



June 27, 2025

### **ADDENDUM # 3**

#### **RFT-SM-006-25 – Glencoe Wastewater System Upgrades – Victoria Street Sewage Pump Station Upgrade**

##### **Specifications:**

Refer to missing Specification 15053 Motors, Drives, and Guards

##### **Questions**

**Question 1:** Section 16000.1.1.2 The following items are part of the cash allowance:

.2 SCADA Integrator (Owner's Representative): RPU/PLC and SCADA programming, supply of SCADA hardware and software, supply of RPU/PLC and communication panels, SCADA start-up and commissioning. Is the SCADA integrator supplying the CP1 Control Panel on drawing EI-521.

**Answer 1:** Delete Section 16000, Item 1.1.2 in its entirety **and replace with:**

.2 The following items are part of the cash allowance:

.1 Utility Service.

.2 SCADA Integrator (Owner's Representative), RPU/PLC and SCADA Programming, SCADA start-up and commissioning.

All other items are the responsibility of the Contractor to provide.

**Question 2:** When I read the attached documents, I realized that Stantec consultant requested to have two pumps (Primary / Back up) and the flow 50 L/S on TDH 38m. The following questions need to be answered to give more details and enabling us to generate a comprehensive proposal:

Sizing a temporary pumping system

1. What is the existing lift station rated for? 50 Flow L/S @ 38 TDH m. The pump rental company will be able to accurately size a temporary pump by knowing what the service rating of the existing booster pump is.
2. What is the maximum vertical depth of the suction point? \_\_\_\_\_ feet / Meter. This information will help determine whether a surface mounted suction lift or a submersible pump is needed for the application. (illustration shows a surface mounted suction lift pump)
3. What length of suction hose will be required? \_\_\_\_\_ feet /Meter. Suction hose length is determined by access of the temporary pump to the wet well. Suction hose is typically available in 10' and 20' sections.
4. What length of discharge hose will be required? \_\_\_\_\_ feet / Meter. What is the distance from the temporary pump discharge to the tie-in point? Flanged discharge hose is typically available in 10' and 20' lengths.
5. What is the size and description of the last Discharge pit?  
\_\_\_\_\_
6. Does the Primary & Backup pumps will be manifolded to carry to the discharge sewage in combined line OR each pump Primary & Backup will be in separate discharge line to the discharge pit ?
7. Does project design requested sewer plugs on the suction side ? if so, how many one or two of them ?
8. What is the duration of the project or duration of equipment rental?

**Answer 2:** This question is very generic and requests information that is shown on the drawing in terms of general dimensions. However, the following responses are provided:

1. This information is noted in the specification for the temporary pumping operation.
2. Approximately 6.7 m. Refer to drawings.

3. Approximately 12.1 m based on the layout shown on the drawing. Piping is shown as PVC, not hose. Contractor to confirm location/siting and temporary connections based on their proposed plans.
4. The approximate distance is 8.3 m, however as noted above this is to be confirmed by the Contractor.
5. This is a generic question. Refer to the drawings. These pumps will connect to the existing valve chamber which will then utilize the existing forcemain to discharge to the downstream Glencoe WWTP.
6. The pumps will be manifolded into one combined discharge line to connect to the valve chamber.
7. Refer to the specifications and drawings related to requirements for the sewer plug on the 600 mm sewer.
8. This is to be determined by the Contractor based on their timeline to complete the work within the facility.

**Question 3:**

1. Diameter size for both the air valves ARV010, ARV010?
2. In the Drawing CHV103 (check valve) is shown as temporary piping but is not in the valve list, is it required?
3. Duck bill CHV02 is shown in the valve list but not in the Drawings?
4. BLV104 (Ball valve) is shown in the drawing but not in the valve list, is it required?
5. Can you confirm if the Gate valve GTV-101 needs stem extensions?

**Answer 3:** Refer to the following responses:

1. Inlet is 50 mm (2"), outlet is 25 mm (1"). Reducers to be provided as required.
2. Yes.
3. Refer to Section 1 on Drawing DP-301. The duck bill is shown but not labelled, however it is at the end of the sump pump return and drain pipe from the valve chamber.
4. Yes, to be provided by the Contractor.

5. Yes, please provide stem extension and valve box as shown on Section 2 on Drawing DP-301.

**Question 4:**

1. Reference Breakdown pricing - Div 3 Concrete item
  - Item 3.2 PRE-ENGINEERED BUILDING ITEMS- Can you clarify the scope of work inside this building, or at least refer to the drawing showing the work?
  - Item 3.6 CONCRETE FINISHES - Please provide the specification, and is it regarding the Concrete Pad or some work inside the building?
2. As discussed in the meeting, the forcemain will be installed by another contractor. Could you please provide the estimated completion schedule for this contract? Additionally, will the forcemain be tested and ready for connection upon completion, or will we need to schedule our work accordingly?
3. We have noted that the SCADA work is included as part of the allowance. Could you confirm whether this work will be contracted directly by the owner? Additionally, please advise whether contractors should coordinate accordingly.

**Answer 4:** Refer to the following responses:

1. There is no pre-engineered building. Delete Item 3.2 of the 24-Hour Price form. Regarding concrete finishes, this relates to the generator pad, benching within the existing wet well, or any concrete work related to pipe supports within the pre-cast valve chamber.
2. It is anticipated that the forcemain will be installed by end of July 2025, including testing.
3. There is an allowance noted for SCADA programming. Refer to the response to Question 1 in this addendum for further clarifications on what is to be addressed by the allowance. All other items are to be provided by the Contractor.

**Question 5:**

1. Spec (section 2.1.1 of 16620) asks for the sound enclosure specifies a maximum sound level of 75 dB, will the Municipality accept a 76.4dB maximum sound level enclosure?
2. Spec (section 3.1.2 of 16620) asks for 4 hrs witnessed FAT at 0.8 pf. Do we include 0.8 pf test at shop (gets expensive with need to rent a 0.8 pf reactive load bank)? Or include the factory test report at 0.8 PF and at shop we can do at 1 PF. Please confirm if witnessed FAT at shop will be acceptable at 1.0 PF.

**Answer 5:** Refer to the following responses:

1. No. The 75 dB maximum sound limit is a requirement given the location of the generator in proximity to nearby residential homes.
2. Witness FAT requirements to remain as noted in the specifications.

**Question 6:**

1. What is the static head?
2. Also, is it possible to provide the system curve for these pumps in parallel operation?

**Answer 6:** Refer to the following responses.

1. It is not clear if this refers to the submersible pumps to be provided. If so, it is not clear why this question is being asked as the pump specification notes the pump to be provided at time of tender. Contractors are reminded to refer to Division 1, Specification 01035 as it relates to potential alternatives. Those will not be considered prior to close of tender.
2. Refer to response above.

**Question 7:**

What are the properties of RGS Buried Conduit?

- Voltage, Material Type, Insulation?
- What is the centerline elevation of the conduit?

- How far is it from the edge of the new structure? If it is as close as our measurement (in red), the chamber might require relocation, as the shoring won't fit in between the conduit and the proposed structure.
- What is the limit of movement for the shoring structure to protect the conduit?
- Can it be daylighted? Can it be turned off during the installation of the shoring?

#### Extent of shoring?

- Please confirm the existing ground elevation around the new valve chamber.
- What is the required bottom elevation of the excavation to install the precast valve chamber?
- How far is the new valve chamber from the existing one?
- Will the trees be removed near the newly proposed structure?

#### **Answer 7:** Refer to the following responses:

1. The 20mm conduit is estimated to be approximately 0.6 m in depth. This line is related to the alum line. Contractor to daylight as required. The chemical line may be disconnected if required to permit the installation of the valve chamber.
2. Ground elevations are shown on the drawing, as is the base elevation of the proposed valve chamber. Please refer to drawings. The approximate distance from the existing valve chamber to the new valve chamber is 3.4m, however the exact location of the chamber may be adjusted if needed by the Contractor to avoid conflicts. Tree removals are shown, additional trees may be removed if necessary to permit for the work to proceed.

**Question 8:** Reference EI-522 PLC – Specified part number 5069-L3100ERM has 10Mb memory, Description only notes 5mb memory.

Confirming 5069-L3100ERM correct part number for the PLC required as there is a significant cost impact.

**Answer 8:** Change part number from 5069-L3100ERM to **5069-L306ER**.

**Question 9:**

1. Is div 16 taking care of the removals for the exist genset & diesel tank etc???
2. By-Pass Piping for By-Pass Pumping: Please confirm what they are providing; Do I have to include for the piping shown on DP-102?
3. Outside services: Are they including for the 20mm dosing line?

**Answer 9:** Refer to the following responses:

1. This is not a clear question. Contractor is required to undertake removals of the existing generator and tank. The Municipality does not require this to be handed over.
2. This is not a clear question. The Contractor is responsible for providing temporary pumping and piping as required to bypass the existing wet well as shown. Contractor to coordinate with temporary pump supplier, but is responsible for providing a fully functional system.
3. This is not a clear question. Dosing line is to be provided from the chemical building to the new valve chamber.

**Question 10:** Would HOMA pumps be an acceptable alternative on this tender? See attached literature.

**Answer 10:** Refer to the Specification 01035 as it relates to modifications.

**Question 11:** Could you also please include the specifications or model numbers for the valves listed below in the same addendum? This would help ensure accurate coordination and pricing.

- 3WV-101 6" THREE-WAY VALVE- Please provide detailed specification / information
- 3WV-102 6" THREE-WAY VALVE- Please provide detailed specification / information

- ARV-010 AIR RELEASE VALVE- Please provide detailed specification / information
- CHV-103 6" CHECK VALVE- Please provide detailed specification / information
- BLV-104 3 1/2" BALL VALVE- Please provide detailed specification / information
- CHV-101 10" CHECK VALVE- Please provide detailed specification / information
- CHV-102 10" CHECK VALVE (Specification Page no 297)- detailed spec not available-Please provide one
- CHV-104 3 1/2" CHECK VALVE - Please provide detailed specification / information
- DBV-101 3 1/2" CHECK VALVE - DUCK BILL- (Specification Page no 293 & 298) detailed spec not available
- KNV-102 10" KNIFE GATE VALVE - (Specification Page no 298) detailed spec not available. Can we use same spec as KNV-101 ?
- KNV-103 10" KNIFE GATE VALVE- (Specification Page no 298) detailed spec not available. Can we use same spec as KNV-101 ?
- KNV-104 10" KNIFE GATE VALVE- (Specification Page no 298) detailed spec not available. Can we use same spec as KNV-101 ?
- KNV-105 10" KNIFE GATE VALVE- (Specification Page no 298) detailed spec not available. Can we use same spec as KNV-101 ?
- KNV-106 10" KNIFE GATE VALVE- (Specification Page no 298) detailed spec not available. Can we use same spec as KNV-101 ?
- KNV 107 6" KNIFE GATE VALVE - (Specification Page no 298) detailed spec not available. Can we use same spec as KNV-101 ?
- SMP-101 SUMP PUMP - No details available

**Answer 11:** Refer to the attached revised Specification 15100 including the tables at the end of the specification. Note that the sump pump information was already provided in Addendum 1.

**Question 12:**

1. Div 15 Spec index notes spec 15051 for Pipe welding but this spec is not in the package. Please provide.

2. Spec 15060 Data Sheets SS-1, SS-2 & SS-5 note to see spec 15050 for welding details, but spec 15050 has no welding spec. Please advise.
3. Drawing DP-301 notes the vents as Spec SS-1, but Table 15060-1 defines the vents as Spec SS-5. Please confirm which spec is to be used.
4. Are ALL flanges required as drawn, or can we weld pipe to fittings and just maintain flanges where required (valves, equipment, etc...)
5. Section 3 on DP-301 notes to see Structural drawings for the New Valve chamber details, but there are no Structural Drawings in the drawing package, and no detail was added in Addenda #1. Please advise.
6. Due to high volume of tenders and the holiday in the middle of next week we kindly request an extension of two (2) weeks for this tender closing.

**Answer 12:** Refer to the following responses:

1. Refer to attached Specification 15051.
2. Refer to revised Specification 15060 which notes to reference new Specification 15051.
3. Specification revised to read SS-1.
4. Preference at this time is to provide flanges as shown.
5. New valve chamber shall be precast. The Contractor shall insulate and waterproof the exterior valve chamber perimeter surfaces and provide insulation to the inside of the chamber hatch and cap segment as well.
6. Please refer to revised closing date on Page 1.

**Question 13:** Can you provide structural drawings for the new chambers? Notes on DP-301 reference the structural drawings for the required waterproofing, but we can't find these in the documents provided. Addendum 1 drawings don't show the new Valve Chamber.

**Answer 13:** The new valve chamber is to be a precast chamber. Refer to response to Question 12 above, Item 5.

**Question 14:** Are there any landscape drawings for this project?

**Answer 14:** No. The intent of the landscape allowance is to address planting of new trees at the discretion of the Municipality to address the removal of trees noted, and for seeding of grassed areas.

**Question 15:** Can the Temporary Pumps and Piping be an allowance item?

**Answer 15:** No. The preference is for the Contractor to price this item as the duration of the temporary pumping is subject to the Contractor's progress and coordination of site activities.

**Question 16:** Is the flow meter being supplied by the owner?

**Answer 16:** No, the flow meter is to be provided by the Contractor. Please refer to Division 16, including clarifications noted in Addendum 1.

**Question 17:** Can you further clarify in an addendum what is required at the time of Tender and what is required for the 24 hour breakdown including a list of documents?

**Answer 17:** Please refer to revised Page 1 of Section C with a list of items required at time of bid submission, within 24 hours, and prior to commencement of work.

**Question 18:** 11216 2.11 – Xylem does not offer a stainless steel base elbow, please remove this requirement.

**Answer 18:** Delete reference to "316 Stainless Steel" under 11216, Item 2.11.3 and replace with "Cast Iron".

**Question 19:** As discussed, would you verify the duty point requirement on this project. Unless I am missing something here, the pump recommended—the HL200M will barely be able to meet the provided duty point. In my opinion this pump is oversized for this job.

**Answer 19:** As noted in 13006, Item 1.4.4, the Contractor may propose an alternative system. The target pump capacity of 50 L/s at 38 m TDH is intended

to provide information to support pump selection. An alternative pump selection would be acceptable.

**Checklist of Items Required with Bid Submissions:**

- Form of Tender – completed, signed and initialed where indicated
- Tender Document Privilege Clause
- Summary Form (Page 14 of Section C)
- List of References (Page 5 of Section C)
- Agreement to Bond
- Bid Bond (10%)
- Addendum/Addenda

**Checklist of Items Required within 24 Hours of Request of Lowest Bidders:**

- 24-Hour Breakdown Pricing (Pages 11 to 13 of Section C)
- List of subcontractors to be employed (Page 6 of Section C)
- Statement A, Contractor and Subcontractor's Experience
- Statement B, relative to supervisory personnel I/we propose to assign to the project, (including subcontractors).

**Checklist of Items Required Prior to Commencement of Work:**

- Executed copies of the Agreement
- Proposed preliminary schedule of construction
- Insurance certificates in compliance with Tender documents
- Copy of notification of Contract as sent to Ministry of Labour
- Copy of Contractor's Health and Safety Policy
- All required bonding as listed in the Tender Documents

## 1.0 GENERAL

### 1.1 Related Requirements

- .1 Section 15050 – Mechanical General Provisions.

### 1.2 Reference standards

- .1 American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME)
  - .1 ANSI/ASME B31.1-2018, Power Piping.
  - .2 ANSI/ASME B31.9-2017, Building Services Piping.
  - .3 ANSI/ASME Boiler and Pressure Vessel Code-2019:
    - .1 BVPC 2019 Section I: Rules for Construction of Power Boilers
    - .2 BPVC 2019 Section V: Non-destructive Examination.
    - .3 BPVC 2019 Section IX: Welding and Brazing Qualifications.
- .2 American National Standards Institute/American Water Works Association (ANSI/AWWA)
  - .1 ANSI/AWWA C206-17, Field Welding of Steel Water Pipe.
- .3 American Welding Society (AWS)
  - .1 AWS B2.1/B2.1M-2014, Specification for Welding Procedure and Performance Qualification
  - .2 AWS C1.1M/C1.1:2019, Recommended Practices for Resistance Welding.
- .4 Canadian General Standards Board (CGSB)
  - .1 CGSB 48.2-1992, Spot Radiography of Welded Butt Joints in Ferrous Materials
  - .2 CGSB 48.9712-2014, Non-Destructive Testing - Qualification and Certification of NDT Personnel.
- .5 Canadian Standards Association (CSA International)
  - .1 CSA B51-14, Boiler, Pressure Vessel and Pressure Piping Code.
  - .2 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
  - .3 CSA W59-18, Welded Steel Construction (Metal Arc Welding).
  - .4 CSA-W117.2-12 (R2017), Safety in Welding, Cutting and Allied Processes.

- .5 CSA W178.1-18, Certification of Welding Inspection Organizations.
- .6 CSA W178.2-18, Certification of Welding Inspectors.

### 1.3 Quality assurance

- .1 Qualifications:
  - .1 Welders
    - .1 Welding qualifications in accordance with CSA B51 and ASME B31.1 Section 127.5, if applicable.
    - .2 Use qualified and licensed welders possessing certificate for each procedure performed from authority having jurisdiction.
    - .3 Submit welder's qualifications to Departmental Representative.
    - .4 Each welder to possess identification symbol issued by authority having jurisdiction.
  - .2 Inspectors:
    - .1 Inspectors qualified to CSA W178.2 and CGSB 48.9712 with minimum Level II Certification for specific type of testing with a pressure vessel and piping endorsement.
  - .3 Certifications:
    - .1 Registration of welding procedures in accordance with CSA B51.
    - .2 Copy of welding procedures available for inspection.
    - .3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.
  - .4 Program:
    - .1 Maintain a Quality Assurance Program for defect prevention and in-service reliability conforming to CSA B51 Part 1.
    - .2 Maintain on site: Quality Assurance Program and Quality Control Manual, welder certifications, weld procedures and all NDE test results.
  - .5 Visual test inspection of welds shall take place prior to, during, and after completion of all welds.
  - .6 Pressure welders shall be used for contained pressure in excess of 100 kPa.
  - .7 Material log and material test reports (MTR). MTR is a report confirming the materials conformance to a specific material grade or designation. MTR's are supplied by the mill producing the material and must include, as a minimum, the following information;
    - .1 Place of manufacturer.
    - .2 Identification of the standard the material has been produced to, i.e. ASTM, NACE.
    - .3 Chemical composition.
    - .4 Physical properties.
    - .5 Mechanical properties.
    - .6 Certification, i.e. QA managers signature.

.7 Heat treatment.

.8 Welder log:

.1 Self-formatted and maintained record of the welding procedures for which each individual welder has been qualified to perform. Welders logs must also contain the dates of the qualification, expiration dates and the unique identifying symbol assigned to each welder to identify his work when required.

#### 1.4 Closeout submittals

.1 Submit in accordance with Section 15050 – Mechanical General provisions. Include:

.1 Weld maps to be included in redline as-built drawings

.2 Results of weld quality tests; Non-Destructive Testing (NDT) methods as appropriate to suit the welding application:

.1 Radiographic.

.2 Ultrasonic.

.3 Magnetic particle.

.4 Liquid penetrant.

.3 Submit results of NDT tests, together with copy of welder's licence and description of procedures used, to inspector of insurance company under contract to City of London.

.4 Welder log.

.5 Welding Procedure Specification (WPS).

.6 Procedure Qualification Record (PQR).

.7 Material log and material test reports (MTR).

## 2.0 PRODUCTS

### 2.1 General

.1 Install and weld piping and fittings in accordance with required ASME/ANSI Code of Construction for each system.

### 2.2 Electrodes

.1 Electrodes: in accordance with CSA W48 Series.

.2 All filler materials shall be fully identified by the ASME Specification number and the AWS classification number.

.3 Filler metal storage and handling procedures shall be required to maintain the material in a clean and dry condition up to the time of use. A materials log shall be

kept for all electrodes. Heat number and MTR (material test report or mill test report).

- .4 Low hydrogen electrodes shall be handled and stored in accordance with the manufacturer's recommendations to avoid pickup and to retain the low hydrogen characteristics of the electrode. A method of keeping electrodes warm and moisture free shall be available with each welder.
- .5 The methods to be used for handling and storing electrodes shall be covered in the welding procedure or Contractor's Quality Control Manual.

### **2.3 Base materials**

- .1 Use base materials consisting of carbon steels listed in Table 126.1 or ANSI B31.1 which have ASME equivalents listed in P-1 group No. 1, Table QW422 of ASME Section IX. Either the ASTM materials listed or their ASME equivalents shall be acceptable.
- .2 All base materials shall be identified by specification number and grade, class, or type when recorded on a welding procedure specification's procedure qualification record, or the record of welder qualification test.
- .3 Ring or saddle reinforcements, doublers, lugs, etc., shall be made from material having the same general chemical composition as the pipe headers, or nozzles to which they will be joined unless otherwise specified or unless prior written approval is obtained from the Access doors to be 14 U.S.S. gauge steel with concealed hinges, anchor straps, screwdriver operated lock, rounded safety corners and dust tight doors that open 180 deg. Doors are to be adequately sized to suit equipment which is to be accessed, but in no case smaller than 8" x 8" (200mm x 200mm)

## **3.0 EXECUTION**

### **3.1 Performance of work**

- .1 Perform work in accordance with Section 15050 – Mechanical General provisions. Supplemented as noted herein.

### **3.2 Quality of work**

- .1 Welding: in accordance with ANSI/ASME B31.1, B31.9, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS B2.1, AWS C1.1, and special procedures specified elsewhere in Division 23 and in accordance with applicable requirements of federal and provincial authorities having jurisdiction.
- .2 The Departmental Representative reserves the right to request a welder be removed from a project due to poor performance including weld failure rate deemed to be excessive at the discretion of the Departmental Representative.

### **3.3 Fume minimization and extraction**

- .1 Utilize welding materials and procedures that minimize fumes and

smoke generation.

- .2 Use fume extractors when welding. Follow manufacturer's recommendations for selecting the appropriate extractor and maintaining filter cleanliness.

### **3.4 Installation requirements**

- .1 Identify each weld with welder's identification symbol.
- .2 Maintain weld maps and logs identifying the location of all welds performed on the piping system together with the identification of the welder performing the weld.
- .3 Backing rings are not permitted.
- .4 Fittings:
  - .1 NPS 2 and smaller: install welding type sockets.
  - .2 Branch connections: install welding tees or forged branch outlet fittings.
- .5 Weld Procedures:
  - .1 Follow the welding procedure for the type of piping system to be welded and the associated piping code standard that would apply (either ASME B31.1 or ASME B31.9 as indicated in associated piping system specification)
  - .2 All welders shall be qualified for each procedure to be welded (PQR).
- .6 Structural welding shall conform to CSA Standard W59.

### **3.5 Joint fit-up**

- .1 Valves welded into the system shall be open as the welding is carried out.
- .2 The geometry of pipe weld joints (i.e. joint preparation and root opening) shall be in accordance with the tolerance specified by the weld joint sketches and/or PQR contained in the welding procedures submitted to the Departmental representative.
- .3 Each joint should be tack welded in place and the welding inspector shall visually check all welds before implementing the welding to ensure proper fit up and clean surface to the weld. In cases where the internal misalignment exceeds 1.5mm (1/16 inch), the tack well shall be removed, and the piping shall be realigned to fit within the acceptable tolerance.

### **3.6 Inspection and tests - general requirements**

- .1 Review weld quality requirements and defect limits of applicable codes and standards with Departmental Representative before work is started.
  - .1 For visual tested (VT), RT, UT, PT and MT methods, acceptance criteria shall be as per applicable piping design code

- .2 Arc strikes and arc burns on pressure boundaries shall not be permitted.
- .2 Formulate "Inspection and Test Plan" in co-operation with Departmental Representative.
- .3 Do not conceal welds until they have been inspected, tested and approved by inspector and hydrostatic pressure test is complete.
- .4 All welds shall be 100% VT in accordance with the applicable acceptance criteria. VT is to be performed before any other required NDE.
- .5 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified at no additional cost to the contract.
- .6 Departmental Representative may use any method of inspection necessary to establish quality control and assure adherence to proper welding procedures.
- .7 The method of inspection to be used may be changed by the Departmental Representative at their discretion.
- .8 The limitations as to weld imperfections shall be in accordance with the applicable section of the ASME B31.1 and ASME B31.9 piping codes.

**3.7 Specialist examinations and tests**

- .1 General
  - .1 Perform examinations and tests by specialist qualified in accordance with CSA W178.1 and CSA W178.2 and approved by Department Representative.
  - .2 To ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of authority having jurisdiction.
- .2 Weld inspections will be performed as a minimum, by the method and in the quantity identified in the following table:

**Table 1:**

Piping Design Code	Frequency of Inspection		
	Weld Setup	Radiographic Inspection	Visual
ASME B31.9 Piping	20% of all welds	0% of all welds + 100% of all welds where new piping connects to existing.	100%, and minimum of 40% of root passes.

- .3 All documentation regarding all welds shall be reviewed by quality control and

quality assurance inspector prior to leak testing.

- .4 Hydrostatically test welds to requirements of ANSI/ASME B31.1. All welds will be visually inspected for leaks during the hydrostatic test period.
  - .1 If hydrostatic testing is not possible, perform radiographic tests.
  - .2 Upon failure of welds by hydrostatic test, perform additional testing as directed by Departmental Representative at no additional cost until successful results achieved.
- .5 Visual examinations: include entire circumference of weld externally and wherever possible internally.
  - .1 Failure of visual examinations:
    - .1 Upon failure of welds by visual examination, perform additional testing as directed by Departmental Representative. A total percentage of welds may be selected at random by Departmental Representative in accordance with the frequency of inspections per Table 1, or greater.
- .6 Radiographic tests for piping systems.
  - .1 Spot radiography to CAN/CGSB-48.2.
    - .1 Conduct radiographic tests of welds in accordance with Table 1, with welds selected by Departmental Representative.
  - .2 Radiographic film:
    - .1 Identify each radiographic film with date, location, name of welder, and submit to Departmental Representative. Replace film if rejected because of poor quality.
  - .3 Interpretation of radiographic films:
    - .1 By qualified radiographer.
  - .4 Failure of radiographic tests:
    - .1 Extend testing to an additional 10% of welds by welder responsible when those welds fail tests.
    - .2 The Departmental Representative reserves the right to request any welder be replaced if the number of failures is deemed excessive. The welder will not be permitted to make further welds on the project without the approval of the Departmental Representative.

### 3.8 Defects causing rejection

- .1 As described in ANSI/ASME B31.1 or B31.9 and ANSI/ASME Boiler and Pressure Vessels Code.
- .2 Rejection of welds will be based on the weld evaluation as performed by a qualified NDT technician.

- .3 In addition, chilled water systems below 1035 kPa:
  - .1 Undercutting greater than 0.8 mm adjacent to cover bead on outside of pipe.
  - .2 Undercutting greater than 0.8 mm adjacent to root bead on inside of pipe.
  - .3 Undercutting greater than 0.8 mm at combination of internal surface and external surface.
  - .4 Incomplete penetration and incomplete fusion greater than total length of 38 mm in 1500 mm length of weld depth of such defects being greater than 0.8 mm.
  - .5 Repair cracks and defects in excess of 0.8 mm in depth.
  - .6 Repair defects whose depth cannot be determined accurately on basis of visual examination or radiographic and/or particle tests.

### **3.9 Repair of welds which failed tests**

- .1 Repair welds shall be made using a written repair procedure that has been reviewed and accepted by the Department Representative to starting any repair. The procedure shall state as a minimum, the following information:
  - .1 Means of excavating defects from the weld area
  - .2 NDE methods used to verify complete defect removal before repair
  - .3 Welding procedures to be used for weld repair
  - .4 NDE methods used to verify satisfactory completion of the repair
- .2 Re-inspect and re-test repaired or re-worked welds at Contractor's expense.
- .3 Claims for delays in completion of project will not be accepted for reasons of failures of welds to pass examinations.

END OF SECTION

## **1.0 GENERAL**

### **1.1 Related Sections**

- .1 Section 01300 - Submittal Procedures.
- .2 Section 15000 - General

### **1.2 References**

- .1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
  - .1 ASHRAE 90.1-01, Energy Code for Buildings Except Low-Rise Residential Buildings.
  - .2 Electrical Equipment Manufacturers' Advisory Council (EEMAC)

### **1.3 Sections Includes**

- .1 Electrical work to conform to Division 16 including the following:
  - .1 Control wiring and conduit is specified in Division 16 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 15. Refer to Division 16 for quality of materials and workmanship.
  - .2 Supplier and installer responsibility is indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.

### **1.4 Shop Drawings**

- .1 Submit shop drawings in accordance with Section 01330 - Submittal Procedures.

### **1.5 Closeout Submittals**

- .1 Provide maintenance data for motors, drives and guards for incorporation into manual specified in Section 01330 - Submittal Procedures.

### **1.6 Waste Management And Disposal**

- .1 Separate and recycle waste materials in accordance with Section 01355 - Waste Management and Disposal.
- .2 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Engineer.

- .3 Remove from site and dispose of packaging materials at appropriate recycling facilities.

## **2.0 PRODUCTS**

### **2.1 General**

- .1 Motors to be premium (high) efficiency, in accordance with local Hydro company standards and the requirements of ASHRAE 90.1.
- .2 Provide motors for mechanical equipment as specified.
  - .1 Provide ECM motors where indicated.
  - .2 Provide VFD motors where indicated.
- .3 If delivery of specified motor will delay delivery or installation of equipment, install motor approved by Engineer for temporary use. Final acceptance of equipment will not occur until specified motor is installed.
- .4 Motors under 373 W, 1/2 HP : speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.
- .5 Motors 373 W, 1/2 HP and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature 40°C, 3 phase, 600 V, unless otherwise specified or indicated. Motors must be premium efficiency, Class F insulation, suitable for use with VFD's.
- .6 Explosion proof motors: CSA approved for Class I, Division 1 service.

### **2.2 Temporary Motors**

- .1 If delivery of specified motor will delay completion or commissioning work, install motor approved by Engineer for temporary use. Work will only be accepted when specified motor is installed.
- .2 Ensure for temporary use with machine guards meet the requirement of OHSA, especially that the guards have no free area that is large enough to provide access with fingers to moving components. Work will only be accepted when specified motor is installed.

### **2.3 Belt Drives**

- .1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
- .2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

- .3 For motors under 7.5 kW, 10 HP : standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.
- .4 Correct size of sheave to be determined during commissioning.
- .5 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.
- .3 Motor slide rail adjustment plates to allow for centre line adjustment.

## 2.4 Drive Guards

- .1 Provide guards for unprotected drives.
- .2 Guards for belt drives:
  - .1 Expanded metal screen welded to steel frame.
  - .2 Minimum 1.2 mm thick sheet metal tops and bottoms.
  - .3 38 mm diameter holes on both shaft centres for insertion of tachometer.
  - .4 Removable for servicing.
- .3 Provide means to permit lubrication and use of test instruments with guards in place.
- .4 Install belt guards to allow movement of motors for adjusting belt tension.
- .5 Guard for flexible coupling:
  - .1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.
  - .2 Securely fasten in place.
  - .3 Removable for servicing.
- .6 Unprotected fan inlets or outlets:
  - .5 Wire or expanded metal screen, galvanized, 19 mm mesh.
  - .6 Net free area of guard: not less than 80% of fan openings.
  - .7 Securely fasten in place.
  - .8 Removable for servicing.

## 3.0 EXECUTION

### **3.1 Installation**

- .1 Fasten securely in place.
- .2 Make removable for servicing, easily returned into, and positively in position.

END OF SECTION

## **1.0 GENERAL**

### **1.1 Summary**

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

### **1.2 Products Supplied Under Other Sections**

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

### **1.3 Co-ordination**

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

### **1.4 Related Sections**

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

.3 Mechanical Insulation Section 15250

### 1.5 Submittals

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

### 1.6 Definitions

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

- .9 Submerged: Regularly or occasionally submerged in liquid inside tanks and/or channels and wet wells and within 3.0 m above maximum water level of open tankage. Includes pipe and appurtenances within manholes, vaults, chambers, and similar items.

## 1.7 Quality Assurance

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

## 1.8 Product Delivery, Storage and Handling

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

## 2.0 PRODUCTS

### 2.1 Materials

- .1 Supply pipes in size and class specified in Contract Documents. Where pipe size is not specified, provide pipe required by Ontario Plumbing Code (minimum 12 mm diameter).
- .2 Supply pipe material as specified. Refer to Section 15250 for insulation requirements.
- .3 Supply fittings suitable for and compatible with class and type of pipe with which they will be used.
- .4 Process piping data sheets
  - .1 Piping materials and fittings: comply with Data Sheets' included in this Section. Data Sheets are referred to on Drawings in the Line Identification Number. Line Identification Number is made up of following components:  
  
(Nominal diameter) (Service) - (Line Number) - (Pipe Material Code)  
i.e. 300 - TW - 706 - SS is equivalent to: 300 mm dia. -Treated Water - Line 706  
Stainless Steel  
Line Number: Y; YYY is the sequential line number.

### 2.2 General

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

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

**TABLE 15060-1:**

ABB R	SERVICE	PIPE MAT.	DATA SHEET NO.	PRIMARY JOINT	WORKING PRESS. kPa	TEST PRESS. kPa	TEST MEDIA	TEST DURATIO N (hours)	DESIGN TEMP. °C	ALLOWAB LE LEAKAGE	REMARKS
RWW	Raw Sewage Discharge	SS	SS1/SS2	W/FL/VIC	234	1050	Water	4	0-40	0	Plant
RWW	Raw Sewage	PVC	PVC2	BS	234	1050	Water	4	0-40	0	Buried
RWW	Raw Sewage - Temporary Pipe	PVC	PVC3	BS	234	1050	Water	4	0-40	0	Plant/Outside
RWW	Raw Sewage – emergency truck loading	SS	SS1	W/FL	234	1050	Water	4	0-40	0	Plant
ALUM	Alum	PFA/ PVC	TU3/PVC3	ChemFlar e Conn./BS	400	700	Alum	4	10-35	0	Plant
DRN	Drain	PVC	PVC3	SW/FL	Gravity	Leakage	Water	4	0-40	0	Plant/Buried
VT	Vent	SS	SS1	W/FL	Gravity	Leakage	Water	4	0-40	0	Plant/Outside

**Note:**

1. Refer to following page for legend.

**Legend for Table 15060-1: Primary Joints.**

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

**2.3 Polyvinyl Chloride (PVC) (Buried): Data Sheet No. PVC1**

Data Sheet No. **PVC1**

ITEM	SIZES (mm)	GENERAL DESCRIPTION
Pipe	Up to and including 200	Polyvinyl Chloride (PVC) pipe up to and including 200 mm diameter shall conform to AWWA C900, to be certified by the Canadian Standards Association to CSA Standard B137.3, and shall be Class 150, DR18, with Cast Iron O.D. dimensions. Forcemain installations should be white in colour.
Fittings	Up to and including 200	PVC injected molded fittings to AWWA C907 and CSA B137.3. Ductile Iron conforming to C153 minimum class of 350. All fittings to be in accordance with Municipality of Southwest Middlesex Standards.
Joints	Up to and including 200	Integral bell and spigot ends with stiffened wall section and formed groove for rubber gasket.
Joint Restraints		Conform to Municipality of Southwest Middlesex Standards.
Installation	All	.1 Lay and join pipe to CSA B182.11 and manufacturer's instructions. .2 Install pipe with bell ends facing upgrade. .3 Install gaskets as recommended by manufacturer. .4 Support pipes with hand slings or crane as required minimizing lateral pressure on gasket and maintaining concentricity until gasket is properly positioned. .5 Align pipes carefully before joining. .6 Maintain pipe joints free from mud, silt, gravel and other foreign material. .7 Avoid displacing gasket or contaminating with dirt or other foreign material. Remove disturbed or dirty gaskets; clean, lubricate and replace before joining is attempted. .8 Complete each joint before laying next length of pipe. .9 Minimize joint deflection to manufacturer's recommendations. .10 Apply pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

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

Data Sheet No. **PVC2**

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

**2.5 Polyvinyl Chloride (PVC): Data Sheet No. PVC3**

Data Sheet No. **PVC3**

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

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

### Data Sheet No. SS1

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

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

Data Sheet No. **SS2**

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

## 2.8 Type 316L (ASTM A312) Stainless Steel – SS (Victaulic Joints)

Data Sheet No. **SS5**

ITEM	SIZES (mm)	GENERAL DESCRIPTION
Pipe	80 - 900	Schedule 10S Type 316L stainless steel conforming to ASTM A312 and ANSI B36.19, seamless or welded, pickled. Groove pipe ends to rigid radius groove conforming to ANSI/AWWA C-606.
Pipe Design	All	To CSA B242 for radius grooved and shoulder type mechanical pipe couplings.
Fittings	80 - 900	Schedule 10S Type 316L stainless steel, long radius elbows, caps and reducers conforming to ASTM A403 Grade WP and ANSI B16.9. Groove ends conforming to ANSI/AWWA C-606.
Branches	In piping 80 to 600	Schedule 10S Type 316L stainless steel butt welded smooth flow tees conforming to ASTM A304 with re-pad to B31 or weldolets conforming to ASTM A-182 Grade F316L Groove ends to rigid radius groove conforming to ANSI/AWWA C-606.
Flanges	80 to 900	Type 316L stainless steel ANSI B16.5 Class 150 weld neck Flanges, bored for Schedule 10S pipe, conforming to ASTM A182.  Schedule 10S Type 316L stainless steel stub-end collar conforming to ASTM A403 with backing ring flange, drilled to ANSI B16.5 Class 150, hot-dip galvanized in T2 thickness or AWWA Class "D" rated flange.
Blind Flanges	80 - 600	Schedule 10S Type 316L stainless steel, conforming to ASTM A403 with flange drilled to ANSI B16.5 Class 150.
Joints	80 to 900	Joints to be welded, flanged or Victaulic Roll-Groove (Style #77 for flexible, Style #89/W89 for rigid rated to 300psi). Contact Victaulic for applicable psi ratings of flexible joints. All welds to be full penetration and all welders to be certified by the TSSA.
Couplings at building expansion joints	80 - 300 350 - 600	Victaulic Style 77 on flexible radius grooved pipe.  Victaulic Style W77 on flexible advanced grooved pipe.
Couplings (General)	80 - 300 350 - 600	Victaulic Style 89 on rigid radius grooved pipe.  Victaulic Style W89 on rigid advanced grooved pipe.
Identification	All	Differential rigid joint from flexible joint by color code identification.
Bolts	All	Type 316L stainless steel ASTM A-193/193M Grade B8M heavy hexagonal machine bolts, scale free, shiny stainless steel finish.
Nuts	All	Type 316L stainless steel ASTM A194/194M, B8M hexagonal nuts, scale free, shiny stainless steel finish. service).
Gaskets	All	3 mm thick full-faced premium grade Neoprene
Welding	All	In accordance with Section 15051.
Piping	All	Piping system to withstand pressures to 1050 kPa and temperatures from -30°C to 82°C, unless otherwise specified in Table 1.

## 2.9 Teflon Tubing (PFA): Data Sheet No. TU3

Data Sheet No. TU3

ITEM	SIZES (mm)	GENERAL DESCRIPTION
Pipe	<25	100% Teflon PFA tubing, minimum 1.0 mm wall thickness Suitable for Alum or Caustic service.
Fittings	<25	ChemFlare type connections
Piping	All	Piping system to withstand pressures to 700 kPa and temperatures from -30°C to 82°C, unless otherwise specified in Table 1.

## 2.10 Welding Materials

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

## 2.11 Flange/Coupling Spacing

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

## 2.12 Flexible Couplings

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

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

### **2.13 Steel Supports**

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

### **2.14 Instrument Vent Lines**

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

### **2.15 Drain Points**

- .1 Services: All.
- .2 Horizontal pipes: 25 mm drain point with Schedule 40S Type 316L stainless steel NPS pipe, manual ball valve, and nipple. Valves are supplied under Section 15100.
- .3 Locations:
  - . 1 Install drain point on bottom of horizontal pipe at low points in process piping system.
  - . 2 Where indicated on Drawings. Drawings may not indicate all required drain point locations.

### **2.16 Magnetic Meter Spool Pieces**

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

Services	Diameter (mm)	Quantity
RWW	250	1 – Magnetic Flowmeter

## 2.17 Quick Disconnects

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

## 2.18 Grooved Pipe Couplings

- .1 Provide following grooved pipe couplings for specified piping system in Table 15060-1:
  - . 1 Manufacturer's: Victaulic Company.
  - . 2 Materials: ASTM A-47, Grade 32510 or 35108.
  - . 3 Design: CSA B242 for radius grooved and shoulder type mechanical piping couplings.
  - . 4 Method: Rigid Joint method on HDPE, ductile iron, steel, carbon steel, galvanized carbon steel, and stainless steel piping systems.
  - . 5 Pipe ends: Grooved to ANSI/AWWA C-606 and manufacturer's recommendations to make connections rigid.
  - . 6 Differentiate Rigid Joint from Victaulic Flexible Joint by colour code identification.
  - . 7 Style 31 Victaulic couplings on flexible radius grooved ductile iron pipe when pipe crosses structural expansion joints.

## 2.19 Pipe Couplings

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

## 2.20 Puddle Flanges

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

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

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

## 2.21 Wall Seals

- .1 Services: All.
- .2 Type: wall penetration seals, non-insulating.
- .3 Sealing element: EPDM rubber.
- .4 Bolts, nuts, washers and pressure plates: Type 304 stainless steel.
- .5 Pressure rating: 1050 kPa static head.
- .6 Temperature rating: 40°C.

- .7 Pipe size: as indicated on Drawings.
- .8 Number required: on one side of wall.
- .9 Manufacturers: Link-seal.

## **2.22 Gaskets**

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

## **2.23 Galvanizing**

- .1 Hot dip zinc coat galvanize to CSA G164 with minimum coating of 550 g/m<sup>3</sup> where piping is specified to be galvanized.

### **3.0 EXECUTION**

#### **3.1 Finishes**

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

#### **3.2 Preparation**

- .1 Prepare piping to Section 15050.

#### **3.3 Examination**

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

#### **3.4 Sleeves**

- .1 Install pipe sleeves to Section 15050.

#### **3.5 Insulation**

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

#### **3.6 Connecting Dissimilar Piping Systems**

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

#### **3.7 Expansion Joints**

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

#### **3.8 Pipe Installation**

- .1 Install piping systems in accordance with Section 15050.
- .2 Additional installation requirements for chemical piping systems:
  - . 1 Maximum union spacing: 7 metre intervals and in each room.
  - . 2 Design: allow for thermal expansion in long lengths of PVC pipe.

- . 3 Install piping, where possible, to permit drainage back to low point in building. Provide additional valves for drainage.
- . 4 Provide tees and screwed drain plugs at low and high points in piping or vents and drainage.
- . 5 Maximum vertical piping supports: 1.5 m with supports with broad smooth surfaces.
- . 6 Align and support piping to avoid excessive stresses.

### **3.9 Cleaning**

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

### **3.10 Field Tests**

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

### **3.11 Yard Piping**

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

### **3.12 Protection**

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

### **3.13 Existing Pipe Cleaning**

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

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

END OF SECTION

## 15100 Process Valves

### 1.0 General

#### 1.1 Summary

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

#### 1.2 Related Sections

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

#### 1.3 Submittals

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

## 1.4 Quality Assurance

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

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

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

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

**2.3 Manual Valves**

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

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

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

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

.8 Handwheel

- .1 Handwheel diameters conforming to:

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

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

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

## 2.4 Air-Vacuum and Air Release Valves

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

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

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING			
			PRESSURE (kPa)	TEMP. (°C)		
Combination Air Valve with Surge Suppression	<b>ARV</b>	Liquid/Wastewater	1050	120		
TYPICAL SERVICE						
RAW SEWAGE						
VALVE MATERIALS			VALVE DESCRIPTION			
ITEM	MATERIAL		Reference Document			
Body	ASTM A351 Grade CF8M stainless steel		Size Range		25mm-100mm	
Orifice	Type 316 SS		Style		Refer to notes	
Float	Type 316 SS		Connections		Threaded	
Coating	Fusion Bonded Epoxy (inside and out) to NSF 61		Internal Parts		Type 316SS or better	
Orifice size and venting capacity	1/8" ; venting capacity 2% of maximum flow 120L/s in the pumping station		Additional Items		Refer to notes	
NOTES						
<p>.1 Supply and install all combination air valves, size and location, as shown on the drawings. Valves shall be specifically designed and manufactured for wastewater.</p> <p>.2 Valve shall be extended body, single chamber design.</p> <p>.3 The valve shall have a built-in anti-surge device with relief openings designed to automatically prevent the development of hydraulic transients during start-up and pressure surges.</p> <p>.4 Tag numbers and description/service on all valves.</p> <p>.5 Furnish with backwash accessories.</p> <p>.6 Resilient seats shall be Buna-N®.</p> <p>.7 Air valve bodies shall be coated with an exterior-grade, UV-resistant coating recommended by the manufacturer to resist dirt and grease marks during installation and maintenance.</p> <p>.8 The valve shall have a full port orifice, a double guided plug, and an adjustable threaded orifice button. The 1 in. (25 mm) body shall be globe style to increase float clearance and reduce clogging. The plug shall be protected against direct water impact by an internal baffle and an extended float stem. The plug shall have a precision orifice drilled through the center stem. The float shall include a sensitivity skirt to minimize spillage.</p> <p>.9 Valve designs employing hinges, levers, or ball type floats are specifically prohibited.</p> <p>.10 Valves shall be manufactured and tested in accordance with AWWA C512 and rated for maximum working pressures of 1034kPa (150 psi).</p> <p>.11 A Regulated Exhaust Device (RED) shall be provided and shall be mounted on the outlet of the Wastewater Combination Air Valve, allow free air flow in and out of the valve, close upon rapid air exhaust, and control the air exhaust rate to reduce pressure surges. The material of the body shall be consistent with the Wastewater Combination Air Valve.</p>						

<b>ACCEPTABLE PRODUCTS</b>			
Valmatic (801SS)(design basis)	Approved equal		

**2.6 Detailed Valve Specification Sheet: Ball Valves**  
**Type BLV01**

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

### Type BLV02

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

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

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

### Type SCV03

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

**2.8 Detailed Valve Specification Sheet: Gate valves**  
**Type GTV03**

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

**2.9 Detailed Valve Specification Sheet: Knife Gate valves**  
**Type KNV01**

GENERAL					
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING		
			PRESSURE (kPa)	TEMP. (°C)	
Knife Gate Valve	<b>KNV</b>	Liquid/Wastewater	1050	40	
TYPICAL SERVICE					
RAW SEWAGE					
VALVE MATERIALS			VALVE DESCRIPTION		
ITEM	MATERIAL	Reference Document			
Body	Cast 316SS, Grade CF8Mc/w Packing Gland.	Size Range	100mm to 750mm		
Blade (Gate)	316SS Low-Friction Blade (Gate) with Rounded Edges.	Style	Wafer Type		
Seat	EPDM or Nitrile Material.	Valve Ends	Wafer Type Fully Lugged, Flanged ANSI B16.5, Class 150, TAPPI and MSS-SP-81, Face to Face dimension.		
Topworks	Note 1.	Operator	Note 3, Note 4.		
Packing	Note 2.	Actuator	Note 5.		
		Additional Items	Notes 6 and 7.		
NOTES					

- .1 Topworks: Stainless steel yoke and stem; aluminum-bronze or brass stem-nut; non-rising stem for motorized or gear operated valves; yoke pillars/beams to be of stainless steel or anodized aluminum with stainless steel tie rods; non-lubricated yoke bearings for ease of operation.
- .2 Packing: Braided, Teflon impregnated with resilient core; stainless steel packing gland with peripheral access to gland adjusting nuts; minimum of 4 gland bolts to ensure uniform packing load. CWP non-shock working pressure. Valve rating: drip tight shut-off for full pressure rating of 1050 kPa in either direction.
- .3 Valves shall be handwheel operated (with spinner knob on valves 16" and smaller). Provide other types of operation such as 2" square nut, chainwheels as required and/or specified. Bevel gear operated.
- .4 All manually operated knife gate valves shall be bidirectional, non-rising stem, manual and wheel operator. Extension stem and valve box shall be provided where indicated in the drawings.
- .5 Motorized: Provide motorized actuators for valves, where shown on drawings, in accordance with requirements of this Section 15100, (Clause 2.0, 2.2) and as noted below. All motorized knife gate valves to have safety guards include, c/w safety locks. Refer to Division 16, Section 16 05 81.
- .6 Tag numbers and description/service on all valves.
- .7 Exposed knife gate valves shall be installed with a means of removing the complete valve assembly without dismantling the valve or operator.

**ACCEPTABLE PRODUCTS**

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

Orbinox Series 22 (BT) (Base Design)	Dezurik	Stafsjo	Trueline
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**2.10 DETAILED VALVE SPECIFICATION SHEET TWV01**

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING			
			PRESSURE (kPa)	TEMP. (°C)		
Three Way Plug Valve	<b>3WV</b>	Liquid	1210/100 to 250mm & 1050/300 to 1050mm (Note 1)	98		
TYPICAL SERVICE						
<b>DS, RS, RWW</b>						
VALVE MATERIALS			VALVE DESCRIPTION			

ITEM	MATERIAL	Reference Document	
Body	Cast Iron ASTM A-126, Class B.	Size Range	80mm to 410mm
Cover	Cast Iron ASTM A-126, Class B.	Style	100% Port Eccentric Plug Valve.
Packing	Nitrile – Butadiene.	Valve Ends	Flanged ANSI B16.1, Class 125.
Plug/Shaft	Stainless Steel	Operator	Note 2.
Plug	Resilient	Actuator	Note 3, Note 4.
Plug Facings	Nitrile – Butadiene (Hycar).	Additional Items	Note 5, Note 6.
Seat	Welded-in Nickel.		
Bearing	Type 316SS.		
NOTES			
.1 Lubrication: Alemite, buttonhead grease fittings for pressure lubrication of stem sealing area and lower trunnion. .2 Tag numbers and description/service on all valves. .3 Exposed plug valves shall be installed with a means of removing the complete valve assembly without dismantling the valve or operator			
ACCEPTABLE PRODUCTS			
DeZURIK 3-Way Plug Valves	Valmatic, 3 way tapered plug	GA Figure 513	

## 2.11 DETAILED VALVE SPECIFICATION SHEET CHV02

GENERAL						
TYPE OF VALVE	SYMBOL	TYPE OF COMMODITY	RATING			
			PRESSURE (kPa)	TEMP. (°C)		
End of Pipe	<b>DBV</b>	Liquid	-	-		
TYPICAL SERVICE						
DRN						
VALVE MATERIALS			VALVE DESCRIPTION			
ITEM	MATERIAL	Reference Document				
Body	100% Elastomer (Neoprene).	Size Range	50mm to 900mm			
Retaining Rings	304SS	Style	Curved Bill, Rating ANSI Class 125/150#.			
Fasteners	304SS	Valve Ends	Flanged ANSI B16.1, Class 150.			
		Additional Items	Note 1.			
NOTES						

.2 Tag numbers and description/service on all valves.

ACCEPTABLE PRODUCTS			
Tideflex/Red Valve	EVR Products	Cla-Val	

## 2.12 Valve Assignments

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

Number	TYPE OF EQUIPMENT	VALVE TAG DRAWINGS	VALVE TYPE SPECS	DIAMETER (mm)	Description/Function
1	Air Valves	ARV-010	ARV01		Temporary pumping
2	Air Valves	ARV-101	ARV01		
3	Ball Valves	Alum if needed	BLV01	20	Chemical dosing
4	Ball Valves	BLV-101	BLV02	10	Pressure gauge isolation
5	Ball Valves	BLV-102	BLV02	50	Air valve isolation
6	Ball Valves	BLV-103	BLV02	80	Drainage
7	Ball Valve	BLV-104	BLV02	80	Drainage
8	Check Valves	CHV-101	SCV03	250	
9	Check Valves	CHV-102	SCV03	250	
10	Check Valves	CHV-103	SCV03	150	
11	Gate Valves	GTV-101	GTV03	250	
12	Knife Gate Valves	KNV-101	KNV01	250	
13	Knife Gate Valves	KNV-102	KNV01	250	
14	Knife Gate Valves	KNV-103	KNV01	250	
15	Knife Gate Valves	KNV-104	KNV01	250	
16	Knife Gate Valves	KNV-105	KNV01	250	
17	Knife Gate Valves	KNV-106	KNV01	250	
18	Knife Gate Valves	KNV-107	KNV01	150	
19	Odour Control Valve		Wager Model 1800	150	
20	Duckbill Valve	DBV-101	CHV02	80	Duckbill to prevent backup from wet well and mitigate gas migration
21	3 Way Plug Valve	3WV-101	TWV01		
22	3 Way Plug Valve	3WV-102	TWV01		
23	Check Valves	CHV-104	SCV-103	80	Drainage

.2

### **2.13 Carbon Filter**

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

## **3.0 EXECUTION**

### **3.1 Preparation**

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

### **3.2 Installation**

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

- .15 Install valves to provide sufficient access for operation, removal and maintenance and to prevent interferences between valve operators, structural members, equipment, walkways and hand railing and other similar items.
- .16 Adjust valve installation if there are interferences between valve or stem and surrounding area.
- .17 Do not route slings, chains, cables, or ropes through valve ports or attached to hand wheels to hoist valve in place.
- .18 Do not rest valves on operating shafts, hand wheels, actuators, cylinders or other parts prone to damage.
- .19 Install plug valves intended for throttling service to close to the upstream side.

### **3.3 Valve Extensions**

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

### **3.4 Valve Leakage**

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

### **3.5 Field Tests**

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

**End of Section**