DIVISION 40

PROCESS INTEGRATION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies general clauses applicable to the supply and installation of all process mechanical systems.

.2 The process mechanical systems include all of the systems handling wastewater.

.3 The Work under this section shall include the supply, installation, testing and start-up of all Mechanical Material and Products to provide a complete and workable installation in accordance with the contract drawings and specifications and all applicable codes, standards and ordinances. Any work and/or other necessary materials not specifically mentioned in the specifications or shown on the drawings, but necessary to complete the installation, shall be furnished by the Contractor as if specifically mentioned herein and detailed.

1.2 INTENT

.1 The responsibility and scope of each subtrade rests solely with the Contractor. Extras will not be considered based on the grounds of difference in interpretation of specifications as to which trade involved is to provide certain specifications or materials.

.2 Where errors or discrepancies appear in catalogue numbers, provide the material in accordance with the system requirements and to the standard of the specifications.

.3 Provide complete and fully operational mechanical systems with facilities and services to meet requirements described herein and in complete accord with applicable codes and ordinances.

.4 The specifications are to be considered as an integral part of the drawings which accompany them; neither the drawings nor the specification shall be used alone. Any item omitted from one but which is mentioned or reasonably implied in the other shall be considered as properly and sufficiently specified.

1.3 RELATED WORKS

.1 Refer to Division 25 for Controls and Instruments related to Process Mechanical work.

.2 Refer to Division 26 for Electrical work related to Process Mechanical work.

.3 The process mechanical drawings do not show structural details and any information involving accurate measurements of buildings. Refer to architectural, structural, and civil drawings as well as all other divisions of this specification.

1.4 PERMITS, CERTIFICATES AND FEES

.1 The Contractor shall give all notices, obtain all permits and pay all fees so that the work specified herein may be carried out.

.2 The Contractor shall make all necessary arrangements with Utilities Companies for services and meters as required and pay for all the costs involved.

.3 Arrange for inspection of all work by the authorities having jurisdiction over the work including local building, plumbing, and Manitoba Hydro Representatives. On completion of the work, present to the Contract Administrator the final unconditional certificate of approval of the inspecting authorities.

1.5 CODES AND STANDARDS

.1 Comply with the requirements of the latest edition of the applicable CSA standards, the requirement of the Authorities, Federal, Provincial and Municipal Codes, the applicable standards of the Underwriters Association and all other Authorities having jurisdiction. Comply with the guidelines of Manitoba Conservation in the undertaking of the work. These codes and regulations constitute an integral part of these specifications.

.2 Conform to the latest edition and supplements of the following for all materials and installations:

.1 National Building Code of Canada and Provincial Building code, as amended by local by-laws and Provincial Statutes.

.2 Codes, Standards, By-laws, Statutes and Manufacturer's Association Specifications, refer to latest revisions thereof at time of calling of bids, unless specifically designated otherwise.

.3 In no instance shall the standard established by the drawings and specifications be reduced by code or otherwise.

.4 Where conflict or discrepancies between Codes, Standards, By-laws, Statutes, Specifications, Drawings, etc. exist, the most stringent requirement to apply.

.5 Installation to conform to good practice such as described in the ASHRAE Handbooks and Standards, and the SMACNA manuals.

.3 Welding shall conform to the ANSI/ASME Power Piping Code and the ASME Boiler and Pressure Vessel Code.

.4 Welders shall be qualified and licensed in Manitoba, and welder qualifications shall be in accordance with CSA-Z662.

.5 Welding safety requirements shall be in accordance with CSA-W117.2 - Code for Safety in Welding and Cutting.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

.1 All materials and equipment shall be delivered, handled and stored subject to the provisions contained herein and according to the manufacturer's recommendations.

.2 Provide temporary storage facilities and heated storage where required for sensitive items such as motors.

.3 Equipment, including pumps and motors, shall not be placed in temporary or final locations in the new structures before a date approved by the Contract Administrator. The date of delivery into the structure shall be commensurate with the construction progress and the suitability, with respect to temperature, humidity, etc. of the building.

.4 Take precautions to maintain equipment in good condition and to avoid corrosion or other damage which may affect the equipment's performance. Provide temporary coatings as required to prevent corrosion.

.5 Leave factory covers in place and prevent entry of foreign materials into working parts of equipment.

.6 Protect members and bearings with plastic covers.

.7 Grease all shafts and sheaves to prevent corrosion.

.8 The Contractor shall recognize the time interval required for complete construction before the structure is suitable for equipment installation. If equipment is manufactured before it is required at the site, the Contractor shall provide suitable heated dry storage space for the equipment, to the approval of the Contract Administrator. All equipment and motors shall be rotated at least weekly during the storage period, and after installation, until the equipment is placed in normal use.

.9 All material damaged or otherwise harmfully affected during delivery, storage, handling or installation shall be replaced by the Contractor at his/her own expense.

1.7 EQUIPMENT SUPPORT, ANCHORS AND BASES

.1 The Contractor shall provide all structural work required for foundation and support of units, foundation bolts, sleeves, washers, nuts, shims and templates to locate bolts.

.2 Anchor bolts shall be set in concrete with one end of the bolt hooked as detailed; or sleeved anchor bolts as detailed may be set in concrete. Expansion type bolts drilled into concrete may not be used in lieu of anchor bolts.

.3 Where grouting is required for bedplates and equipment bases on concrete foundations, the surface of the concrete foundation shall be roughened to provide a bond.

1.8 MATERIALS

.1 Provide new materials and equipment of first class quality, delivered, erected, connected and finished in every detail, and supplied with the acceptance of the Contract Administrator.

.2 Assume responsibility of ensuring that equipment provided performs as specified.

.3 Replace materials or workmanship below specified quality and relocate work wrongly placed.

.4 Materials and equipment installed to new, full weight and of the best quality specified. Use same brand or manufacturer for each specific application. Provide statically and dynamically balanced rotating equipment for minimum vibration and low operating noise levels. Provide balancing certificates if requested by the Contract Administrator.

.5 Each major component of equipment to have manufacturer’s name, address, catalogue and serial number in a conspicuous place.

1.9 INSTALLATION

.1 Follow the recommended installation details and procedures for all equipment as found in the supplier's technical data, supplemented by the shop drawings, the contract drawings and the specifications and the directions of the Contract Administrator. Coordinate work with the work of other trades to avoid conflict.

.2 Install mechanical work in advance of concrete pouring as necessary.

.3 Install equipment generally in locations and routes shown, with minimum interference with other services or free space. Remove and replace improperly installed equipment to satisfaction of the consultant at no extra cost.

.4 Provide labour, material and tools required to install, test and place into operation, a complete mechanical system.

.5 For equipment or material of the same type or classification, install only products of one manufacturer.

.6 Install all equipment with adequate access for inspection and servicing and to provide minimum interferences. Conserve headroom and leave maximum usable space.

.7 Employ only skilled tradesmen properly licensed by the Province of Manitoba, for all work requiring tradesmen with special skill.

.8 Motors shall be aligned, shimmed and coupled to fit shafts, to the tolerances given by the manufacturer.

.9 Set equipment in place and install piping, fittings, valves and other items. Make final adjustments in alignment and elevation before securely fastening equipment and other items in place.

.10 Control alignment so that excess forces are not imposed on equipment when piping connections are tightened.

.11 Do not tighten pipes until grout is set.

.12 Tighten so that there are no excessive stresses set up in flanges.

1.10 VIBRATION ISOLATION

.1 Provide vibration isolators for all mechanical motor driven equipment throughout the project, unless specifically noted otherwise. This shall include but not be limited to the emergency generator equipment.

.2 Provide Vibration Isolators as manufactured by Vibro-Acoustics, Vibron or Air Master. All sound and vibration elimination materials are to be supplied by one supplier unless otherwise specified.

.3 Statically and dynamically balance rotating equipment for minimum vibration and low operating noise level.

.4 Provide flexible connectors for pipes to all equipment supported by vibration isolators.

.5 Provide flame proof flexible connectors between fans, heaters, equipment and ducts.

.6 Equipment installed by the Contractor shall operate smoothly without excessive wear, adjustment and attention. Vibration shall not exceed the manufacturer's specified limits for individual products. Vibrations in pumps shall be within acceptable field vibration limits as outlined in the Standards of the Hydraulics Institute.

1.11 GUARDS

.1 Provide vibration free guards on all exposed drives and rotating parts, to meet the requirements of Manitoba Workplace Health and Safety.

.2 Guards shall be provided for the emergency generator equipment.

.3 Provide means to permit lubrication, use of test instruments and movements of motors to adjust belt tension.

1.12 MINOR DEVIATIONS

.1 The Contractor shall allow for additional material such as pipe and ducts for modifications that may be required to correct minor conflicts or deviations.

1.13 DRAWINGS

.1 Drawings do not indicate exact architectural, structural, or electrical features. Examine drawings prior to laying out, fabricating, installing or commencing work to ensure no interference exists. Report conflicts to Contract Administrator before proceeding.

1.14 PRIMARY MEASURING ELEMENTS

.1 Install all primary elements specified in Division 25 – Integrated Automation.

1.15 IDENTIFICATION OF EQUIPMENT

.1 Provide a manufacturer's nameplate on each piece of equipment.

1.16 CONTRACT CLOSE-OUT

.1 Refer to Division 1.

.2 Perform the following items prior to substantial completion inspection:

.1 Heating systems capable of operating with alarm controls functional and automatic controls in operation generally, but not necessarily finally calibrated.

.2 Necessary tests on equipment made including those required by authorities and certificates of approval obtained.

.3 Equipment and piping painted and escutcheons installed.

.4 Equipment lubricated as per manufacturer’s data.

.5 Warranty forms have been mailed to manufacturer. Provide copy of original warranty for equipment which has warranty period longer than one (1) year.

.6 Systems chemically cleaned, flushed and potable water systems disinfection.

.7 Final Operating/Maintenance Manuals submitted. Operating and Maintenance instructions completed.

.8 Review and ensure access doors are suitably located and equipment easily accessible including plumbing cleanouts.

.9 Noise and vibration control devices and flexible connections inspected by manufacturer’s representative and written report submitted.

.10 Operations of plumbing systems and fixtures checked and ensure fixtures are solidly supported.

.11 Fan plenums cleaned, temporary filters removed and permanent filters installed.

.3 Prior to substantial performance inspection, provide complete list of items which are either not finished or deficient at the time of the inspection.

.4 Provide declaration in writing, that substantial performance deficiencies and the following items have been completed prior to the total performance inspection:

.1 Equipment cleaned inside, outside and lubricated.

1.17 CLEAN UP AND DISINFECTION

.1 All piping and equipment shall be thoroughly cleaned of dirt, cuttings and other foreign substances.

.2 Disconnect, clean and reconnect whenever necessary for purposes of locating and removing obstructions.

1.18 EQUIPMENT PROTECTION AND CLEANUP

.1 Protect equipment and materials in storage on site, during and after installation until final acceptance. Leave factory covers in place and take special precautions to prevent entry of foreign material into working parts of piping and duct systems.

.2 Protect equipment with polyethylene covers and crates.

.3 Operate, drain and flush-out bearings and refill with new change of oil before final acceptance.

.4 Thoroughly clean piping, ducts and equipment of dirt, cuttings and other foreign substances.

.5 Protect bearings and shafts during installation. Grease shafts and sleeves to prevent corrosion. Supply and install necessary extended nipples for lubrication purposes.

1.19 LUBRICATION

.1 For all equipment, furnish all lubricants used during testing and trial runs.

.2 Identify lubricants furnished by brand, grade and item of equipment for which it is intended.

.3 Operate, drain and flush out bearings and refill with a new change of oil before completion.

1.20 MOTORS

.1 Refer to Division 26 for all motor design requirements.

1.21 PATENTS

.1 Pay all royalties and licence fees, and defend all suits or claims for infringement of any patent rights, and save the City and the Contract Administrator harmless of loss or annoyance on account of suit, or claims of any kind for violation or infringement of any letters patent or patent rights, by this Subcontractor or anyone directly or indirectly employed by him or by reason of the use by him or them or any part machine, manufacture or composition of matter on the work, in violation or infringement of such letters patent or rights.

1.22 TRIAL USAGE AND TEST

.1 The City has the privilege of trial usage of mechanical systems or parts thereof for the purpose of testing and learning operational procedures.

.2 Do not waive any responsibility resulting from trial usage.

.3 Trial usage shall not be construed as acceptance by the Contract Administrator.

.4 Provide and pay for all testing required on the system components where in the opinion of the Contract Administrator, Manufacturer's ratings or specified performance is not being achieved.

1.23 INSTRUCTIONS TO CITY

.1 Where specified elsewhere in Division 40, manufacturers to provide demonstrations and instruction.

.2 Provide instruction to operating staff during regular work hours prior to acceptance and turn-over.

.3 Availability of approved operation and maintenance manuals to the facility operators are mandatory during all training sessions.

.4 Use as-built drawings, audio visual aids, etc. as part of instruction manual.

.5 Where deemed necessary, the City may record these demonstrations on videotape for future reference. Coordinate operational demonstrations with availability of videographer.

.6 Additional sections of the specifications may define and describe training and number of days for start-up of each type of equipment. Utilize the most stringent.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the supply and installation of all valves including check, plug, and ball valves applicable to the process mechanical and building mechanical piping systems of the lift station.

1.2 SUBMITTALS

.2 The Contractor shall submit shop drawings and product data in accordance with these contract documents.

1.3 SUPPLIERS

.3 All valves and operators of the same type shall be provided by one manufacturer.

Part 2 Products

2.1 BALL VALVES

.1 Process Ball Valves up to 50 mm:

- .1 Two piece Stainless Steel body
- .2 Type 316 SS wetted parts to CF8M.
- .3 Blowout proof stem
- .4 Rated for minimum 5515 kPa (800 psi)
- .5 Full standard port
- .6 Solid Stainless Steel ball
- .7 PTFE seat and packing
- .8 Lever handle
- .9 Ends to suit connection.
- .10 Kitz 53F, Flowtek S80, Trueline N-620, or approved equal in accordance with B7.

.2 Domestic Ball Valves

- .1 Full port
- .2 2760 kPa (400 psi) WOG, 1035 kPa (150 psi) WST
- .3 Stainless Steel
- .4 Locking level handle
- .5 Blow out proof steam
- .6 Acceptable manufacturer’s Kitz, Flowtek, Mueller, Crane, Jenkins, or approved equal in accordance with B7.

2.2 CHECK VALVES

.1 On process pump discharge:

.1 The swing check valve shall be designed, manufactured and tested in accordance with ANSI/AWWA C508 and certified to NSF 61.

.2 The valve body and cover shall be constructed of ASTM A 536 ductile iron c/w fusion bonded epoxy on interior and exterior surfaces.

.3 The valve body shall be full flow equal to nominal pipe diameter at all points through the valve.

.4 The seating surface shall be on a 45 degree angle to minimize disc travel and slamming.

.5 The top access port shall be full size, allowing removal of the disc without removing the valve from the line.

.6 The disc shall be of one-piece construction, precision molded Buna-N (NBR), ASTM D2000-BG with an integral o-ring type sealing surface, and contain alloy steel and nylon reinforcement in the flexible hinge area. The flex portion of the disc shall be warranted for twenty-five years.

.7 The valve disc shall be independently cycle tested 1,000,000 times in accordance with ANSI/AWWA C508 and shall remain drip tight at high and low pressures. The test result shall be applicable to sludge application.

.8 Valve shall be provided with flanges in accordance with ANSI B16.1, Class 125.

.9 Val-Matic swing-flex check, Cla-Val #584, Crispin RF Series rubber flapper check, or approved alternative in accordance with B7.

.2 On building mechanical systems:

.1 Swing Check Valves up to 50 mm (2”): Bronze body screw-in cap, renewable no. 125 composition disc, threaded ends 860 kPa (125 psi) steam. Red-White Fig. 236T. Toyo #236T.

.2 Inline Check Valves up to 50 mm (2”): Forge brass body, spring loaded, threaded ends for horizontal and vertical installation. Pressure rated for 1380 kPa (200 psi) WOG water. Red-White Fig. 232.

.3 Inline Check Valves 50 mm and over: Cast iron body, dual plate bronze discs, stainless steel spring. Pressure rated for 1035 kPa (150 psi) WOG water. Red-White Fig. 442.

2.3 BACKFLOW PREVENTER (DOUBLE CHECK VALVE ASSEMBLIES)

.1 On Potable Water Line:

.1 The backflow preventer (Double Check Valve) shall be designed, manufactured and tested in accordance with AWWA C510, CSA B64.5.

.2 The assembly shall consist of two positive seating check modules with captured springs and rubber seat discs. The check module seats and seat discs shall be replaceable.

.3 Service of all internal components shall be through a single access cover secured with stainless steel bolts.

.4 The Double Check Valve Assemblies shall be constructed using Lead Free cast copper silicon alloy. Lead Free Double Check Valve Assemblies shall comply with state codes and standards, where applicable, requiring reduced lead content.

.5 The assembly shall also include two resilient seated isolation valves; four top mounted, resilient seated test cocks.

.6 The assembly shall be approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

.7 Watts Series LF007 or approved alternative in accordance with B7.

2.4 PLUG VALVES

.1 Cast iron body to ASTM A126 Class B

.2 Welded nickel seat

.3 Valve shall meet ANSI/AWWA C517

.4 Permanently lubricated radial shaft bearings of 316 SS

.5 Flanges to ANSI-B16.1, Class 125

.6 One piece construction plug c/w EPDM coating

.7 Adjustable packing

.8 Thrust washers of 316 SS and Teflon

.9 Drip tight shut off up to rated working pressure

.10 Pressure rating to 1200 kPa (175 psi) for valves up to 300 ϕ

.11 Fusion bonded epoxy coating on interior and exterior

.12 For horizontal installation, install valve such that the seat is downstream and when open the plug is located at the top; for vertical installation ensure seat is at the top of the valve

.13 Minimum open area of 80%

.14 Manual valve actuators shall be as follows and as indicated on the drawings:

.1 150 mm and larger - totally enclosed, grease packed gear actuator c/w position indicator and handwheel.

.15 Val-Matic Cam-Centric Series #5800R, DeZurik Model PEC (Eccentric), Pratt Ball Centric, or approved equal in accordance with B7.

2.5 WASTEWATER COMBINATION AIR RELEASE VALVE

.1 Size as shown on drawings; 50ø valves with NPT, screwed male connection, and larger valves with flanged connection conforming to ANSI B16.1 Class 125

.2 Single body design c/w large diameter disc allowing high volume airflow during pipe draining and filling

.3 To AWWA C-512 New #, Body, float shaft, guide mount, bolts, piston, plugs and cover made of stainless steel.

.4 Intake and discharge orifices shall be of equal diameter to the nominal valve size

.5 Fully guided float shaft not requiring linkages

.6 Valve shall be leak tight throughout the range of 14 kPa to 1035 kPa (2.0 psi to 150 psi)

.7 Air and gas shall be discharged throughout the range of 14 kPa to 1035 kPa (2.0 psi to 150 psi)

.8 Provide 90° outlet.

.9 Provide back flush kit

.10 APCO (CP) ASU or approved equal in accordance with B7.

2.6 PRESSURE GAUGES

.1 Provide 115 mm diameter, cast aluminum pressure gauges – black finish – stainless steel internals – dial type to CGSB 91-GP-1 – glass window, white dial, black lettering – ½ of 1% accuracy.

.2 Pressure range selected so that max indicated pressure on gauge is 1.5x max pressure expected in the associated system.

.3 Provide threaded connection type diaphragm seal c/w flushing connection. Sized to match the pressure gauge. Metallic diaphragm shall be welded to top housing to ensure maximum leak integrity.

.1 Diaphragm and lower housing must be compatible with process media: Hastelloy C276 or Tantalum for media containing hydrogen sulfide (H_2S)

.2 Fill fluid shall be suitable for vacuum and compound gauge ranges.

.4 Gauges located in outdoor environment shall be dry type, all others liquid filled

.5 Use materials compatible with system requirements

.6 Acceptable Gauge Manufacturers: Ashcroft, Trerice, Taylor, Weiss, Weksler, Winters, Marshall Town or approved equal in accordance with B7.

2.7 SHOP FINISHES

.1 All unfinished iron and steel work on the valves shall be thoroughly cleaned and painted.

.2 All valves identified on the drawings as requiring epoxy coating shall be coated on the interior and exterior with Fusion Bonded Epoxy.

.3 Acceptable Product: 3M Scotch-Coat Fusion Bonded Epoxy or approved equal in accordance with B7.

Part 3 Execution

3.1 DELIVERY

.1 Provide for unloading and storage of the valves on the site of the Work.

3.2 VALVES AND OPERATORS

.1 Install all valves and operators in strict accordance with manufacturer's shop drawings and instructions.

.2 Install extension stems, stem supports and other accessories as required and as shown on drawings.

.3 If pipe sleeves through roof are not in vertical line with gear operators other than as shown on the drawings, provide universal joints on the extension operating stem for the correction of alignment.

3.3 SHOP FINISHES

.1 All valves shall be shop prepared, primed and coated as indicated on the drawings.

3.4 FIELD PAINTING

.1 Field painting of valves shall only be required to touch up damaged coatings.

3.5 TESTING

.1 Valves shall be tested in accordance with the Manufacturer's Recommendations.

END OF SECTION

Part 1 General

1.1 DESCRIPTION OF WORK

.1 This section specifies the general requirements for supply, installation, training, start up and commissioning of slide gates, complete with sluice, thimble, frames, operating stems, seals, operators and other required appurtenances as specified in Part 2 of this section.

.2 The equipment is intended to be purchased and installed by the pumping station wells fabricator. The equipment supplier is expected to assist the contractor to provide instructions and start up services to ensure a successful installation.

1.2 SUBMITTALS

.1 Submit shop drawings in accordance with Section 01 33 00. Shop drawings shall include frame, slide, wall castings, stem, stem extension, stem guide, operator, stem cover and all other appurtenances plus mounting details and seal details along with all dimensions.

.2 Shop drawings shall be submitted for review by the Contract Administrator before fabrication commences.

.3 Submit Operation & Maintenance Manuals in accordance with Section 01 33 00. The manuals shall include equipment descriptions, operating instructions, drawings, troubleshooting techniques and recommended maintenance schedule and the recommended lubricants.

1.3 STANDARDS

.1 Unless otherwise specified have all equipment conform to the appropriate ASME Standards.

.2 Have all screw fastening dimensioned and threaded to ASA Standards B18.2 and B.1.1.

.3 Except as modified or supplemented herein, all gates and operators shall conform to the applicable requirements of AWWA C561, latest edition.

Part 2 Products

2.1 DESIGN PERFORMANCE CRITERIA

.1 Provide gates and operators with all necessary accessories indicated on the drawings, specified or otherwise required to meet the specified features and operating conditions to fully isolate the incoming sewer pipe to the wet well.

.2 Sluice, frames and operators for all sluice gates shall be products of a single manufacturer.

.3 Under the design unseating head conditions, the leakage shall not exceed 1.25 L/minute per meter of seating perimeter.

.4 Slide gates shall be designed to resist stresses which may occur during installation and operation.

.5 Slide gates will be non-rising stem, non-self contained type.

.6 Slide gate will be operable from top of the well without entering the well.

2.2 ACCEPTABLE MANUFACTURERS

.1 Gates and appurtenances shall be in compliance with these specifications and plans and shall be supplied by:

.1 H. Fontaine Ltd. Series 20 Stainless Steel Isolation.

.2 Waterman Industries Series SS.250

.3 Approved equal in accordance with B7.

2.3 FRAME

.1 Gate frame shall be constructed of structural members or formed plate welded to form a rigid one-piece frame.

.2 Frames shall be suitable for bolting on a curved FRP wall in front of an initegral FRP pipe sleeve.

.3 Top and side seals shall be replaceable without removing gate from its mount.

.4 Frame shall support at least two thirds (2/3) of the vertical height of the slide in the fully open position.

.5 Material: Stainless Steel Type 304L, according to ASTM A-240.

.6 Fasteners: Stainless Steel, ASTM F593 and F594 GR1 for Type 304 and GR2 for Type 316.

2.4 SLIDE

.1 Flat plate reinforced with formed plates or structural members to limit its deflection to 1/720 of the gate's span under the design head.

.2 Material: Stainless steel Type 316L, according to ASTM A-240.

2.5 GUIDES AND SEALS

.1 Guides shall be UHMWPE (ultra high molecular weight polyethylene).

.2 Sealing system shall maintain efficient sealing in any slide position.

.3 Materials:

.1 Top and Side Seals: UHMWPE, self-adjusting type.

.2 Bottom Seal: Neoprene, forming a flush bottom.

.3 Compression cord: Nitrile, according to ASTM D2000.

.4 Gasket between frame and wall: EPDM, according to ASTM 1056.

2.6 STEM AND COUPLING

.1 Operating stem shall transmit in compression at least 2 times the rated output of the operating manual mechanism with a 178 N effort on the handcrank.

.2 The slenderness ratio (L/r) for the unsupported length of the stem shall not exceed 200.

.3 Machined cut threads shall be of the ACME type.

.4 For stems in more than one piece and with a nominal diameter of 45 mm and larger, join the different sections together by grooved and keyed solid bronze couplings of greater strength than the stem.

.5 Stems less than 45 mm diameter shall be joined to an extension tube using pins.

.6 Hollow stems will not be accepted.

.7 Stem guides shall be equipped with an UHMWPE bushing and be adjustable and spaced in accordance with the manufacturer's recommendation.

.8 Materials:

.1 Threaded Stem: Stainless Steel, Type 303MX or 316, according to ASTM A-276.

.2 Stem guides/Stem extension: Stainless Steel, Type 304L, according to ASTM A-240.

2.7 LIFT NUT

.1 Provide each slide gate with a lift nut.

.2 For rising stem arrangement, the lift nut shall be located at the operator level.

Material: Manganese bronze ASTM B584.

2.8 OPERATORS

.1 Manual Gear Operator

.1 The slide gate shall be operable from top of the wet well without entering the well. The slide shall be operated by suitably sized nut located in the SS floor / valve box on top of the well flushed with the floor. A tee-wrench made of SS, approximately 4ft in height with a suitably sized nut adapter on the end the shafting will be supplied to operate the gate manually. Open and close direction shall be marked with corresponding arrows.

.2 All bearings and gears shall be enclosed in a weather tight housing.

.3 The pinion shaft of the gear operator shall be stainless steel and supported by roller bearings or needle bearings.

.4 The manual gear operator shall operate the slide gate under the maximum seating and unseating heads by exerting not more than a 178N effort on the operating tool and shall be able to withstand, without damage, an effort of 356 N on the operating tool.

.5 Provide mechanism to prevent over travel of the slide past the fully open or fully closed position.

.6 All geared lifts shall be suitable for operation with a portable motor apparatus.

2.9 SOURCE QUALITY CONTROL

.1 Each gate shall be factory tested and adjusted to ensure satisfactory operation.

2.10 PAINTING

.1 Except for galvanized and stainless steel components, paint and protective coat the unit.

Part 3 Execution

3.1 INSTALLATION

.1 The gates shall be installed according to the Supplier's specifications. The gate supplier shall provide installation assistance and start up services.

3.2 FIELD TESTS

.1 Following installation, gates shall be operated through a minimum two complete open/close cycles.

.2 Perform a leakage test to demonstrate conformance with performance requirements.

3.3 TRAINING

.1 Training must be provided by a factory certified trainer.

.2 The Contractor shall coordinate the training session with the City's operating personnel, the Contract Administrator and the manufacturer.

.3 Training shall cover basic maintenance and care and detailed O and M procedures.

.4 Refer to Section 01 79 00 – Demonstration and Training for additional requirements.

END OF SECTION

Part 1 General

1.1 DESCRIPTION OF WORK

.1 This section specifies the supply, delivery and installation of vertical-direct coupled centrifugal pumping units for wastewater, containing solids and/or fibrous materials, all accessories as required and as shown on the drawings.

.2 Included with each pump will be:

- .1 Electric motor
- .2 Pump support frame and suction elbow
- .3 Flanged connections
- .4 Stainless steel impeller
- .5 Pump motor frame
- .6 Coupling guard
- .7 Floats and associated equipment
- .8 Power and control cables
- .9 All necessary bolts, nuts, gaskets and couplings to assemble two complete pumping units
- .10 One (1) working days of testing, commissioning and training by pump supplier as per Section 01 91 13.

1.2 SUBMITTALS

.1 The pump supplier shall submit all shop drawings and maintenance and installation manuals to the Contractor – Section 01 33 00.

.2 The Contractor shall submit operation and maintenance manuals as per Section 01 78 00.

1.3 RELATED SECTIONS

.1 Division 25 – Integrated Automation

.2 Division 26 – Electrical

.3 Section 40 05 00 – Common Work Results for Process Integration

.4 Section 40 23 50 – Fibreglass Lift Station

.5 Section 40 05 60 – Process Valves

.6 Section 40 23 36 – Process Piping Materials and Methods

.7 Section 41 36 00 – Testing

1.4 QUALITY ASSURANCE

.1 The pump Supplier shall be responsible for the design, fabrication, assembly in factory and testing of the equipment. The pump Supplier shall supply all necessary shop drawings and installation and maintenance manuals for the Contractor. The Contractor shall be responsible for taking delivery of the equipment and assembly (as required) and

installation of the equipment to produce an operational pumping system. Pumps shall be furnished by and be the product of one manufacture.

.2 Manufacturer's Warranty:

.1 The pump manufacturer shall warrant the pump equipment to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below.

.2 Pumps shall be backed by a 1 (one) year whole pump unconditional guarantee against defect in material and workmanship. The pump manufacturer shall be solely responsible for warranty of the pump equipment and all components.

.3 Components failing to perform as specified by the Contract Administrator, or as represented by the manufacturer, or as proven defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer without cost of parts or labour to the City.

Part 2 Products

2.1 DESCRIPTION AND CHARACTERISTICS

.1 Pumps shall be vertical, single stage, end suction centrifugal type to pump raw sewage, containing large solids and fibrous material.

.2 Products provided under this specification must comply with all regulations and codes in effect in Manitoba.

.3 Pump and motor should come from single supplier.

.4 The pumping units shall be described briefly:

Service	Duplex Lead/Lag
Location	Dry Well/Pit
No. Of Units	2
Rated Capacity (each)	85 L/S @ 18 m TDH (1316 USGPM @ 25.6 psi)
Max Pump RPM	1200
Minimum Efficiency	70%
Motor	25 HP, 600V, 3ø, 60 Hz
Pump Drive	Electric Motor
Pump Manufacturer/Model	Flygt A-C Model 300 size 6 x 6 x 14 with John Crane Type 21 Double Mechanical seal, or approved equal in accordance with B7.

2.2 PUMP DESIGN

.1 Impeller

.1 Stainless Steel construction.

.2 Single-suction enclosed type with two vanes.

.3 Self-tightening.

.4 Clearances and hydraulic performance and efficiency should be adjustable without pump disassembly.

.5 Balanced to minimize vibration after final machining.

.2 Volute Casing

.1 Cast or ductile iron construction.

.2 Flanged volute capacity 45° rotation.

.3 Volute has cleanout opening.

.4 Should permit removal of rotating assembly without disturbing suction or discharge piping.

.3 Wear Rings

.1 To be provided on impeller and front head.

.2 Made of 11.5 – 14 % Chrome Steel “L”.

.3 Have provision for adjustment of axil clearance.

.4 Suction Cover

.1 Should allow access to the impeller.

.2 Cast iron construction.

.5 Stuffing Box

.1 Cover shall be cast iron construction.

.2 Graphite-impregnated packing.

.3 Teflon Seal cage.

.4 Splita-type glands.

.5 John Crane Type 21 or approved equal in accordance with B7 with double mechanical seal.

.6 Single-stage dynamic seal.

.6 Bearing Frame Assembly

.1 Cast iron construction.

.2 Designed for removal of complete rotating assembly for the casting without disconnecting suction or discharge piping.

.3 Pump shaft will be high strength carbon steel capable of taking all mechanical and hydraulic load. Shaft should be protected from pump by a shaft steel. Bearing shall provide a minimum L10 bearing life of 100,000 hours per AFBMA to best efficiency point.

.7 Pedestal Base and Suction Elbows

.1 Pumps shall be supported by a cast iron or fabricated steel pedestal base with large enough opening to permit access to section elbow and clean-out handhole.

.2 Base designed to support the weight of pump with direct coupled motor (of the largest size) required by the pump.

.3 Provide clean-out type cast iron elbow.

.8 Paint

.1 Blast and clean per SSPC-SP10.

.2 Apply primer paint with one coat of ICI Devoe Bar-Rust 233H or equal for a DFT of 4-6 mils.

.3 Apply top coat with ICI Devoe Bar-Rust 235 Epoxy or equal for a DFT of 4-8 mils.

.4 Color (City's choice). Total DFT of 8-16 mils.

.9 Vibration Limit

.1 As set in the Standards of the Hydraulic Institute.

.10 Factory Testing

.1 To be performed on each pumping unit in accordance with Hydraulic Institute Standards, latest edition.

.2 Test to be performed from shut-off to 150% of design flow.

2.3 MOTOR

.1 TEFC.

.2 High efficiency with 1.15 service factor.

.3 Suitable for across the line starting or Schneider soft starter with 300% - 400% current limit

2.4 FINISHING

.1 Pumps shall be supplied in completely assembled units.

.2 After installation thoroughly clean the pumping units.

Part 3 Execution

3.1 DELIVERY

.1 Provide for unloading and storage of the pumping units on the site of the Work.

3.2 INSTALLATION

.1 Install, level, align, and lubricate pump(s) as indicated on project drawings. Installation must be in accordance with written instructions supplied by the manufacturer at time of delivery.

.2 Check rotation prior to startup.

3.3 TESTING

.1 Provide written notice to the Contract Administrator of the date when field tests will be made at least two (2) weeks in advance of the test.

.2 Testing to be witnessed by authorities having jurisdiction.

.3 Test each pump to demonstrate compliance with performance requirements. (Minimum site time = 1 days).

.4 During tests, observe and record operation of pumps, suction and discharge gauge readings, ampere draw, pump controls, and liquid level controls. Be alert to any undue noise, vibration, or other operational problems.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.1 ASTM D2564-12, Standard Specifications for Solvent Cements for Poly (vinyl-chloride).

.2 Canadian Standards Association (CSA International).

.1 CSA B181.2-11, PVC Drain, Waste and Vent Pipe and Pipe Fittings.

.2 CAN/CSA B125-01, Plumbing Fittings.

1.2 SCOPE

.1 Piping and Fittings

.2 Floor drains

1.3 SUBMITTALS

.1 Submit shop drawings of each factory fabricated component in accordance with Section 01 33 00 – Submittal Procedures.

1.4 GENERAL REQUIREMENTS

.1 Provide materials, equipment and labor to install sanitary system as required by Provincial and Local Codes as specified herein.

.2 Provide drainage connections to equipment furnished in other sections of this specification and by the Purchaser.

.3 Provide and include charges for connections to Municipal and Utility Company services.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 Cleanouts, Floor Drains: Roto Tech Smith, Zurn, Ancon, Mifab

2.2 PIPING AND FITTINGS

.1 Sanitary drainage, and vent, inside building, above ground

.1 Piping:

.1 PVC Schedule 40

.2 Fittings:

.1 PVC Schedule 40 with solvent weld joints.

.2 Sanitary drainage, and vent, inside building, below ground

.1 Piping:

.1 PVC Schedule 40

.2 Fittings:

.1 PVC Schedule 40 with solvent weld joints.

.3 Equipment drains and overflows

.1 Piping:

.1 PVC Schedule 40

.2 Fittings:

.1 PVC Schedule 40 with solvent weld joints.

2.3 FLOOR DRAINS

.1 FD-1:

.1 Size 150 mm dura cast iron body with bottom outlet, combination invertible membrane clamp and adjustable collar with seepage slots and "TYPE B" polished nickel bronze strainer.

.2 Supplied with Acid Resisting Epoxy Coated Cast Iron top.

Part 3 Execution

3.1 INSTALLATION

.1 Bury outside drainage pipe minimum 2450 mm (8’-0”).

.2 Lubricate cleanout plugs with mixture of graphite and linseed oil. Prior to building turnover, remove cleanout plugs, re-lubricate and re-install using only enough force to ensure permanent leakproof joint.

.3 Drainage lines shall grade 2% for size equal or smaller than 75mm unless otherwise noted on drawings.

.4 Plumbing vents shall be located minimum 5 m (16’-0”) from air intakes.

.5 Pipe discharge from all relief valves, safety valves, vents, drains, equipment blowdowns, water columns, and over flows to the nearest building drain.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies the general requirements for supply and installation of all process and building mechanical piping systems and accessories and is supplemented by other specific details shown or specified in the respective piping system section.

1.2 RELATED WORK

.1 Process Integration, all other sections – Division 40

1.3 QUALITY ASSURANCES

.1 Welding materials, fabrication standards and labour qualifications must conform to ANSI/ASME B31.1, ANSI/ASME B16.25, ASME Section IX, and the Provincial Labour Board.

.2 Use welders fully qualified and licensed by Provincial Authorities.

.3 Domestic Water, Drainage and Vent Piping: Provincial and Municipal codes.

1.4 REFERENCES

.1 ANSI/ASME B1.20.1-2013, Pipe Threads, General Purpose (Inch)

.2 ANSI/ASME B16.3-2011, Malleable Iron Threaded Fittings: Classes 150 and 300

.3 ANSI/ASME B16.5-2013, Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard

.4 ANSI/ASME B16.9-2007, Factory-Made Wrought Steel Buttwelding Fittings

.5 ANSI/ASME B16.11-2011, Forged Fittings, Socket-Welding and Threaded

.6 ANSI/ASME B16.25-2012, Buttwelding Ends

.7 ANSI/ASME B31.1-2014, Power Piping

.8 ANSI/MSS-SP-58-2009, Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation

.9 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

.10 ASTM A181/A181M-14, Standard Specification for Carbon Steel Forgings, for General-Purpose Piping

.11 ASTM A183-14, Standard Specification for Carbon Steel Track Bolts and Nuts

.12 ASTM A240/A240M-14, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

.13 ASTM A312/A312M-14b, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

.14 ASTM A403/A403M-14, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings

.15 ASTM A774/A774M-14, Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures

.16 ASTM A778-01(2009)e1, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products

.17 ASTM D2564-12, Specification for Solvent Cements for Poly (Vinyl-Chloride).

.18 ASTM B88-14, Standard Specification for Seamless Copper Water Tube

.19 AWWA C207-13, Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm)

.20 CAN/CSA-B137.1, Polyethylene Pipes, Joints and Fittings for Cold Water Piping

.21 CAN/CSA-B137.3, Rigid Polyvinyl Chloride (PVC) for Pressure Application

Part 2 Products

2.1 PIPING MATERIAL

.1 Unless otherwise specified on the construction drawings the pipe material to be used at different areas of the process piping system shall be as follows:

.1 Pumping Station Dry Well Process Piping shall be – SCH 10S stainless steel

.2 Genset Exhaust Piping – Carbon Steel

.3 Potable service water piping – copper, Type K

.4 Ventilation piping – SCH 80 PVC and Galvanized Steel as shown.

.5 Pump suction, sump pump discharge, and inter-well pipe connections – prefabricated fiber reinforced plastic (FRP)

2.2 PIPE FOR NON-BURIED SERVICE

.1 Steel Pipe

.1 ASTM-A53 – Grade B

.2 Schedule 40, (welded joints not acceptable on galvanized pipe)

.3 Standard wall thickness

.4 Welded or seamless

.5 Hot dip galvanized finish for wet well vents

.6 Plain finish for generator exhaust

.2 Polyvinyl Chloride (Pressure and Non- Pressure Service)

.1 CSA-B137.3

.2 Class 12454B PVC compound

.3 Schedule as detailed on drawings

.4 Solvent weld joints

.3 Copper Pipe – Pressure Service

.1 Tube, hard drawn, type K to ASTM B88M

.4 Stainless Steel

.1 ASTM-A778 or A312 Type 304 L pipe

.2 ASTM-A774 or A-403 Type 304 L fittings

.3 Minimum Wall Thickness:

.1 Schedule 10S

.4 Vacuum rating: 100 kPa

.5 Longitudinally welded Tungsten Inert Gas (TIG) for all sludge treatment piping and/or Metal Inert Gas (MIG) method elsewhere.

.6 Ends prepared for welding or to suit connections as shown on drawings.

.7 Provide flanges where required to connect to valves and equipment, where shown on construction drawings, and at 3 m maximum spacing on straight runs.

.5 Fibreglass Reinforced Plastic (FRP) – Filament Wound

.1 ASTM-D3517 or D3754 for pipe and couplings

.2 ASTM-D4161 or A-403 Type 304 L fittings

.3 Minimum Wall Thickness:

.1 Not less than 87.5% of the nominal wall thickness published in the manufacturer literature

.4 Fittings shall be of same structural design as adjoining pipe.

2.3 PIPE FITTINGS

.1 PVC

.1 For pressure service to CSA-B137.3

.2 For non-pressure service to CSA-181.2

.3 Schedule to match pipe

.4 Solvent joint fittings to match pipe

.5 To AWWA-C111 - rubber gasket type where required

.6 Flanges, reducing bushings and other fittings to be compatible with line pipe material

.2 Stainless Steel

.1 Wall thickness to match or exceed line pipe wall

.2 Elbows to 450 mm shall be smooth flow and manufactured to the requirements of ANSI B16.9.

.3 Backing flanges to be stainless steel, ANSI-B16.5 Class 150 standard, or ANSI-B16.5 Class 300 where noted on drawings.

.4 Ends to be prepared to suit piping as required.

.5 Fitting ASTM type to match pipe ASTM type.

.3 Copper

.1 Brass or bronze screwed water fittings to ANSI-B16.15

.2 Solder joints to ANSI-B16.18 and ANSI-B16.22

.3 Flanges to ANSI-B16.24

.4 Cast Iron/Ductile Iron

.1 to match pipe supplied

2.4 FLANGES

.1 Flanges for stainless steel shall be welded neck or slip-on type as shown on the drawings.

.2 Slip-on flanges shall be in accordance with AWWA A-C207, and rated for 1035 kPa.

.3 Flanges shall be steel to ASTM-A 181, Grade 60, fabricated to ANSI B16.5, rated for 1035 kPa or 2070 kPa as shown on the drawings.

.4 Use flat face flanges to connect to cast iron flanges, and raised face flanges to connect to raised face flanges.

.5 Flat face flanges shall be used to connect to resilient seat butterfly valves.

.6 Flange class shall be plainly marked on all flanges.

2.5 BOLTS AND NUTS

.1 Bolts and nuts shall be to AWWA C207.

.2 Bolts and nuts shall be stainless steel to ASTM -240, Type 304, hexagonal heads.

.3 Size and length to match flanges and valves.

2.6 FLANGE GASKETS

.1 For flanges, 1.6 mm cloth inserted rubber SBR, Garlock Style 22 or approved alternate for temperatures below 100°C.

.2 Use flat ring gaskets with raised face flanges.

.3 Use full faced gaskets with flat face flanges.

2.7 SLEEVE TYPE COUPLINGS

.1 Use only as indicated on the drawings.

.2 Use steel couplings, fusion bonded epoxy coating, with Dresserloy or approved alternative in accordance with B7 to nuts and bolts, and plain grade 27 gaskets.

.3 Couplings to be Dresser Style 38, Robar or approved alternative in accordance with B7 to standard length, standard weight.

.4 Transition couplings to be Dresser Style 162, Robar or approved alternative in accordance with B7.

.5 For underground service use couplers with followers and middle rings fully coated with Dresser Al-Clad or approved alternative in accordance to B7 and installed with harness, nuts, bolts and rings packed with protective Denso Plast and coated with Denso tape.

.6 Joint harness details shall be in accordance with AWWA Steel Pipe Manual M11.

.7 Design of joint harness shall be based on an operating pressure of 1035 kPa unless otherwise noted.

.8 Harness nuts and bolts to be hot dipped galvanized.

2.8 WELDING OUTLETS

.1 Fabricate to the requirements of ANSI-B16.9, ANSI-B16.11 and ANSI-B31.1.

.2 Welded outlets include weldolets, sockolets and thredolets.

2.9 SUPPORTS AND HANGERS - GENERAL

.1 Hangers and supports shall conform to ANSI Code for Pressure Piping B31.1.

.2 Materials, design and manufacture for Pipe Hangers and Support shall be in accordance with ANSI/MSS SP-58.

.3 Hot dip galvanize all supports, hangers, guides, sway braces, restraints, dampeners, bolts, washers and nuts after fabrication and before installation.

.4 Hangers and supports shall be sized to suit the pipe sizes as shown on drawings and as recommended by the manufacturer.

2.10 PIPE SUPPORTS

.1 Wall supports - use Grinnell Fig. 194, Fig. 195, or Fig. 199 welded steel brackets hot dipped galvanized, or as shown on the drawings.

.2 Pipe saddle supports – use Grinnell Fig. 264 adjustable pipe saddle support complete with riser pipe and floor flange.

.3 Strap supports (vent piping) - use Grinnell Fig. 262 for 100 mm and smaller pipe. Provide straps for larger pipe as detailed on drawings.

.4 Any part of a hangar or other pipe support in direct contact with stainless steel shall be nylon coated with NCA-1477 nylon thermoplastic 0.5 mm thick or shall be of 316 stainless steel. Provide felt paper between pipe and concrete pipe supports to prevent bonding.

.5 Wall supports for PVC pipe up to 50 mm diameter shall be Grinnell tube strap or approved alternate.

2.11 CAST IRON/DUCTILE IRON COATING

.1 All cast iron and ductile iron pipe and fittings for use inside the wells shall be coated on the interior and exterior with Fusion Bonded Epoxy.

.2 Acceptable Product: 3M Scotch-Coat Fusion Bonded Epoxy or approved equal in accordance with B7.

2.12 HOSE BIBB

.1 Hose Bibb (Interior)

.1 Hose Bibb: Zurn 12341. Hose bibb with vacuum breaker. Bronze construction, chrome finish, 19 mm male hose connection.

2.13 WALL HYDRANT

.1 Non-freeze key operated wall hydrant with chrome plated or stainless steel face, integral vacuum breaker, 20 mm female x 19 mm male pipe connection, all bronze head, seat casing and internal working parts, bronze wall casting and loose key.

.2 Zurn Z1321, Watts HY-420 or approved equal in accordance with B7.

2.14 HOSE REEL

.1 Retraction regulated spring driven rewind heavy duty safety hose reel with the following:

.1 13 mm hose with 15 m length for 2070 Ka pressure
.2 Auto rewind easily wraps, stores and protects hose.
.3 Heavy gauge steel base and support post.
.4 Factory-matched cartridge-style spring motor.
.5 Solid machined brass swivel.
.6 Guide arm adjusts to wall, floor and overhead positions.
.7 Multi-position lock ratchet hose at desired length.
.8 Non corrosive stainless steel spring, pawl and zinc plated ratchet.
.9 Supplied with matched nozzle.

.2 Cox Reel model EZ-SH-450, T&S B-7243-05 or approved equal in accordance with B7.

Part 3 Execution

3.1 NUTS AND BOLTS

.1 Install nuts and bolts so that bolts have a minimum of two exposed threads projecting after tightening; with a maximum of 8 threads projecting.

.2 Apply Denso paste to exposed threads, flanges and coupling bolts.

3.2 INSTALLATION OF PIPE AND FITTINGS

.1 Route piping in an orderly manner and maintain proper grades. Install to conserve headroom and interfere as little as possible with use of space. Run exposed piping parallel to walls. Group piping wherever practical at common elevations.

.2 Prior to commencing piping work, examine route for conflicts and notify the Contract Administrator of any conflicts. Obtain approval of the Contract Administrator for any relocations.

.3 Install piping lines to elevations shown on the drawings.

.4 Install all piping parallel to building walls where shown on the drawings.

.5 Determine exact location of each pipe in the field with respect to adjacent and interconnecting piping and equipment.

.6 Install piping to allow for expansion and contraction without unduly stressing pipe or equipment connected.

.7 Provide clearance for proper installation of insulation and for access to valves, air vents, drains and unions.

.8 Install all piping systems in accordance with the ANSI code for pressure piping, B31.1.

.9 Provide temporary bracing and supports to adequately support pipes and fittings during installation.

.10 Where the required piping is not shown on drawings or is shown diagrammatically, the pipes shall be installed in such a way as to conserve head room and interfere as little as possible with the spaces through which they pass.

.11 Make reductions in water pipes with eccentric reducing fittings installed to provide drainage and venting. Top flat for water-containing pipe.

.12 Where piping is to connect to equipment, dimensions shown on the drawings are based on catalogue information of first named supplier.

.13 Modify work to suit final dimensions shown on shop drawings for equipment.

.14 Ascertain the correct equipment dimensions before ordering piping closure lengths and fittings. Review of drawings by the Contract Administrator will not relieve the Contractor of his/her obligation in this respect.

3.3 JOINTING PIPES - GENERAL

.1 Clean pipes inside and outside before assembly. Remove welding slag.

.2 Ream pipes and tubes.

.3 Make screwed joints using approved compound or Teflon tape applied to male threads.

.4 American National Taper pipe thread must be used for all screwed connections. Remove burrs and chips and ream or file the pipe ends out to size or bore. Not more than two (2) imperfect threads exposed when joint make-up.

.5 Use Teflon tape, red lead and linseed oil or other approved non-toxic joint compound applied to male threads only.

.6 Connect pipes to equipment as shown or specified, without springing the pipes.

.7 Provide complete isolation of dissimilar metals.

.8 Use standard fittings for direction changes.

.9 Follow the recommendations of the manufacturer for jointing pipes and installing couplings and fittings.

.10 PVC pipe and socket fittings shall be jointed by use of solvent based cements manufactured in accordance with ASTM D2564.

3.4 FLANGED JOINTS AND RUBBER GASKET JOINTS

.1 Make rubber gaskets joints in ductile iron pipe, PVC pipe or other pipes in accordance with the manufacturer's instructions. Use appropriate tools to pull joints, to field cut joints and to prepare pipes for joining. After assembly check the gasket position.

.2 Fit flanged joints so that gaskets are bearing uniformly and joints are even. Apply an anti-seize compound to bolt threads and tighten bolts evenly.

3.5 WELDING STAINLESS STEEL PIPING

.1 Welds shall be made by a certified welder, skilled in stainless steel welding. Submit certifications for all welders and submit details of proposed methods.

.2 Prepare pipe ends by grinding and beveling; then clean using stainless steel brushes and acetone.

.3 Select filler rods and electrodes to conform with the pipe composition and submit lists for review.

.4 Make tack welds employing gas tungsten arc methods and remove while making the root pass.

.5 Use gas tungsten arc welding for materials to 3 mm thick; and for root pass for heavier thicknesses, using Gas Metal Arc Welding or Shielded Metal Arc Welding.

.6 Use argon as arc shielding gas.

.7 All welds shall have full penetration without shrinkage or porosity. Welds shall be smooth and shall not have undue protrusions on the pipe interior.

3.6 EXPANSION PIECES

.1 Install piping to permit free movement of piping caused by thermal expansion and contraction except where it is anchored.

.2 Provide for expansion and contraction by installing suitable expansion pieces as is necessary or where indicated.

.3 Provide expansion pieces having ratings equivalent to the test pressures specified for the particular piping system and wetted surfaces of material similar to that of the piping system.

.4 Design expansion pieces for the lengths of straight runs shown and the temperature differentials specified.

.5 Provide anchors and guides where necessary to direct expansion into expansion pieces.

3.7 INSTALLATION OF SUPPORTS AND HANGERS

.1 Support all piping after alignment and before tightening joints.

.2 Do not move pipe after tightening joints.

.3 Provide all hangers, supports, anchor bolts, washers and nuts to support pipes at the lines and elevations indicated and/or as detailed on the drawings.

.4 Bolt base flanges to the floors or to concrete.

.5 Provide all necessary sway braces, dampeners, flexible hoses and restraints to eliminate all movements of piping due to vibration. Install additional braces and anchors as necessary to eliminate vibrations.

.6 Provide hangers, supports, anchors, guides, dampeners, flexible hoses, restraints and sway braces that will cope with the loads and thrust forces from all directions so that all pipe joints will function and thrust is not transferred to the equipment to which the pipe is connected.

.7 Install sufficient hangers and supports to provide an adequate safety factor as outlined in ANS1-B31.1.

.8 Drilling into concrete, and using expansion type inserts will be permitted only on approval of the Contract Administrator.

3.8 CLEANING

.1 Clean all pipes, fittings and miscellaneous items after installation.

.2 Remove all materials from pipes, whatever their origin, by flushing with water, blowing with air and dismantling and manually cleaning.

.3 Prevent entrance of foreign materials from pipes to equipment or pumps.

3.9 SHOP FINISHES

.1 All cast iron and ductile iron pipe and fittings shall be shop prepared, primed and coated as specified in this section.

3.10 FIELD PAINTING

.1 Field painting of pipe and fitting shall only be required to touch up damaged coatings.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This section specifies requirements to design, fabricate, pre-assemble and supply and install a complete, prefabricated fibre reinforced plastic (FRP) sewage pumping station, consisting of dry well and wet well.

1.2 RELATED SECTIONS

.1 Refer to Section 03 10 00 for Concrete Form Work.

.2 Refer to Section 03 20 00 for Concrete Reinforcement.

.3 Refer to Section 03 30 00 for Cast-In-Place Concrete.

.4 Metal Fabrications – Section 05 50 00

.5 Process Valves – Section 40 05 60

.6 Process Piping Materials and Methods - Section 40 23 36

.7 Vertical Dry Pit Solids Handling Centrifugal Pumps - Section 40 12 09.01

.8 HVAC – Division 21, 22, 23

.9 Integrated Automation – Division 25

.10 Electrical - Division 26

1.3 REFERENCE STANDARDS

.1 The latest published edition of standards and regulations shall govern.

.2 Standard 41-GP-22 (69-05-09). Process Equipment: Reinforced Polyester, Chemical Resistant, Custom Cast Molded: of the Canadian Specification Board.

.3 ASTM 3299, Filament Wound Tanks

.4 As indicated on drawings.

1.4 DESIGN

.1 CSA approved and sealed by a Professional Engineer registered in Manitoba.

1.5 SUBMITTAL

.1 One (1) electronic or four (4) sets of shop drawings providing details of the major construction elements and a list of all equipment furnished must be submitted to the Contract Administrator for review and approval prior to fabrication.

Part 2 Products

2.1 LIFT STATION GENERAL

.1 There shall be an intermediate platform in each well which will form a service area with servicing space in the upper section of the main chamber. This platform shall have hinged access hatches providing access to the bottom of the wells for maintenance purposes and lowering/lifting pumps and associated equipment. The access hatches shall be rated to support a minimum of 200 kg. The valves shall be located above the intermediate platform to facilitate operation and/or servicing.

.2 The top access hatches of both wells shall be aluminum. Each hatch shall be complete with a cover stay, handle, flush fitting padlock tank, and recessed lock. Each access hatch shall be capable of supporting a minimum of 300 kg point load. Top hatches of the dry well shall be airtight.

2.2 FIBREGLASS TANK

.1 The shell shall be constructed of filament wound fibre reinforced plastic (FRP). Reinforcing ribs shall support and stiffen the shell. The lift station top and bottom shall be of hand layed-up construction.

.2 Premium grade isophthalic polyester resin shall be used which contains no fillers except as required for viscosity control.

.3 All glass fibre reinforcing material, except surfacing veil, shall be a commercial “Grade E” type glass.

.4 A safety factor of four (4) on the minimum ultimate tensile strength of the laminate shall be used in designing the wall, bottom and roof thickness of the station, taking into account all normally imposed loads arising from floatation, soil pressures, normal backfill (sand, screened gravel etc.), handling loads, operating loads, and static loads imposed by equipment used for hoisting in and out the pumps used in the station.

.5 Ultraviolet light inhibitors shall be used on all external surfaces in accordance with the resin manufacturer’s recommendation. The outside surface finish shall be an even and smooth appearance.

.6 All cut edges shall be coated with resin so that no glass fibres are exposed and all voids are filled.

.7 Joint construction shall meet or exceed the requirements of paragraph 4.2.6 of Standard 41-GP-22.

.8 A minimum of two (2) lifting lugs are required and are to be provided near the end of the station, each capable of supporting the entire weight of the station.

.9 Hold down lugs shall be provided near the bottom of the tank, allowing it to be bolted to the concrete base.

.10 All inside surfaces shall be lined with a commercial grade “C” type glass surface veil. The surfaces shall be at least 0.25 mm (0.01”) thick and free from cracks and crazing and have a smooth finish.

.11 The wetwell shall be designed and manufactured in such a way that 450 mm x 450 mm slide gate could be directly installed on its wall to isolate the incoming sewer.

.12 Make provision for power and control cabling to penetrate the well walls. Coordinate final quantities and locations.

2.3 INLET AND OUTLET PIPE

.1 Inlet and discharge lines shall terminate a minimum 300 mm from the outside face of the tank with end connections as shown on the drawings.

2.4 VENT

.1 Dual vent pipes as detailed on the drawings at the top of the wetwell shall provide ventilation.

.2 Vent openings within the wet well shall be terminated at the elevations shown on the drawings.

.3 The vents shall terminate above the outside top of the station in a goose neck c/w a bird screen.

2.5 ACCESS LADDER

.1 An access ladder shall be installed in each of the wells to provide safe access to the station bottom and or the intermediate platform.

.2 Exterior hand hold and associated permanently affixed sockets shall be provided.

.3 Material for this ladder, hand hold, and sockets shall be aluminum.

2.6 ENTRANCE COVER

.1 Wet well cover shall be made of checker plate aluminum. Hinges are to be fabricated out of stainless steel.

.2 Dry well cover will be made of FRP having concrete floor on top of it which will be flush with the building floor. Therefore, the dry well must be reinforced to support and sustain load of the concrete top dead load, live load and equipment moving on it.

.3 A confined space signage shall be installed on all covers.

2.7 CONCRETE FOUNDATION

.1 Provide reinforced concrete foundation as detailed on the drawings.

2.8 FRP PIPES

.1 As indicated on drawings, the part of individual pump suction pipes between the wet and dry well shall be made of FRP. This part of pipes shall be included in the scope of supply of the FRP well's manufacture, and will be installed together with the wells.

.2 Sump pump discharge pipe from sump pump to the wet well will be made of FRP and supplied by the wells manufacturer.

.3 Wet well wastewater level transmitter pipe from wet well to the dry well will be made of FRP and supplied by the wells manufacturer.

Part 3 Execution

3.1 INSTALLATION

.1 The Contractor shall install the fibre glass tank as per Manufacturer's/Supplier's instructions.

END OF SECTION