rock surfaces which are to bond to concrete.

.7 Excavate trenches to lines and grades to minimum of 300 mm below pipe invert indicated. Provide recesses for bell and spigot pipe to ensure bearing will occur uniformly along barrel of pipe.

.8 Cut trenches to widths as indicated.

.9 Remove boulders and fragments which may slide or roll into excavated areas.

.10 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.3 DAMAGE

.1 Upon completion of blasting or immediately following the receipt of a complaint, a site condition survey shall be performed to determine if any damage has resulted. The Contractor shall record all incidents of any damage or injury, which shall be reported immediately in writing to the Contract Administrator. All other complaints shall be reported to the Contract Administrator in writing within 24

hours of receipt. Each complaint report shall include the name and address of the complainant, time received, and description of the circumstances that led to the complaint.

.2 The contractor shall be responsible for any and all damage caused by their choice of rock removal.

3.4 ROCK DISPOSAL

.1 Dispose of surplus removed rock off site. Dispose in locations acceptable to authorities having jurisdiction and Contract Administrator. The Contractor may be permitted to crush rock on site for use as Granular A or Granular B material if crushed material conforms to Section 31 05 16.

.2 Do not dispose removed rock into landfill. Material must be sent to appropriate location as approved by the Contract Administrator.

END OF SECTION

BRACING AND SHORING

PART 1 GENERAL

1.1 SCOPE

.1 This specification covers the requirements for the design, supply, placement, maintenance, and removal or abandonment of temporary support systems required to permit the excavation and backfilling of trenches or excavations for the installation of underground utilities and any other specified subsurface construction.

.2 This specification also covers the requirements for the design, placement, maintenance, and removal or abandonment of temporary support systems required to permit the construction of below grade structures and/or foundations for building structures.

.3 Shoring is mandatory where indicated and, in all areas, where excavation will potentially undermine existing structures, pipes, conduits, utilities or roadways.

.4 Subject to paragraph 1.1.3, it will be the Contractor's decision whether to carry out general excavation in open cut or to use shoring system to conserve space and/or control groundwater infiltration.

1.2 RELATED SECTIONS

.1 Division 1 – General Requirements

.2 Section 02 23 40 – Vibration Monitoring

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

.4 Section 31 23 19 – Dewatering

.5 Section 31 23 33 – Excavating, Trenching and Backfilling

1.3 REFERENCES

.1 Occupational Health and Safety Act, R.S.O. 1990, c.O.1, as amended.

.2 Ontario Regulation 213/91 – Regulations for Construction Projects, as amended.

.3 OPSS 404 – Construction Specification for Support Systems.

.4 OPSS 539 – Construction Specification for Temporary Protection Systems.

.5 CSA G30.18-21 - Carbon Steel Bars for Concrete Reinforcement -

.6 CSA G40.20-13/G40.21-13 (R2018) - General requirements for rolled or welded structural quality steel / Structural quality steel.

.7 CSA A23.1/A32.2-19 - Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete

.8 CSA W59-18 – Welded Steel Construction (Metal Arc Welding)

1.4 RESPONSIBILITY FOR SHORING SYSTEM

.1 Engage a professional engineer, registered in the Province of Ontario, who has demonstrated competence in shoring and underpinning work, to design and supervise construction of temporary structures required to execute construction of permanent Works.

.2 Take full responsibility for design, supply, placement, installation, maintenance and where applicable removal of shoring system.

.3 Comply with all safety requirements of The Occupational Health and Safety Regulations and Ontario Building Code.

1.5 DESIGN OF SHORING SYSTEM

.1 Design excavation shoring and/or underpinning systems based on recognized geotechnical and structural theories and principles and site conditions encountered. Undertake additional geotechnical site investigation for design of the shoring system and/or underpinning at no extra cost to the Owner.

.2 Design shoring system for all applicable lateral pressures from soil and groundwater, including unsymmetrical surcharge loads from construction operations and frost action on retained soil.

.3 Design shoring system such that intermediate bracing members, walers or struts will not interfere with permanent structure. All below grade structures are to be complete with ground level slabs, and other bracing elements prior to backfill.

.4 Design bracing to be fully effective at all stages of construction. Pre-stress bracing, if required, to control deflection.

.5 Design underpinning and temporary supports for existing structures and/or utilities to safely resist all loads including loads which may be imposed as a result of construction operations.

.6 Where shoring system retains materials which provides support for foundations at a higher level, design to limit deflections so that foundation materials are not disturbed or weakened. Design lateral pressures to be determined based on at-rest soil pressures. Limit total deflection to 20 mm horizontally.

.7 Co-ordinate design of shoring system with design of dewatering system to meet performance requirements specified herein.

.8 Locate all yard piping, services, conduit, structures, etc., in the area of the excavation. Assume all items found are live and are to be kept live unless specifically noted otherwise. Take precautions necessary to ensure that there is no damage to existing buried services, piping, conduit, structure, etc., during the shoring and excavation work.

1.6 METHOD STATEMENT

.1 Submit method statements for the construction sequence and duration of all main activities including any ground treatment that may be required to construct without the use of active dewatering at least fifteen (15) days prior to the commencement of the Works.

1.7 COORDINATION

.1 Coordinate design of temporary shoring system with the design of dewatering system in Section 31 23 19 – Dewatering.

1.8 SHORING PERFORMANCE REQUIREMENTS

.1 General Requirements

.1 Construct substantially watertight excavation shoring systems suitable for geotechnical conditions encountered and which will meet all requirements of these performance specifications. Prevent destabilization of subgrade, migration of soil fines, damage to any structure and/or works. Prevent disturbance, displacement or damage, to sides and bottom of excavation, to new and existing structures, pipelines, utilities, roads, embankments, etc. at any stage of construction of works. Prevent destabilization or failure of bottom of excavation from shear, heave, piping and boiling, groundwater pressure or any other cause.

.2 Review Utilities drawings and Site Survey, available from the Engineer showing site information and configuration of existing buildings and services.

.3 Prior to beginning work on the site, confirm location of all underground services and structures, and arrange work to prevent damage to any services or structures.

.4 Provide adequate space for access for installation of formwork and inspection.

.2 Watertightness

.1 Shoring system to be watertight to the extent that any dewatering required inside the excavation shall not lower the water table on outer side of the shoring system.

.3 Tolerances

.1 Install shoring so that, exclusive of temporary walers or bracings, no part of temporary structure to be left in place above the bottom of the

excavation in its deflected position will reduce the concrete wall thicknesses to below the dimensions indicated.

.2 If the shoring installation does not satisfy these requirements, alter it, at no extra cost to Owner, until it meets the requirements.

.3 The maximum permitted deviation of the finished pile from the vertical at any level is 1 in 200.

.4 Lateral deflection limit

.1 Performance of temporary shoring systems shall be performance level 1a as described in OPSS 539.

.5 Monitoring Deflection

.1 The contractor shall hire a monitoring contractor with at least five years' experience in precision survey monitoring that can demonstrate having performed at least 10 projects of similar scope, magnitude and complexity to develop and execute a precision survey program for monitoring movement at the top of the shoring wall. The system shall achieve an accuracy of plus/minus 2 mm at each measurement point.

.2 The monitoring contractor is responsible for developing the system to meet 2 mm accuracy but the system at a minimum meet the following criteria:

.1 Monitoring points are to be spaced no more than 3 m apart and at all critical locations.

.2 Movement in the x, y and z direction must be measured at each point.

.3 The surveying instrument shall be a Leica TCA 1800 or equal. The manufacturer's published accuracy must be at least one second angular resolution with plus minus 1 mm electronic distance measurement at 100 m distance.

.3 Readings shall be recorded twice weekly until the excavation is no longer open.

.4 Reports shall show movement in both at a tabulated and graphical format. The owner's representative to approve the reporting format prior to start of the work.

.5 Data is to be reported weekly, but immediately if any unusual movements occur.

1.9 SUBMITTALS

.1 Submit shop drawings at least fifteen (15) days before commencement of shoring Works for temporary structures including both shoring and bracing systems. Shop drawing to bear seal and signature of a Professional Engineer, registered in the Province of Ontario, who has carried out the design and who will provide construction supervision of temporary structures.

.2 Indicate on shop drawings the following:

.1 Dimensions and elevations

.2 Relationship to new and existing structures and utilities

.3 Material designations, grades, sizes, mix design, etc.

.4 Temporary struts and walers etc., their relationship to permanent structure and schedule for removal3

.5 Permanent tie backs locations, size and embedment.

.6 Deflections of shoring members when deflection limitations have been specified in this Section.

.7 Design loads, design assumptions, surcharge loads and all loading restrictions.

.8 Identification of Shoring Engineer of record who will be responsible for design calculations, checking of shop drawings, inspection and supervision of fabrication and installation, and filing of reports with the appropriate authorities and the Owner.

.9 Complete field instructions required during installation and any other pertinent information.

.10 Schedule for removal of temporary struts and walers.

.3 Submittal of shop drawings for such temporary structures is for record purposes. The Engineer will not review or check such shop drawings for structural adequacy. Take the full responsibility for design, supplying, placing installation and maintenance.

1.10 QUALITY CONTROL

.1 Provide a system of quality control to ensure that the minimum standards specified herein are attained.

.2 Bring to the attention of Engineer any defects in the work or departures from the Contract Documents which may occur during construction. The Engineer will decide upon corrective action and state recommendations in writing.

.3 The Engineer's general review during construction and inspection and testing by Independent Inspection and Testing Companies reporting to the Engineer are both undertaken to inform the Owner of the Contractor's performance and shall in no way augment the Contractor's quality control or relieve him of contractual responsibility.

1.11 QUALITY ASSURANCE

.1 Engage a Professional Engineer, licensed in Ontario, to design, supervise installation of, and inspect all temporary structures for the duration of construction.

.2 Utilize only personnel with demonstrated competence and experience to install temporary structures.

.3 Welder: CSA W47.1 certified.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Concrete Mixes and materials

.1 CSA A23.1/A23.2

.2 Reinforcing Steel

.1 CSA G30.18

.3 Steel Liner Plates

.1 Corrugated proprietary steel liner plates with bolted joints and grouting nipples supplied on a sufficient number of plates to provide grouting connections at 3 m maximum around the circumference and every second ring of plates.

.4 Steel Casings

.1 Temporary casings shall be thin-walled mild steel cylindrical casing, spirally welded or other similar construction. The dimensions and quality of the casing shall be adequate to withstand without damage or distortion all handling, construction and ground stresses to which they will be subjected, including preventing concrete from within the pile from displacing soft soil or soil squeezing in and displacing fresh concrete.

.5 Structural Steel Members

.1 CSA G40.20/G40.21 Grade 300W for walers, bracing and soldiers piles.

.6 Welding

.1 CSA W59 Welded Steel Construction

.7 Steel Sheet Piling:

.1 Per CAN/CSA G40.20/G40.21 interlocking type. Selection properties to suit design.

.8 Lumber

.1 Graded lumber, sound, straight, free from cracks, shakes, large or loose knots. Use planks for sheeting, tongued and grooved, or grooved and splined as required.

.9 Drypack Concrete Fill Behind Lagging

.1 Concrete in accordance with Section 03 30 00 – Cast-in Place Concrete suitable for filling all voids behind lagging with a 28-day compressive strength of 20 MPa.

PART 3 EXECUTION

3.1 GENERAL

.1 Before work begins, inspect conditions upon which work depends. Inform the Engineer, in writing, of conditions not identified.

.2 Protect adjacent structures, utilities, pipelines, or other foundations on or below grade from damage and/or displacement.

.3 Monitor and control vibration of existing structures in accordance with Section 02 23 40 – Vibration Monitoring.

.4 Monitor settlements of existing structures.

3.2 COLD WEATHER PROTECTION

.1 Between the 15th of October of any year and the 15th of April of the following year, provide on hand and ready for use all equipment necessary for adequate cold weather protection.

.2 Provide sufficient insulation, and heat as necessary, to prevent freezing of frost susceptible soil behind temporary shoring works.

.3 When providing heat, do not dry out sensitive soils such as clays.

3.3 PLACEMENT - GENERAL

.1 Retain Professional Engineer responsible for design and supervision of construction of temporary/permanent retaining structures to verify that Work is carried out in conformance with the design. Retained engineer to provide written acceptance of “As Constructed” shoring before excavation is occupied.

.2 Prior to commencing excavation in any area protected by temporary shoring, the shoring engineer shall provide written certification that the shoring has been constructed in accordance with the approved drawings as amended by field instruction. This requirement will not apply to trench boxes.

.3 Do not place any part of shoring and bracing systems until permission by the Engineer has been given to proceed.

.4 Have shoring systems installed by personnel with demonstrated competence and experience in this type of work.

.5 Provide and set all excavation, shoring and bracing necessary to prevent cave-in of banks and excavations.

.6 For installation of sheets, select driving hammer equipment suitable for the soil conditions. The driving equipment shall not exceed the vibration limits transmitted to adjacent structures established in Section 02 23 40 – Vibration Monitoring.

.7 Install shoring so that there is no loose material or voids between shoring and sound undisturbed soil.

.8 Set all shoring to a true vertical and to dimensions and elevations indicated on shop drawings.

.9 Do not encase any part of temporary structure in the structural concrete of the permanent structure without written permission from the Engineer.

.10 If bracing members, such as walers, etc., are to be removed during construction, timing and procedure for removal shall not induce stresses in permanent structures. Submit removals plan to Engineer for review.

~~**3.4 SECANT PILE WALLS**~~

~~.1 Excavation and construction methods shall result in minimum disturbance of surrounding material. The Contractor shall be required to drill through any boulders and rock encountered in the excavation boring.~~

~~.2 The sides of all borehole shall be kept intact and no loose material shall be permitted to fall into the bottom of the boreholes. The Contractor's boring equipment shall be able to sink a steel casing to support the sides of all boring.~~

~~.3 The Contractor shall be responsible for the program and sequence of construction which is dependent on the rate of gain of strength of primary piles affects the time within which secondary piles can be formed. The concrete mix may include additives to control the rate of gain of strength, particularly the primary piles. Where the Contractor considers that alternative proposals for the concrete mix are required then evidence of trial mixes should be provided.~~

~~.4 Concrete to be placed under high groundwater table shall be using a tremie method of concreting in accordance with CSA A23.1/A23.2.~~

~~.5 The caissons shall be socketed with a minimum of 1000mm below the sound bedrock elevation.~~

~~**3.5 SOLDIER PILES AND LAGGING**~~

~~.1 Install soldier piles to dimensions and elevations indicated on shop drawings. If soldier piles are installed in predrilled holes, fill void around piles with a lean concrete mix before commencing excavation.~~

~~.2 Install walers and/or ringwalers, struts and bracing for soldier piles as excavation proceeds and follow behind as closely as possible with lagging installation. Install lagging to bottom of excavation at the end of each day's work.~~

~~.3 Wedge lagging tightly against firm soil at all points. Prevent migration of soil particles through joints in lagging.~~

~~.4 If soil has been loosened, remove it and fill void with dry pack concrete rammed tightly between the lagging and firm soil.~~

~~.5 Fill all voids between lagging and firm soil with dry pack rammed tightly in place.~~

.6 ~~If bracing members, such as walers, etc., are to be removed during construction, timing and procedure for removal shall not induce stresses in permanent structures or bracing members in excess of those allowed by applicable codes.~~

3.6 LINER PLATES

.1 Excavate to depth of one (1) ring and place liner plates, set first ring true to circle and vertical position.

.2 Excavate for next ring and place liner plates. Do not excavate further ahead of liner in place than the width of one ring.

.3 Grout voids between liner plates and ground, by means of a grout pump. Frequency of grouting to suit conditions but not less frequent than after every second ring has been placed. Do not leave any ring ungrouted overnight.

.4 Do not leave the sides of the excavation exposed below the liner plates at the end of the day's work.

.5 Provide reinforcing at openings as required by the design.

3.7 STEEL SHEET PILING

.1 Provide temporary guide frames and bracing to hold sheet piles in proper alignment during setting and driving. Install piling to dimensions and elevations indicated on shop drawings.

.2 Install walers and bracings so not to interfere with reinforcing bars or other parts of permanent structures.

.3 Splices in walers shall develop full strength of member in bending, shear and axial compression.

.4 If bracing members, such as walers, etc., are to be removed during construction, timing and procedure for removal shall not induce stresses in permanent structures or in steel sheet piling or bracing members in excess of those allowed by applicable codes.

.5 Leave sheeting in place unless otherwise specified.

3.8 CLOSED SHEETING FOR TRENCHES

.1 Provide and install braced closed sheeting where required for trench construction.

.2 Sheeting system shall be adequate for all loading and pressures and for surcharge effects due to construction equipment and materials in accordance with the provision of The Occupational Health and Safety Act, and The Ontario Building Code.

.3 Where sheeting is to be left in place, the top shall be cut off 1.2 m below grade or as directed.

3.9 MONITORING DEFLECTION/SETTLEMENT OF EXISTING INFRASTRUCTURE

.1 Monitor deflection of shoring systems that retain materials providing support for adjacent foundations at higher levels at least daily. Verify that measured deflections are within design tolerances.

.2 Monitor deflection/settlements at each corner and center of existing structures daily. Report to the Engineer immediately if specified settlement limits are exceeded. Monitor and control vibration.

.3 Monitor the following structures:

.1 Existing Digester Complex

.4 Submit written records of settlement and deflection result to the Engineer weekly.

3.10 SHORING REMOVALS

.1 When footings, walls, slabs and other foundations are in place and backfilling near completion to existing grade, cut down and remove the tops of piles and lagging to a minimum of 1200 mm below finished grade.

.2 Remove shoring as shown on the drawings where necessary to construct new foundation.

3.11 NOTIFICATION

.1 Give the Engineer advance notice of shop fabrication, field installation and other phases of the work to allow the Engineer reasonable opportunity to inspect the work for compliance with contract requirements. Failure to meet this requirement may be a cause for the Engineer to classify the work as defective.

3.12 DEFECTIVE MATERIALS AND WORK

.1 Where factual evidence exists that defective work has occurred or that work has been carried out incorporating defective materials, the Engineer may have tests, inspections or surveys performed, analytical calculations of structural strength made, and the like, in order to help determine whether the work must be replaced. Tests, inspections or surveys or calculations carried out under these circumstances will be made at the Contractor’s expense, regardless of their

results, which may be such that, in the Engineer's opinion, the work may be acceptable.

.2 All testing shall be conducted in accordance with the requirements of the Ontario Building Code and in accordance with the standards given by the Engineer.

.3 Materials or work which fail to meet specified requirements may be rejected by the Engineer whenever found at any time prior to final acceptance of the work regardless of previous inspection. If rejected, defective materials or work incorporating defective materials or work shall be promptly removed and replaced or repaired to the satisfaction of the Engineer, at no expense to the Owner.

END OF SECTION

PART 1 GENERAL

1.1 RELATED WORK

.1 Section 00 31 13 – Construction Phasing

.2 Section 02 05 20 – Temporary By-Pass Pumping

.3 Section 31 05 16 - Aggregate Materials.

.4 Section 31 23 19 - Dewatering

.5 Section 31 23 33 - Excavating Trenching and Backfilling.

.6 Section 33 05 14 – Precast Structures

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM B745/745M, Standard Specification of Corrugated Aluminum Pipes for Sewers and Drains.

.2 ASTM D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.3 ASTM D2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Piping

.4 ASTM D3350-14 – Polyethylene Plastic Pipe and Fittings Material

.5 ASTM F1290 – Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings

.6 ASTM F2164 – Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure

.7 ASTM F2206 – Fabricated Fittings for Butt-Fused Polyethylene Plastic Pipe

.8 ASTM F2620 – Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

.2 Canadian General Standards Board (CGSB). CSA B137, Thermoplastic Pressure Piping Compendium.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A5-98, A8-98, A23.5-98, A362-98, A363-98, A456.1-98, A456.2-98, A456.3-98).

.1 CAN/CSA-A5, Portland Cement.

.2 CSA B1800, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).

.1 CSA B182.2, PVC Sewer Pipe and Fittings (PSM Type).

.4 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS Sections 401, 403, 405, 409, 410, 412, MUNI 1841

1.3 DEFINITIONS

.1 Pipe section is defined as length of pipe between successive manholes and/or between manhole and any other structure which is part of sewer system.

1.4 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittals.

.2 Inform Contract Administrator at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.

.3 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.

.4 Ensure certification is marked on pipe.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

1.6 SCHEDULING

.1 Schedule Work to minimize interruptions to existing services and maintain existing sewage flows during construction with temporary bypass pumping.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

.3 Notify Contract Administrator and plant superintendent two (2) working days in advance of any interruption in service.

PART 2 PRODUCTS

2.1 SANITARY AND STORM SEWERS

.1 Less than or equal to 450 mm ø:

.1 PVC SDR 35 as per ASTM A2412 and in compliance with CSA B182.2 and ASTM A3034. Pipe stiffness minimum 320 kPa. Pipe joints to be bell and spigot with rubber gaskets.

.2 Greater than 450 mm ø:

.1 High Density Polyethylene Pipe (HDPE) SDR 35 to CSA B 137.1. Pipe shall be in accordance with NSF/ANSI 61.

2.2 FORCEMAINS

.1 Polyvinyl Chloride (PVC) SDR ~~**26**~~ **25** to AWWA C905 and CSA B 137.3. Joints are to be bell and spigot with rubber gasket or mechanical joints to AWWA C110/A21.10.

.2 Fittings to AWWA C907 and certified to CSA B137.2. Ductile iron fittings may also be used. They shall be in accordance with ANSI/AWWA C153/A21.53. Mechanical joints shall conform to ANSI/AWWA C111/A21.11.

.3 High Density Polyethylene Pipe (HDPE) SDR ~~**21**~~ **17** to CSA B 137.1. Pipe shall be in accordance with NSF/ANSI 61.

.1 All material must be produced from a PE 4710 resin listed in the Plastic Pipe Institute (PPI) TR-4. The resin material should comply with ASTM D 3350 with a minimum cell classification of 445474C. HDPE pipe and fittings must not contain any recycled compounds except that generated in the manufacturer's own facility from resin meeting the same specifications, sourced from the same raw material. HDPE products shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

.2 Pipe shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification of 445474C. The polyethylene compound shall be UV protected by means of carbon black of not less than 2 percent.

.3 Pipe sizes 4” – 63” shall be manufactured in accordance with ASTM F 714, while pipe sizes 3/4” – 3” shall be manufactured in accordance with ASTM D 3035. All HDPE pipes shall adhere to Sandale’s Inspection and Test Procedure (ITR-04).

.4 HDPE Fittings – Fittings shall be made of HDPE Material with a minimum designation code of PE 4710 & a minimum cell classification of 445474C. All fittings shall be manufactured by Sandale Utility Products, CRP or approved equal. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified by the owner/engineer. All fittings shall meet the requirements of AWWA C901 or C906 and all applicable ASTM Standards.

.5 Fusion Equipment Requirements

.1 Butt fusion equipment must be in satisfactory working order and the hydraulic system must be leak free. Heater plates shall be free from scrapes, gouges, and have a consistent clean coated surface. The pressure gage and thermometer should be checked for accuracy. When requested by the owner, records showing a maintenance service/inspection within 3 months prior to use for this project shall be provided.

.2 Electrofusion Processors shall be maintained and calibrated per manufacturer’s requirements and recommendations.

.4 Transition coupling to AWWA C219, fusion bonded epoxy in accordance with AWWA C213 and supplied with stainless steel nuts, bolts, non-corrosive washers and rubber gaskets to AWWA/ANSI specifications C111/A21.11.

.5 Direct Bury Plug Valves shall be 100% port eccentric direct buried plug valves to AWWA C517-05 and sized to match pipe size noted or as noted on drawings. Valves shall be cast iron body, supplied with mechanical joint ends, Acrylonitrile-Butadiene V-type multiple V-Ring packing, Chloroprene plug facing, a gear actuator suitable for burial applications and supplied with an extended nut actuator and valve box. Valves shall be supplied with a two part epoxy and suitable for direct burial applications. Valves to be Dezurik PEF 100% port eccentric plug valve or approved equivalent.

.6 Valve boxes shall be a 130mm diameter slide type box complete with cast iron lid.

2.3 COUPLERS

.1 Flexible couplers to be carbon steel with fusion-bonded epoxy coating. Couplers to be supplied with ANSI 304/303 stainless steel bolts and nuts. Gasket compound to be approved for contact with sanitary sewage. Couplers to be properly sized to accommodate different O.D. of pipes when a transition between pipe types occur at the flexible coupler. Couplers to be Robar 1506 or approved equivalent.

2.4 RESTRAINTS

.1 Mechanical joint retainer glands shall be cast from ductile iron grade 70-50-5 (minimum) and shall comply with all applicable provisions of AWWA/ANSI C110/A21.10 and C111/A21.11. Square head bolts (5/8") made of 4140 steel and hardened to Rockwell "C" scale 45-47 shall be used. Restraining devices shall have a pressure rating of 1035 kPa (150 psi) or the rated pressure of the pipe, whichever is greater; with a minimum safety factor of 2. Tie rods shall be 16mm in diameter (minimum) and used on blind flanges and elbows as indicated on contract drawings. The minimum number of rods required for each connection shall be three (3), unless noted otherwise.

2.5 FITTINGS

.1 PVC fittings shall conform to AWWA C907 and be certified to CSA B137.2 Ductile Iron fittings shall conform to ANSI/AWWA C153/A21.53; mechanical joints are to conform to ANSI/AWWA C11/A21.11.

.2 HDPE Fittings shall conform to AWWA C906 and ASTM D-3261.

2.6 PIPE BEDDING, COVER, AND SURROUND MATERIAL

.1 Granular 'A' as per OPSS.MUNI 1010 and Section 31 23 33 – Excavating, Trenching, and Backfilling.

2.7 LINK SEAL

.1 Link seals are to be used for connections to all concrete structures (sanitary and effluent piping). Link seals (and sleeves) are to be sized by various pipe O.D's as shown on contract drawings.

2.8 TRACER WIRE

.1 Install tracer wire along forcemains as per OPSS standards and connect to PVC pipe, fittings, valves, etc. to form a continuous loop.

.2 Test the loop of tracer wire and demonstrate to Contract Administrator that it functions properly after the backfill has been completed.

.3 TWU or RWU, 10 gauge, 7 strands or more, 60 C or higher, 600 V, plastic coated or approved equivalent.

.4 C-tap to be approved by CSA and to be sized to connect two tracer wires as specified above.

.5 Tapes to be rugged, pressure-sensitive, PVC-based, minimum 0.1mm thickness. Tapes must protect against waters, salts and be suitable for direct burial applications.

2.9 BACKFILL MATERIAL

.1 Select Subgrade material to OPSS.MUNI 1010.

2.10 INSULATION

.1 50mm thick extruded Polystyrene foam, minimum compressive strength 275kPa as per ASTM D 1621-73. Standard of acceptance:

.1 D.O.W HI-40,

.2 Owens Corning Foamular C400;

2.11 PROTECTIVE MASTIC/TAPE

.1 Protective mastic and tape shall be Densopol 60 or approved alternate.

PART 3 EXECUTION

3.1 PREPARATION

.1 Clean and dry pipes and fittings before installation.

.2 Obtain approval of pipes and fittings from Contract Administrator prior to installation.

3.2 TRENCHING

.1 Do trenching Work in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.

.2 Do not allow contents of any sewer or sewer connection to flow into trench.

.3 Trench alignment and depth require approval of Contract Administrator prior to placing bedding material and pipe.

3.3 GRANULAR BEDDING

.1 Place bedding in unfrozen condition.

.2 Place granular bedding materials in uniform layers not exceeding 150 mm compacted thickness to depth indicated.

.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 95% of Standard Proctor Maximum Dry Density (SPMDD).

.6 Fill excavation below bottom of specified bedding adjacent to manholes or structures with compacted bedding material.

3.4 INSTALLATION

.1 Lay and join pipes in accordance with manufacturer's recommendations and to approval of Contract Administrator.

.2 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points. Ensure barrel of each pipe is in contact with shaped bed throughout its full length. Tolerances: 3mm in 3 m.

.3 Buried HDPE pipe and fittings shall be installed in accordance with ASTM D 2321 or ASTM D 2774 for pressure systems and AWWA Manual of Water Supply Practices M55 Chapter 8. For additional information, contractor should refer to Chapter 7 of PE Handbook of Polyethylene (2nd Edition)

.4 Do not exceed maximum joint deflection recommended by pipe manufacturer.

.5 Do not allow water to flow through pipe during construction, except as may be permitted by Contract Administrator.

.6 Make watertight connections to manholes using suitable gaskets in new structures or using a Link Seal at connections to existing structures.

.7 Install protective mastic and tape in accordance with manufacturer's recommendations on all metallic buried pipe, fittings and valves.

3.5 PIPE SURROUND AND COVER

.1 Place surround material in unfrozen condition.

.2 Hand place surround material in uniform layers not exceeding 200 mm compacted thickness as indicated. Do not dump directly on pipe.

.3 Place layers uniformly and simultaneously on each side of pipe.

.4 Install insulation as indicated on Contract Drawings.

3.6 BACKFILL

.1 Place backfill material in unfrozen condition.

.2 Place backfill material, above pipe surround in uniform layers not exceeding 300 mm compacted thickness up to grades as indicated. Backfill material is to be compacted to at least 95% of SPMDD.

3.7 FIELD TESTING OF SEWERS

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 When directed by Contract Administrator, draw metal mandrel 95% of inside diameter of pipe through sewer to ensure pipe is free of obstructions or deflections.

.3 Carry out CCTV camera inspection on each section of sewer.

.4 Provide colour digital video (DVD) inspection for sewers (2 copies of video and report). Report to document condition of sewer to satisfaction of Contract Administrator. Cost of inspection to be paid by Contractor.

.5 Repair and retest sewer sections as required, until test results are acceptable.

.6 Repair visible leaks regardless of test results.

.7 Obtain a letter of compliance from Municipality and submit to Contract Administrator.

3.8 FIELD TESTING OF FORCEMAINS

.1 Notify Contract Administrator a minimum of 48 hours in advance of proposed tests. Perform tests in presence of Contract Administrator.

.2 Strut and brace caps, bends, and tees to prevent movement when test pressure is applied.

.3 Expel air from forcemain by slowly filling forcemain with water.

.1 Drill and tap high points and install suitable cocks to vent air and to be shut when pressure is applied.

.2 Remove stops after satisfactory completion of test and seal holes with tight fitting plugs.

.4 Apply hydrostatic test pressure of 345 kPa (50 psi) minimum after backfilling of trench, based on elevation of lower point in forcemain and corrected to elevation of test gauge, for period of 2 hours.

.5 Remove joints, fittings and appurtenances found to be defective and replace with new sound material and make watertight.

.6 Define leakage as amount of water supplied from water storage tank in order to maintain test pressure for minimum of 2 hours.

.7 Do not exceed allowable leakage defined as A = T x F x D x L, where T is the time in hours, F is 0.041 L/mm of pipe dia/km of pipe/hour, D is pipe diameter in mm, and L is the pipe length in km.

.8 Locate and repair defects if leakage is greater than amount specified.

.9 Repeat test until leakage is within specified allowance for full length of forcemain.

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 B31.3. A minimum sample of 10% of all welds shall be non-destructively examined as per requirements of ASME/ANSI B31.3 Category D Normal Fluid Service as per Specification 44 01 29. 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 (SS1 AND SS3)

.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 SS1 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 SS3 Size: 65 to 800 mm, TP 304L Schedule 40s with BE, Electric fusion welded stainless steel, A312 TP 304L, Joint Eff. 0.80, with dimensions conforming to ANSI B36.19.

.5 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.

.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.

2.3 TYPE 316 L STAINLESS STEEL (SS2 & SS4)

.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 **SS4)**

.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 VALVES (SS1, SS2, SS3, SS4)

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

.2 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.

.3 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

.4 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.

.5 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, *, l1, CI, EPDM, EPDM,S2,S2; BRAY 31-169; Val-Matic.

.6 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, GA.

.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, GA.

.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, GA.

.4 Direct Bury Plug Valves

.1 Direct Bury Plug Valves shall be 100% port eccentric direct buried plug valves to AWWA C517-05 and sized to match pipe size noted or as noted on drawings.

.2 Valves shall be cast iron body, supplied with mechanical joint ends, Acrylonitrile-Butadiene V-type multiple V-Ring packing, Chloroprene plug facing, a gear actuator suitable for burial applications and supplied with an extended nut actuator and valve box.

.3 Valves shall be supplied with a two part epoxy and suitable for direct burial applications.

.4 Valves to be Val-Matic or Dezurik PEF or approved equivalent.

.5 Valves shall be wrapped in corrosion protection petroleum based wrap (Denso or equivalent as per

.6 Valve boxes shall as per 2.26.

.7 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;

.8 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 flat-bottom.

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

.5 Acceptable Manufacturer: Tideflex, EVR,

.9 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.

.10 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

2.8 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.

2.9 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.

2.10 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.

2.11 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 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

2.12 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.

2.13 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.

2.14 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.

2.15 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.

2.16 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.

2.17 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.

2.18 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.

2.19 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.

2.20 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.

2.21 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.

2.22 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 the specification requirements.

.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.

2.23 SLAB, FLOOR, WALL AND ROOF PENETRATIONS

.1 General: Base design on use of stainless steel wall pipe with thrust collar, unless otherwise specified or shown on the Contract Drawings and Standard Details therein.

.2 Ductile Iron Pipe:

.1 For penetrations through water-retaining concrete walls, floors, slabs, or roofs that are to be watertight.

.2 Diameter and Ends: Same as connecting ductile iron pipe.

.3 Thickness: Equal to or greater than remainder of pipe in line.

.4 Fittings: In accordance with the applicable Piping Specification.

.5 Provide taps for stud bolts in flanges set flush with wall face.

.6 Thrust Collars:

.1 Base design on use for all wall pipes.

.2 Rated for thrust load developed.

.3 Safety Factor: Minimum of two.

.4 Material and Construction:

.1 Ductile iron or cast iron, cast integral with wall pipe wherever possible.

.5 Fabricate by welded attachment of ductile iron thrust collar to pipe where casting impossible.

.1 Perform in the pipe manufacturer's shop by qualified welders as specified herein.

.2 Welds: Electric arc welds of ductile iron with NI 55 or FC 55, nickel-iron-carbon weld rod.

.3 Continuously weld on each side all around.

.3 Stainless Steel Pipe: Base design on use of same material and thickness as connecting pipe; however, minimum thickness of 6mm (¼ inch) is required.

.1 Lining: Same as connecting pipe.

.2 Thrust Collar:

.1 Outside diameter 75 mm greater than outside diameter of wall pipe.

.2 Continuously fillet welded on each side all around.

.4 Pipe Sleeves: Base design on use of 5 mm minimum thickness steel pipe.

.1 Above grade in Nonsubmerged Areas: Hot-dip galvanized after fabrication.

.2 Below grade or in Submerged or Damp Environments: Lined and coated after fabrication with Stainless Steel.

.3 Seep Ring:

.1 5 mm minimum thickness center flange for water stoppage on sleeves in exterior or water-bearing walls.

.2 Outside Diameter: 75 mm greater than wall pipe outside diameter.

.3 Continuously fillet weld on each side all around.

.4 Existing Concrete Walls: Holes drilled with a core drill may be used in lieu of sleeves. In existing masonry walls, use a sleeve and grout around sleeve. Specify fill openings as required to maintain room classifications.

2.24 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

2.25 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).

2.26 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.

2.27 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