

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 74 20 - Waste Managing and Disposal.
- .4 Section 01 78 10 - Closeout Submittals.
- .5 Section 09 91 10 - Painting.
- .6 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings; submit drawings stamped and signed for approval by Contract Administrator's Representative.
- .3 Shop drawings to show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
- .4 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
- .5 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .6 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 10 - Closeout Submittals.
 - .2 Operation and maintenance manual approved by, and final copies deposited with, Contract Administrator's Representative before final inspection.
 - .3 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.

-
- .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .4 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .5 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
 - .6 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Contract Administrator's Representative for approval. Submission of individual data will not be accepted unless directed by Contract Administrator's Representative.
 - .2 Make changes as required and re-submit as directed by Contract Administrator's Representative.
 - .7 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
 - .8 Site records:
 - .1 Contract Administrator's Representative will provide 1 set of reproducible mechanical drawings or AutoCAD files. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour for each service.
 - .4 Make available for reference purposes and inspection.
 - .9 As-built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to Contract Administrator's Representative for approval and make corrections as directed.
 - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.10 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 QUALITY ASSURANCE

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

1.4 MAINTENANCE

.1 Furnish spare parts in accordance with Section 01 78 10 - Closeout Submittals as follows:

- .1 One set of packing for each pump.
- .2 One casing joint gasket for each size pump.
- .3 One glass for each gauge glass.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 10 - Closeout Submittals.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Waste Management and Disposal:

- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Managing and Disposal.

Part 2 PRODUCTS

2.1 MATERIALS

.1 All materials used on this project shall be new and CSA approved unless noted otherwise.

Part 3 EXECUTION

3.1 PAINTING, REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 10 - Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.2 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.

-
- .1 Perform tests as specified in other sections of this specification.
 - .2 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
 - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.
- 3.4 DEMONSTRATION**
- .1 Contract Administrator's Representative will use equipment and systems for test purposes prior to acceptance. Contractor to supply labour, material, and instruments required for testing.
 - .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
 - .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
 - .4 Instruction duration time requirements as specified in appropriate sections.
 - .5 Contract Administrator's Representative may record these demonstrations on video tape for future reference.
- 3.5 PROTECTION**
- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Thermal insulation for piping and piping accessories in commercial type applications.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 61 00 – Product Requirements.
- .3 Section 01 74 00 – Cleaning and Waste Processing.
- .4 Section 01 74 20 – Waste Managing and Disposal.
- .5 Section 07 92 00 – Joint Sealing.
- .6 Section 23 05 53.01 – Mechanical Identification.

1.3 REFERENCES

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 90.1, Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings (Including all Addenda).
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM B209M, Standard Specification for Aluminium and Aluminium Alloy Sheet and Plate Metric.
 - .2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
 - .3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C449/C449M, Standard Specification for Mineral Fibre-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C533 Standard specification for Calcium Silicate Insulation Block and Pipe.
 - .6 ASTM C547 Standard Specification for Mineral Fibre Pipe Insulation.
 - .7 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .8 ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .2 CAN/CGSB-51.53, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts

- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), c. 37.
 - .2 Canadian Environmental Protection Act, (CEPA), c. 33.
 - .3 Transportation of Dangerous Goods Act (TDGA), c. 34.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets.
- .6 Manufacturer's Trade Associations
 - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards.
- .7 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701 Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .3 CAN/ULC-S702, Thermal Insulation, Mineral Fibre, for Buildings
 - .4 CAN/ULC – S702.2, Thermal Insulation, Mineral Fibre for Buildings, Part 2 Application Guidelines.
- .8 Model National Energy Code of Canada for Buildings (MNECB).

1.4 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as defined herein.
- .2 TIAC ss:
 - .1 CRF: Commercial Rectangular Finish
 - .2 CPF: Commercial Piping Finish.

1.5 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
 - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Samples:

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.
- .5 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions to Contract Administrator's Representative.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: certified in performing work of this Section, and have at least 5 years successful experience in this size and type of project, qualified to standards of TIAC.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.
- .2 Storage and Protection:
 - .1 Protect from weather, construction traffic.
 - .2 Protect against damage.
 - .3 Store at temperatures and conditions required by manufacturer.
- .3 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Managing and Disposal.
 - .2 Place excess or unused insulation and insulation accessory materials in designated containers.
 - .3 Divert unused metal materials from landfill to metal recycling facility approved by Contract Administrator's Representative.
 - .4 Dispose of unused adhesive material at official hazardous material collections site approved by Contract Administrator's Representative.

Part 2 Products

2.1 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102.
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 °C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-2: Rigid moulded calcium silicate in sections and blocks, and with special shapes to suit project requirements.
 - .1 Insulation: to ASTM C533.
 - .2 Maximum "k" factor: to 0.075 W/m °C @ 500 °C .
 - .3 Design to permit periodic removal and re-installation.
- .4 TIAC Code A-3: Rigid moulded mineral fibre with factory applied vapour retarder jacket.
 - .1 Mineral fibre: to CAN/ULC-S702 and ASTM C547.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to CAN/ULC-S702.
- .5 TIAC Code A-6: Flexible unicellular tubular elastomer.
 - .1 Insulation: with vapour retarder jacket to ASTM C534.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: 0.039 W/m – °C.
 - .4 To be certified by manufacturer to be free of potential stress corrosion cracking corrodants.
 - .5 Flame spread index less than 25, and smoke developed index less than 50.
- .6 TIAC Code C-2: Mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
 - .1 Mineral fibre: to CAN/ULC-S702.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to CAN/ULC-S702.

2.3 INSULATION SECUREMENT

- .1 Tape: Self-adhesive, aluminum, plain reinforced, 50 mm wide minimum.
- .2 Contact adhesive: Quick setting.
- .3 Canvas adhesive: Washable.
- .4 Tie wire: 1.5 mm diameter stainless steel.

- .5 Bands: Stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

- .1 Thermal insulating and finishing cement:
 - .1 Hydraulic setting or air drying on mineral wool, to ASTM C449/C449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 OUTDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.
- .2 Reinforcing fabric: Fibrous glass, untreated 305 g/m².

2.8 JACKETS

- .1 Polyvinyl Chloride (PVC):
 - .1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.
 - .2 Colours: to match adjacent finish paint. Confirm colour with Contract Administrator's Representative.
 - .3 Minimum service temperatures: -20°C.
 - .4 Maximum service temperature: 65°C.
 - .5 Moisture vapour transmission: 0.02 perm.
 - .6 Thickness: 0.55 mm.
 - .7 Fastenings:
 - .1 Use solvent weld adhesive compatible with insulation to seal laps and joints.
 - .2 Tacks.
 - .3 Pressure sensitive vinyl tape of matching colour.
 - .8 Special requirements:
 - .1 Indoor: flame spread rating 25, smoke developed rating 50.
 - .2 Outdoor: UV rated material at least 0.5 mm thick.
- .2 Canvas:
 - .1 220gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
 - .2 Lagging adhesive: Compatible with insulation.
- .3 Aluminum:
 - .1 To ASTM B209.

- .2 Thickness: 0.50 mm sheet.
 - .3 Finish: Embossed or corrugated.
 - .4 Joining: Longitudinal and circumferential slip joints with 50 mm laps.
 - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.
- .4 Stainless steel:
- .1 Type: 304 or type 316.
 - .2 Thickness: 0.25 mm.
 - .3 Finish: Smooth.
 - .4 Joining: Longitudinal and circumferential slip joints with 50 mm laps.
 - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

2.9 WEATHERPROOF CAULKING FOR JACKETS INSTALLED OUTDOORS

- .1 Caulking to: Section 07 92 00 - Joint Sealing.

Part 3 Execution

3.1 MANUFACTURE'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE- INSTALLATION REQUIREMENT

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces to be clean, dry, free from foreign material.

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:

- .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 INSTALLATION OF ELASTOMERIC INSULATION

- .1 Insulation to remain dry. Overlaps to manufacturers instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.

3.5 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.
- .2 TIAC Code: A-2.
 - .1 Insulation securements: 18 ga SS wire or 12 mm x 0.51 mm SS bands at 300 mm oc.
 - .2 Seals: lap seal adhesive, lagging adhesive.
 - .3 Installation: TIAC Code: 1501-H.
- .3 TIAC Code: A-3.
 - .1 Securements: Tape at 300 mm oc.
 - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
 - .3 Installation: TIAC Code: 1501-C.
- .4 TIAC Code: A-6.
 - .1 Insulation securements: as per manufacturer's recommendation.
 - .2 Seals: lap seal adhesive, lagging adhesive.
 - .3 Installation: TIAC Code: 1501-CA.
- .5 TIAC Code: C-2 with vapour retarder jacket.
 - .1 Insulation securements: 18 ga SS wire or 12 mm x 0.5 mm SS bands at 300 mm oc.
 - .2 Seals: lap seal adhesive, lagging adhesive.
 - .3 Installation: TIAC Code: 1501-C.
- .6 Thickness of insulation to be as listed in following table.
 - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
 - .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp °C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Steam	up to 175	A-3	38	50	65	75	90	90
Steam, Saturated and Superheated	over 175	A-3	38	65	65	75	90	90

Application	Temp °C <i>Run out</i>	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			<i>to 1</i>	<i>1 1/4 to 2</i>	<i>2 1/2 to 4</i>	<i>5 to 6</i>	<i>8 & over</i>	
Condensate Return	60 - 94	A-3	25	38	38	38	38	38
Pumped Condensate return	up to 94	A-3	25	38	38	38	38	38
Boiler Feed Water		A-3	25	25	25	25	25	25
Hot Water Heating	60 - 94	A-3	25	38	38	38	38	38
Hot Water Heating	up to 59	A-3	25	25	25	25	38	38
Glycol Heating	60 - 94	A-3	25	38	38	38	38	38
Glycol Heating	up to 59	A-3	25	25	25	25	38	38
Domestic HWS		A-3	25	25	25	38	38	38
Chilled Water	4 - 13	A-3	25	25	25	25	25	25
Chilled Water or Glycol	below 4	A-3	25	25	38	38	38	38
Dual Temp. Heating		A-3	25	38	38	38	38	38
Dual Temp. Cooling		A-3	25	25	38	38	38	38
Chilled Water Pump Casing		A-3	25	25	25	25	25	25
Condenser Water Outdoors		A-3	50	50	65	65	65	65
Condenser Water Indoors		A-3	25	25	25	25	25	25
Refrigerated Drinking Water		A-3	25	25	25	25	25	25

Application	Temp °C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Domestic CWS		A-3	25	25	25	25	25	25
Refrigerant hot gas, liquid, suction	4-13	A-6	25	25	25	25	25	25
Refrigerant hot gas, liquid, suction	below 4	A-6	25	25	25	25	25	25
RWL and RWP		A-3	25	25	25	25	25	25
Cooling Coil cond. Drain		A-3	25	25	25	25	25	25
Diesel generator exhaust system		A-2	38	65	65	75	90	90
Roof Drain Body		C-2	25	25	25	25	25	25

- .7 Finishes:
- .1 Exposed indoors: PVC jacket.
 - .2 Exposed in mechanical rooms: PVC jacket.
 - .3 Concealed, indoors: canvas on valves, fittings. No further finish.
 - .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
 - .5 Outdoors: Water-proof Aluminium, or SS jacket.
 - .6 Finish attachments: SS screws or bands, at 150 mm oc. Seals: wing or closed.
 - .7 Installation: To appropriate TIAC code CPF/1 through CPF/5.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 00 – Cleaning and Waste Processing.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section includes:
 - .1 Materials and installation for plumbing pumps.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 45 00 – Quality Control.
- .3 Section 01 74 20 –Waste Managing and Disposal.
- .4 Section 01 78 10 – Closeout Submittals.
- .5 Section 01 91 00 – Commissioning.
- .6 Section 02 81 01 – Hazardous Materials.

1.3 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS)

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet for fixtures and equipment.
 - .2 Submit WHMIS MSDS in accordance with Section 02 81 01 – Hazardous Materials. Indicate VOC's for adhesive and solvents during application and curing.
- .3 Shop Drawings:
 - .1 Submit shop drawings to indicate:
 - .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or field assembled.
 - .2 Wiring and schematic diagrams.
 - .3 Dimensions and recommended installation.
 - .4 Pump performance and efficiency curves.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.

-
- .6 Manufacturers' Field Reports: manufacturers' field reports specified.
 - .7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 10 – Closeout submittals, include:
 - .1 Manufacturers name, type, model year, capacity and serial number.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list with names and addresses.

1.5 QUALITY ASSURANCE

- .1 Pre-Installation Meeting:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installation.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 – Construction /Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .4 Divert unused metal materials from landfill to metal recycling facility as approved by Contract Administrator's Representative.
 - .5 Unused sealant materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
 - .6 Fold up metal and plastic banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 SUMP PUMP SUBMERSIBLE

- .1 Capacity: see pump schedule.
- .2 Construction: simplex CSA approved, housing epoxy coated cast iron or stainless steel, stainless steel shaft, non-clog bronze impeller, mechanical shaft seal, strainer or as indicated in pump schedule.
- .3 Motor: hermetically sealed, with automatic overload protection.
- .4 Control: integral diaphragm type level control buoyant case and switch, plug and cord.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

- .1 Make piping and electrical connections to pump and motor assembly and controls as indicated.
- .2 Ensure pump and motor assembly do not support piping.
- .3 Place 150 mm sand under sump pit tank.

3.3 FIELD QUALITY CONTROL

- .1 Check power supply.
- .2 Check starter protective devices.
- .3 Start-up, check for proper and safe operation.
- .4 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.
- .5 Adjust flow from water-cooled bearings.
- .6 Adjust impeller shaft stuffing boxes, packing glands.

3.4 START-UP

- .1 General:
 - .1 In accordance with Section 01 91 00 –Commissioning, supplemented as specified herein.
 - .2 Procedures:
 - .1 Check power supply.
 - .2 Start pumps, check impeller rotation.
 - .3 Check for safe and proper operation.
 - .4 Check settings, operation of operating, limit, safety controls, over-temperature, audible/visual alarms, other protective devices.
 - .5 Test operation of HOA switch.
 - .6 Adjust leakage through water-cooled bearings.
 - .7 Adjust shaft stuffing boxes.
 - .8 Adjust leakage flow rate from pump shaft stuffing boxes to manufacturer's recommendations.
 - .9 Check base for free-floating, no obstructions under base.
 - .10 Run-in pumps for 12 continuous hours.

-
- .11 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
 - .12 Adjust alignment of piping and conduit to ensure full flexibility at all times.
 - .13 Eliminate causes of cavitations, flashing, air entrainment.
 - .14 Replace seals if pump used to degrease system or if pump used for temporary heat.
 - .15 Verify lubricating oil levels.

3.5 PV - SANITARY AND STORM WATER PUMPS

- .1 Application tolerances:
 - .1 Flow: Plus 10%; Minus 0%.
 - .2 Pressure: Plus 10%; Minus 5%.
- .2 PV Procedures:
 - .1 Fill sump at rate slower than capacity of pump #1.
 - .2 Record levels at which pump #1 starts and stops. Determine flow rate by observing time taken to draw down water level.
 - .3 Fill sump at rate faster than capacity of pump #1 but slower than capacities of pumps #1 and #2 operating in parallel.
 - .4 Record levels at which pumps start and stop - water level rising and water level falling.
 - .5 Verify operation of alternator.
 - .6 Adjust water level controls as necessary.
 - .7 Fill sump at rate faster than capacities of pumps #1 and #2 operating in parallel.
 - .8 Record levels at pump starts and stops - water level rising and falling.
 - .9 Check operation of alternator.
 - .10 Adjust level controls as necessary.
 - .11 Check level at which high water level alarm starts and stops. Adjust as necessary.
- .3 Check removeability of pumps for servicing without interfering with installation or operation of other equipment.
- .4 Verify non-clog capability and maximum size of solids, using procedures recommended by manufacturer.

3.6 REPORTS

- .1 In accordance with Section 01 91 00 –Commissioning: supplemented as specified herein.
- .2 Include
 - .1 PV results on approved PV Report Forms.
 - .2 Product Information report forms.
 - .3 Pump performance curves (family of curves) with final point of actual performance marked thereon.

3.7 TRAINING

- .1 In accordance with Section 01 91 00 –Commissioning supplemented as specified herein.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 20 - Waste Managing and Disposal.
- .3 Section 01 78 10 - Closeout Submittals.
- .4 Section 01 91 10 - Commissioning
- .5 Section 02 81 01 - Hazardous Materials.
- .6 Section 22 05 00 – Common Work Results for Plumbing.
- .7 Section 22 07 19 – Plumbing Piping Insulation.
- .8 Section 23 05 05 - Installation of Pipework.
- .9 Section 23 05 23.01 - Valves - Bronze.
- .10 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME).
 - .1 ANSI/ASME B16.15, Cast Bronze Threaded Fittings, Classes 125 and 250.
 - .2 ANSI/ASME B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
 - .3 ANSI/ASME B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - .4 ANSI/ASME B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 American National Standards Institute/National Sanitation Foundation (ANSI/NSF).
 - .1 ANSI/NSF 61, Drinking Water System Components.
- .3 American Society for Testing and Materials International (ASTM).
 - .1 ASTM A 307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM A536, Standard Specification for Ductile Iron Castings.
 - .3 ASTM B 88M, Standard Specification for Seamless Copper Water Tube (Metric).
 - .4 ASTM F 492, Standard Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe Fittings.
- .4 American Water Works Association (AWWA).

- .1 AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .2 AWWA C606, Grooved and Shouldered Joints.
- .5 Canadian Standards Association (CSA International).
 - .1 CSA B242, Groove and Shoulder Type Mechanical Pipe Couplings.
- .6 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act (CEPA).
- .7 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .8 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
 - .1 MSS-SP-67, Butterfly Valves.
 - .2 MSS-SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
 - .3 MSS-SP-71, Cast Iron Swing Check Valves, Flanged and Threaded Ends.
 - .4 MSS-SP-80, Bronze Gate, Globe, Angle and Check Valves.
- .9 National Research Council (NRC)/Institute for Research in Construction.
 - .1 NRCC 38728, National Plumbing Code of Canada (NPC).
- .10 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act (TDGA).

1.3 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .4 Closeout Submittals:
 - .1 Provide maintenance data for incorporation into manual specified in Section 01 78 10 - Closeout Submittals.
- .5 Grooved joint couplings and fittings to be indicated on product submittals and to be specifically identified with the applicable style or series designation.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 - Waste Managing and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

- .3 Separate for reuse and recycling and place in designated containers Steel, Metal, Plastic waste in accordance with Waste Management Plan.
- .4 Place materials defined as hazardous or toxic in designated containers.
- .5 Handle and dispose of hazardous materials in accordance with CEPA , TDGA , Regional and Municipal regulations.
- .6 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 Products

2.1 PIPING

- .1 Domestic hot, cold and recirculation systems, within building.
 - .1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.
 - .2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

2.2 FITTINGS

- .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI/ASME B16.24.
- .2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI/ASME B16.18.
- .4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.
- .5 NPS2 and larger: roll grooved to CSA B242. Cast bronze to ANSI/ASME B16.18 or wrought copper ANSI/ASME B16.22.
 - .1 Fittings to be manufactured to copper-tube dimensions. Flaring of tube or fitting ends to accommodate IPS sized couplings is not permitted.
- .6 NPS 1 ½ and under: Cast copper, ANSI/ASME B16.18 or wrought copper, ANSI/ASME B16.22; with 301 stainless steel internal components, EPDM seal, and push-to-connect joints.

2.3 JOINTS

- .1 Rubber gaskets, latex-free, 1.6 mm thick: to ANSI/AWWA C111.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: 95/5 tin copper alloy lead free.
- .4 Push-to-connect: EPDM gasket, UL classified in accordance with ANSI/NSF 61 for potable water service.
- .5 Teflon tape: for threaded joints.

- .6 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket. Gasket to be classified in accordance with ANSI/NSF 61 for potable water service. Couplings to be manufactured to copper-tube dimensions. Flaring of tube or fitting ends to accommodate IPS sized couplings is not permitted.
- .7 Dielectric connections between dissimilar metals: dielectric fitting to ASTM F492, complete with thermoplastic liner.

2.4 GATE VALVES

- .1 NPS2 and under, soldered:
 - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 – Valves - Bronze.
- .2 NPS2 and under, screwed:
 - .1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 – Valves - Bronze.

2.5 GLOBE VALVES

- .1 NPS2 and under, soldered:
 - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01 – Valves – Bronze.
 - .2 Lockshield handles: as indicated.
- .2 NPS2 and under, screwed:
 - .1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 – Valves – Bronze.
 - .2 Lockshield handles: as indicated.

2.6 SWING CHECK VALVES

- .1 NPS 2 and under, soldered:
 - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 – Valves - Bronze.
- .2 NPS2 and under, screwed:
 - .1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 – Valves - Bronze.
- .3 NPS 2 and under, push-to-connect, lift-disc type:
 - .1 To MSS-SP-80, 1380 kPa CWP, bronze body, stainless steel disc, spring, and shaft, suitable for installation in horizontal or vertical lines.

2.7 BALL VALVES

- .1 NPS2 and under:
 - .1 As specified Section 23 05 23.01 – Valves - Bronze.

PART 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.
- .2 Install pipe work in accordance with Section 23 05 05 – Installation of Pipework and by certified journeyperson supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Grooved joint couplings and fittings to be installed in accordance with the manufacturer's written installation instructions. Grooved ends to be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets to be verified as suitable for the intended service prior to installation. Gaskets to be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative to provide on-site training for Contractor's field personnel in the use of grooving tools, application of groove, and installation of grooved joint products. The manufacturer's representative to periodically visit the jobsite and review installation. Contractor to remove and replace any joints deemed improperly installed.
- .5 Push-to Connect Piping: Prepare copper tube and install in strict accordance with installation instructions. Pipe ends to be cleaned, free from indentations, projections, burrs, and foreign matter. Use a tube preparation tool to clean and make installation mark. Push copper tube into fittings to installation depth mark, per installation instructions. Keep fittings free of dirt and oil.
- .6 Install CWS piping below and away from HWS and HWR and other hot piping so as to maintain temperature of cold water as low as possible.
- .7 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .8 Buried Tubing
 - .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
 - .2 Bend tubing without crimping or constriction. Minimize use of fittings.

3.2 VALVES

- .1 Isolate equipment, fixtures and branches with butterfly or ball valves.
- .2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

3.3 PRESSURE TESTS

- .1 Test pressure: greater of 1 ½ times maximum system operating pressure or 860 kPa.

3.4 FLUSHING AND CLEANING

- .1 Flush entire system for 8 h. Ensure outlets flushed for 2 h. Let stand for 24 h, then draw one sample off longest run. Submit to testing laboratory for bacteriological testing to verify that system is clean to Provincial potable water guidelines. Let system flush for additional 2 h, then draw off another sample for testing.

3.5 PRE-START-UP INSPECTIONS

- .1 Systems to be complete, prior to flushing, testing and start-up.
- .2 Verify that system can be completely drained.
- .3 Ensure that pressure booster systems are operating properly.
- .4 Ensure that air chambers, expansion compensators are installed properly.

3.6 DISINFECTION

- .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Contract Administrator's Representative.
- .2 Upon completion, provide laboratory test reports on water quality to Contract Administrator's Representative.

3.7 START-UP

- .1 Timing: Start up after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Water treatment systems operational.
- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
 - .1 Establish circulation and ensure that air is eliminated.
 - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
 - .3 Bring HWS storage tank up to design temperature slowly.
 - .4 Monitor HWS and HWR piping systems for freedom of movement, pipe expansion as designed.
 - .5 Check control, limit, safety devices for normal and safe operation.
- .4 Rectify start-up deficiencies.

3.8 PERFORMANCE VERIFICATION

- .1 Timing:

- .1 After pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction.
- .2 Procedures:
 - .1 Verify that flow rate and pressure meet Design Criteria.
 - .2 TAB HWR in accordance with Section 23 05 93 - Testing Adjusting and Balancing for HVAC.
 - .3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
 - .4 Sterilize HWS and HWR systems for Legionella control.
 - .5 Verify performance of temperature controls.
 - .6 Verify compliance with safety and health requirements.
 - .7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut off water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
 - .8 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.
- .3 Reports:
 - .1 In accordance with Section 01 91 00 – Commissioning: using report forms as specified in Section 01 91 00 – Commissioning.
 - .2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

END OF SECTION

PART 1 General

1.1 SUMMARY

- .1 Section includes:
 - .1 The installation of drainage waste and vent piping – cast iron and copper.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 20 - Waste Managing and Disposal
- .3 Section 23 05 05 - Installation of Pipework.

1.3 REFERENCES

- .1 American Iron and Steel Institute (AISI)
 - .1 AISI 304, Stainless Steel.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM B32, Specification for Solder Metal.
 - .2 ASTM B306, Specification for Copper Drainage Tube (DWV).
 - .3 ASTM C564, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-B70, Cast Iron Soil Pipe, Fittings and Means of Joining.
 - .2 CAN/CSA- B125.3, Plumbing Fittings.

1.4 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate and recycle waste materials in accordance with Section 01 74 20 – Waste Managing and Disposal.
 - .2 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.5 SUBMITTALS:

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

- .1 Above ground sanitary, storm and vent Type DWV to: ASTM B306.
 - .1 Fittings.
 - .1 Cast brass: to CAN/CSA-B125.
 - .2 Wrought copper: to CAN/CSA-B125.
 - .2 Solder: tin-lead, 50:50, type 50A or tin-antimony only 95:5, type TA to ASTM B32.

2.2 CAST IRON PIPING AND FITTINGS

- .1 Buried sanitary, storm and vent minimum NPS2, to: CAN/CSA-B70, with one layer of protective coating of bituminous.
 - .1 Joints.
 - .1 Mechanical joints.
 - .1 Neoprene or butyl rubber compression gaskets: to ASTM C564 or CAN/CSA-B70.
 - .2 Stainless steel clamps.
 - .2 Hub and spigot.
 - .1 Neoprene gasket : to CSA B70.
 - .2 Cold caulking compounds.
 - .2 Above ground sanitary, storm and vent: to CAN/CSA-B70.
 - .1 Joints.
 - .1 Mechanical joints.
 - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

2.3 STAINLESS STEEL PIPE AND FITTINGS

- .1 Above ground and buried sanitary, storm and vent, NPS 2 to NPS 10, stainless steel, type AISI 304.
 - .1 Mechanical Joints:
 - .1 Push-fit socket joint with EPDM sealing ring.

Part 3 Execution

3.1 INSTALLATION

- .1 In accordance with Section 23 05 05 – Installation of Pipework and by certified journeyman.
- .2 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.

3.2 TESTING

- .1 Pressure test buried systems before backfilling.
- .2 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

- .1 Cleanouts:
 - .1 Ensure accessible and that access doors are correctly located.
 - .2 Open, cover with linseed oil and re-seal.
 - .3 Verify that cleanout rods can probe as far as the next cleanout, at least.
- .2 Test to ensure traps are fully and permanently primed.
- .3 Storm water drainage:
 - .1 Verify domes are secure.
 - .2 Ensure weirs are correctly sized and installed correctly.
 - .3 Verify provisions for movement of roof system.
- .4 Ensure that fixtures are properly anchored, connected to system and effectively vented.
- .5 Affix applicable label (storm, sanitary, vent, pump discharge, etc.) c/w directional arrows every floor or 4.5 m (whichever is less).
- .6 Provide copies of test reports for Commissioning Manuals.

END OF SECTION

PART 1 General

1.1 SUMMARY

- .1 Section includes:
 - .1 The installation of drainage waste and vent piping – plastic.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 20 - Waste Managing and Disposal
- .3 Section 23 05 05 - Installation of Pipework.
- .4 Section 23 05 53.01 – Mechanical Identification.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D2235, Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
 - .2 ASTM D2564, Specification for Solvent Cements for Poly(Vinyl-Chloride)(PVC) Plastic Piping Systems.
- .2 Canadian Standards Association (CSA)
 - .1 CSA-B1800 Series, ABS Drain, Waste and Vent Pipe and Pipe Fittings.
 - .2 CSA-B181.2, PVC Drain, Waste and Vent Pipe and Pipe Fittings.
 - .3 CSA-B182.1, Plastic Drain and Sewer Pipe and Pipe Fittings.
- .3 Underwriters Laboratory of Canada (ULC)
 - .1 CAN/ULC-S102.2 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

1.4 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate and recycle waste materials in accordance with Section 01 74 20 – Waste Managing and Disposal.
 - .2 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

1.5 SUBMITTALS:

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:

- .1 Provide manufacturer's printed product literature and datasheets for piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 Products

2.1 PIPING AND FITTINGS

- .1 For buried DWV piping to:
 - .1 CSA-B181.1.
 - .2 CSA-B181.2.
 - .3 CSA-B182.1.
- .2 For aboveground DWV piping for combustible construction to:
 - .1 CSA – B181.2
- .3 For aboveground DWV piping for non-combustible construction:
 - .1 Flame spread rating less than 25 and smoke developed classification less than 50.
 - .2 CSA B181.2

2.2 JOINTS

- .1 Solvent weld for PVC: to ASTM D2564.
 - .1 NPS 1 ½ to 6: one step or two step cement
 - .2 NPS 8 and above: two step cement.
- .2 Solvent weld for ABS: to ASTM D2235.

PART 3 Execution

3.1 INSTALLATION

- .1 In accordance with Section 23 05 05 - Installation of Pipework and certified journey person.
- .2 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.

3.2 TESTING

- .1 Pressure test buried systems before backfilling in accordance with Canadian Plumbing Code.
- .2 Hydraulically test to verify grades and freedom from obstructions.

3.3 PERFORMANCE VERIFICATION

- .1 Cleanouts:

- .1 Ensure accessible and that access doors are correctly located.
- .2 Open, cover with linseed oil and re-seal.
- .3 Verify cleanout rods can probe as far as the next cleanout, at least.
- .2 Test to ensure traps are fully and permanently primed.
- .3 Storm water drainage:
 - .1 Verify domes are secure.
 - .2 Ensure weirs are correctly sized and installed correctly.
 - .3 Verify provisions for movement of roof system.
- .4 Ensure fixtures are properly anchored, connected to system and effectively vented.
- .5 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows in accordance with Section 23 05 53.01 – Mechanical Identification.
- .6 Provide copies of test reports for Commissioning Manuals.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 74 20 –Waste Managing and Disposal.
- .3 Section 01 78 10 – Closeout Submittals.
- .4 Section 01 91 00 – Commissioning.
- .5 Section 23 05 19.01 – Thermometers and Pressure Gauges – Piping Systems.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code.
 - .2 CAN/CSA-B139, Installation Code for Oil Burning Equipment.
 - .3 CAN/CSA-B140.0, General Requirements for Oil Burning Equipment.
 - .4 CSA B140.12, Oil-Fired Service Water Heaters and Swimming Pool Heaters.
 - .5 CAN/CSA C22.2 No.110, Construction and Test of Electric Storage Tank Water Heaters.
 - .6 CAN/CSA-C191 Series, Performance of Electric Storage Tank Water Heaters for Household Service.
 - .7 CAN/CSA-C309, Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.
- .2 Provincial Boiler, Pressure Vessel and Compressed Gas Regulations.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate:
 - .1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled, installation procedures.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide maintenance and engineering data for incorporation into manual specified in Section 01 78 10 - Closeout Submittals.

1.5 WASTE MANAGEMENT AND DIPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 20 –Waste Managing and Disposal, and with Waste Reduction Workplan.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Contract Administrator's Representative.

1.6 WARRANTY

- .1 For the Work of this Section 22 30 05 - Domestic Water Heaters, warranty for 5 years from date of Substantial Completion.

Part 2 Products

2.1 ELECTRIC

- .1 To CAN/CSA C22.2 No.110, CAN/CSA-C191 and CAN/CSA-C309 for glass-lined storage tanks, with immersion type elements, KW rating as indicated and surface mounted or immersion type adjustable thermostats.
- .2 Tank: glass lined steel, or stainless steel, 50 mm mineral wool, foam or fibreglass insulation, anode, enameled steel jacket, 5 year warranty certificate, capacity and size as indicated.
- .3 Acceptable Product: Bradford White, A.O. Smith, John Wood, Giant , Rheem/Ruud.

2.2 TRIM AND INSTRUMENTATION

- .1 Drain valve: NPS 1 with hose end.
- .2 Thermometer: to Section 23 05 19.01 – Thermometers and Pressure Gauges – Piping Systems.
- .3 Pressure gauge: to Section 23 05 19.01 – Thermometers and Pressure Gauges – Piping Systems.
- .4 Thermowell filled with conductive paste for control valve temperature sensor.
- .5 ASME rated temperature and pressure relief valve sized for full capacity of heater, having discharge terminating over floor drain and visible to operators.
- .6 Magnesium anodes adequate for 20 years of operation and located for easy replacement.

2.3 ANCHOR BOLTS AND TEMPLATES

- .1 Supply for installation by other Divisions.

Part 3 Execution

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.
- .2 Provide structural steel for horizontal mounted tanks and for instantaneous heaters.
- .3 Provide insulation between tank and supports.
- .4 Install oil burning domestic water heaters in accordance with CAN/CSA-B139.

3.2 FIELD QUALITY CONTROL

- .1 Manufacturer's trained and certified Engineer to start up and commission DHW heaters, as per Section 01 91 00 –Commissioning.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation for plumbing specialties and accessories.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 45 00 – Quality Control.
- .3 Section 01 74 20 –Waste Managing and Disposal.
- .4 Section 01 78 10 – Closeout Submittals.
- .5 Section 01 91 00 –Commissioning.
- .6 Section 02 81 01 – Hazardous Materials.

1.3 References

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A126, Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - .2 ASTM B62, Specification for Composition Bronze or Ounce Metal Castings.
- .2 American Water Works Association (AWWA)
 - .1 AWWA C700, Cold Water Meters-Displacement Type, Bronze Main Case.
 - .2 AWWA C701, Cold Water Meters-Turbine Type for Customer Service.
 - .3 AWWA C702, Cold Water Meters-Compound Type.
- .3 American National Standards Institute (ANSI)
 - .1 ANSI Z358.1 Emergency eyewash and shower equipment.
- .4 Canadian Standards Association (CSA)
 - .1 CSA-B64 Series, Backflow Preventers and Vacuum Breakers.
 - .2 CSA-B356, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .5 Health Canada/Workplace Hazardous Materials Information Systems (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .6 Plumbing and Drainage Institute (PDI)
 - .1 PDI-G101, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
 - .2 PDI-WH201, Water Hammer Arresters Standard.

1.4 Submittals

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
 - .2 Indicate dimensions, construction details and materials for specified items.
 - .3 Submit WHMIS MSDS in accordance with Section 02 81 01 – Hazardous Materials. Indicate VOC's for adhesive and solvents during application and curing.
- .3 Shop Drawings:
 - .1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions, construction and assembly details and accessories.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.
- .6 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 10 – Closeout Submittals. Include:
 - .1 Description of plumbing specialties and accessories, giving manufacturer's name, type, model, year and capacity.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list.

1.5 QUALITY ASSURANCE

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 –Waste Managing and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

- .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging materials in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility as approved by Contract Administrator's Representative.
- .5 Fold up metal and plastic banding flatten and place in designated area for recycling.

PART 2 Products

2.1 Floor Drains

- .1 Floor drains and trench drains.
 - .1 Heavy duty; coated cast iron body, heavy duty non-tilting or hinged lacquered cast iron grate, integral seepage pan and clamping collar, trap primer connections, 200 mm diameter, sediment bucket.
 - .1 Acceptable Product: Watts, Zurn ZN-536-P-Y, Jay R. Smith, MIFAB, Blücher.

2.2 Roof Drains

- .1 Type 1; Epoxy coated, 359 mm diameter, cast iron body, flashing clamp and integral gravel stop, with self locking 314 mm diameter ductile iron dome, sump receiver, fixed extension, Flow Restrictor (1 slot), under deck clamp, 76 mm outlet no hub outlet.
 - .1 Acceptable Product Watts model RD-100, Jay R. Smith, MIFAB, Zurn.
- .2 Type 2; Epoxy coated, 359 mm diameter, cast iron body, flashing clamp and integral gravel stop, with self locking 314 mm diameter ductile iron dome, sump receiver, fixed extension, under deck clamp, 203 mm outlet no hub outlet.
 - .1 Acceptable Product Watts model RD-100, Jay R. Smith, MIFAB, Zurn.

2.3 Cleanouts

- .1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
 - .1 Acceptable Product: Zurn, Jay R. Smith, MIFAB, Blücher.
- .2 Access covers:
 - .1 Wall access: face or wall type, or stainless steel square cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
 - .2 Floor access: round cast iron body and frame with adjustable secured nickel bronze top.
 - .1 Plugs: bronze with neoprene gasket.
 - .2 Cover for unfinished concrete floors: cast iron round, gasket, vandal-proof screws.
 - .3 Cover for terrazzo finish: polished nickel bronze brass with recessed cover for filling with terrazzo, vandal-proof locking screws.
 - .4 Cover for tile and linoleum floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.

- .5 Cover for carpeted floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

2.4 Non Freeze Wall Hydrants

- .1 Recessed with integral vacuum breaker, integral backflow preventer, NPS ¾ hose outlet, removable operating key, polished bronze finish, encased, non-freeze, anti-siphon, automatic draining, wall clamp, replaceable bronze seat and washer.
- .2 Acceptable Product: Zurn Z-1300-4-5, Jay R. Smith, MIFAB.

2.5 Water Hammer Arrestors

- .1 Stainless steel or copper construction, bellows or piston type: to PDI-WH201.
- .2 Acceptable Product: Zurn, Jay R. Smith, MIFAB, Precision Plumbing Products.

2.6 Back Flow Preventers

- .1 To CSA-B64 Series.
- .2 Application: domestic service entrance and fire protection system service entrance.
 - .1 Domestic water:
 - .1 Reduced pressure principle type consisting of a pressure differential relief valve located between two independently operated spring-loaded centre guided check valves.
 - .2 Ductile iron construction with FDA approved fusion epoxy coat inside and out.
 - .3 Compound check.
 - .4 Single access cover.
 - .5 Maximum temperature range: 0.5°C to 60°C.
 - .6 Maximum pressure: 1205 kPa.
 - .7 CSA certified.
 - .8 Acceptable Product: Wilkins Model 375L, Watts, Zurn.
 - .3 Application: install on domestic cold water supply to humidifier.
 - .1 Bronze body construction.
 - .2 Internal pressure differential relief valve located in a zone between two positive seating check modules with captured springs and silicone seat discs.
 - .3 Seats and discs replaceable in both check modules and the relief valve.
 - .4 Assembly to include two resilient seated isolation valves, four resilient seated test cocks, protective wye strainer with 20 mesh screen, union end connections and an air gap drain fitting.
 - .5 Reduced pressure zone type backflow preventer.
 - .6 Acceptable Product: Watts Series U-009QT-S complete with Watts Series 909AG air gap, Wilkins, Zurn.
- .4 Provide backflow preventer test kit as follows:

- .1 Maximum working pressure: 1205 kPa.
- .2 Maximum working temperature: 98.8°C.
- .3 0-103 kPa and 0-15 psig dual scale pressure gauge with 114 mm diameter face, $\pm 2\%$ accuracy.
- .4 Test valves: two (2) ball valves and one (1) needle valve.
- .5 Hoses: three (3) one (1) metre test hoses with female threaded swivel coupling.
- .6 Adapters:
 - .1 Three (3) NPS $\frac{1}{4}$ threaded coupling adapters.
 - .2 Three (3) NPS $\frac{1}{2}$ x NPS $\frac{1}{4}$ bushings.
 - .3 Three (3) NPS $\frac{3}{4}$ x NPS $\frac{1}{4}$ bushings.
- .7 400 mm long securing strap.
- .8 Moisture resistant instruction guide.
- .9 Light weight, shock resistant molded plastic case with foam inserts.
- .10 Acceptable Product: Watts No. TK-9A Backflow Preventer Test Kit, Precisions Plumbing Products, MIFAB.

2.7 VACUUM BREAKERS

- .1 To CSA-B64 Series.
- .2 Atmospheric vacuum breaker (inlet to domestic hot water tanks):
 - .1 Plain brass body with silicone disc.
 - .2 Suitable for temperatures up to 82°C.
 - .3 Maximum operating pressure: 860 kPa.
 - .4 Size: NPS $\frac{3}{4}$.
 - .5 Acceptable Product: Watts Series 288a, Wilkins, Jay R. Smith, MIFAB.
- .3 Hose connection vacuum breaker:
 - .1 NPS $\frac{3}{4}$ female hose thread inlet, NPS $\frac{3}{4}$ male hose thread outlet, brass finish.

2.8 Pressure Regulators

- .1 Capacity: as indicated.
 - .1 Inlet pressure: 1034 kPa.
 - .2 Outlet pressure: 413 kPa.
 - .3 Capacity: as indicated.
- .2 Up to NPS1-1/2 bronze bodies, screwed: to ASTM B62, strainer and stainless steel strainer screen.
- .3 NPS2 and over, semi-steel bodies, Class 125, flanged: to ASTM A126, Class B, strainer.
- .4 Semi-steel spring chambers with bronze trim.

2.9 Trap Seal Primers

- .1 Pressure drop actuated:

- .1 Brass body construction with inlet opening of ½ male NPT and outlet opening of female ½ NPT.
- .2 Provide complete with four-hole view built-in air gap to prevent any backflow from trap being fed into the water supply.
- .3 Provide removable inlet filter screen.
- .4 Capacity to serve up to four (4) floor drains.
- .5 Provide complete with trap seal primer distribution unit as follows:
 - .1 Brass body construction.
 - .2 ½ NPT inlet connection.
 - .3 Four (4) 3/8 FPT brass nipple outlet connections.
 - .4 Four (4) 6 mm diameter vent holes in lid to provide air gap and backflow protection.
- .6 Acceptable Product: MIFAB MR-500 trap seal primer complete with MIFAB MI-DU series distribution unit, Precision Plumbing Products, Zurn.
- .2 Up to 12 floor drains: Electronic trap priming manifold with:
 - .1 Vacuum breaker
 - .2 Pre-set 24 hour time clock
 - .3 Manual override switch
 - .4 120V solenoid valve
 - .5 120V or 3 wire connection.
 - .6 NPS ¾ inlet connection.
 - .7 Calibrated manifold.
 - .8 Water hammer arrestor
 - .9 Mounted in steel cabinet
 - .10 Compression outlet fittings
 - .11 Inlet shut off valve
 - .12 Supplies minimum 59 ml @ 138 kPa.
- .3 Trap guard:
 - .1 All elastomeric normally closed trap guard device utilizes a normally closed seal to prevent evaporation of the trap seal and to protect against sewer gases from backing up into habitable areas. It opens with fluid flow and allows liquid drainage to flow through into the building drain.

2.10 Strainers

- .1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
- .2 NPS2 and under, bronze body, screwed ends, with brass cap, tapped blowoff and plug.
- .3 NPS2½ and over, cast iron body, flanged ends, with bolted cap, tapped blow off connection with bronze ball valve.

2.11 PIPE WALL AND FLOOR PENETRATION SEAL

- .1 Application:

-
- .1 Pipes penetrating exterior concrete walls below grade and concrete floors on grade.
 - .2 Seal material to be EPDM.
 - .3 Pressure plates to be glass-reinforced plastic.
 - .4 Bolts and nuts to be stainless steel 18-8.
 - .5 Suitable temperature range to be -40°C to 121°C.
 - .6 Wall sleeves to be Schedule 40 black iron pipe. Sleeves in exterior walls to be galvanized.
 - .7 Floor sleeves to be Schedule 40 black iron pipe.
 - .8 Wall and floor sleeves to be sufficiently long to mount flush with interior and exterior walls and flush with finished floor of slab-on-grade floors, 50 mm above floor, for floors above grade.
 - .9 Acceptable Product: Metraseal MS Series, Link Seal.

2.12 POTABLE WATER THERMAL EXPANSION TANK

- .1 Quantity: as indicated.
- .2 Application: absorb expanded water from domestic hot water tanks because of the inability to expand back into the Town potable water system due to the presence of a backflow preventer on the incoming water supply to the building.
- .3 ASME Section VIII construction and label.
- .4 FDA approved butyl bladder.
- .5 1NPT stainless steel system connection.
- .6 Standard tire air charging valve connection.
- .7 1033 kPa maximum working pressure.
- .8 Vertical tank, floor mounted.
- .9 Dimensions: as indicated.
- .10 Tank volume: as indicated.
- .11 Acceptance volume: as indicated.
- .12 Red primer exterior finish.
- .13 Air pre-charge to be adjusted in field by the Mechanical Subcontractor to equal the residual cold water pressure on the discharge side of the pressure reducing valve on the domestic water service entrance by the Mechanical Subcontractor.

- .14 Acceptable Product: ExpanFlex, Amtrol, Taco, S. A. Armstrong, Bell and Gossett.

PART 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 Installation

- .1 Install in accordance with Canadian Plumbing Code , and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.3 Cleanouts

- .1 In addition to those required by code, and as indicated, install at base of soil and waste stacks, and rainwater leaders.
- .2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
- .3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.4 Non Freeze Wall Hydrants

- .1 Install 600 mm above finished grade unless otherwise indicated.

3.5 Water Hammer Arrestors

- .1 Install on branch supplies to fixtures or group of fixtures where indicated.

3.6 Back Flow Preventors

- .1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.
- .1 Reduced pressure type where backflow would constitute a health hazard.
- .2 Double check type where backflow would constitute a nuisance or be aesthetically objectionable or material which would not constitute a health hazard.
- .2 Pipe discharge to terminate over nearest drain and or service sink.

3.7 Trap Seal Primers

- .1 Install for floor drains and elsewhere, as indicated.
- .2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Contract Administrator's Representative.
- .3 Install Type K soft copper tubing to floor drain.

3.8 Strainers

- .1 Install with sufficient room to remove basket.

3.9 Start-up AND COMMISSIONING

- .1 General:
 - .1 In accordance with Section 01 91 00 - Commissioning: supplemented as specified herein.
- .2 Timing: Start-up only after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Water treatment systems operational.
- .3 Provide continuous supervision during start-up.

3.10 Testing and Adjusting

- .1 General:
 - .1 In accordance with Section 01 91 00 - Commissioning: supplemented as specified herein.
- .2 Timing:
 - .1 After start-up deficiencies rectified.
 - .2 After certificate of completion has been issued by authority having jurisdiction.
- .3 Application tolerances:
 - .1 Pressure at fixtures: +/- 70 kPa.
 - .2 Flow rate at fixtures: +/- 20%.
- .4 Adjustments:
 - .1 Verify that flow rate and pressure meet design criteria.
 - .2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.
- .5 Floor drains:
 - .1 Verify operation of trap seal primer.
 - .2 Prime, using trap primer. Adjust flow rate to suit site conditions.
 - .3 Check operations of flushing features.
 - .4 Check security, accessibility, removeability of strainer.
 - .5 Clean out baskets.
- .6 Vacuum breakers, backflow preventers, backwater valves:
 - .1 Test tightness, accessibility for O&M of cover and of valve.
 - .2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.
 - .3 Verify visibility of discharge from open ports.

- .7 Roof drains:
 - .1 Check location at low points in roof.
 - .2 Check security, removeability of dome.
 - .3 Adjust weirs to suit actual roof slopes, meet requirements of design.
 - .4 Clean out sumps.
 - .5 Verify provisions for movement of roof systems.
- .8 Access doors:
 - .1 Verify size and location relative to items to be accessed.
- .9 Cleanouts:
 - .1 Verify covers are gas-tight, secure, yet readily removable.
- .10 Water hammer arrestors:
 - .1 Verify proper installation of correct type of water hammer arrester.
- .11 Pressure regulators, PRV assemblies:
 - .1 Adjust settings to suit locations, flow rates, pressure conditions.
- .12 Strainers:
 - .1 Clean out repeatedly until clear.
 - .2 Verify accessibility of cleanout plug and basket.
 - .3 Verify that cleanout plug does not leak.
- .13 Water meters:
 - .1 Verify calibration certificate.
- .14 Commissioning Reports:
 - .1 In accordance with Section 01 91 00 - Commissioning: supplemented as specified herein.
- .15 Training:
 - .1 In accordance with Section 01 91 00 - Commissioning: supplemented as specified herein.
 - .2 Demonstrate full compliance with Design Criteria.

END OF SECTION

PART 1 General

1.1 SUMMARY

- .1 Section includes:
 - .1 The supply and installation of washroom fixtures and trim.
- .2 Products installed but not supplied under this section as indicated elsewhere in the contract:
 - .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
 - .2 Equipment installed by others.
 - .1 Connect with unions.
 - .3 Equipment not installed
 - .1 Capped for future connection by others.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 20 –Waste Managing and Disposal.
- .3 Section 01 78 10 - Closeout Submittals.
- .4 Section 02 81 00 – Hazardous Materials.

1.3 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI 112-19.2, Ceramic Plumbing Fixtures.
- .2 American National Standards Institute/national Sanitation Foundation (ANSI/NSF)
 - .1 ANSI/NSF 61, Drinking Water System Components.
- .3 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B45 Series, Plumbing Fixtures.
 - .2 CAN/CSA-B125, Plumbing Fittings.
 - .3 CAN/CSA-B651, Barrier-Free Design.
- .4 City of Winnipeg Accessibility Design Standard.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit WHMIS MSDS – Material Safety Data Sheets in accordance with Section 02 81 01 – Hazardous Materials.
- .3 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.

- .4 Indicate fixtures and trim:
 - .1 Dimensions construction details, roughing-in dimensions.
 - .2 Factory-set water consumption per flush at recommended pressure.
 - .3 For water closets, urinals: minimum pressure required for flushing.
- .5 Closeout Submittals:
 - .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 10 – Closeout Submittals.
 - .2 Include:
 - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing, maintenance.
 - .3 List of recommended spare parts.

1.5 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 –Waste Managing and Disposal.
 - .2 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.6 ACCEPTABLE PRODUCT

- .1 Fixtures:

American Standard	Crane
TOTO	Kohler
- .2 Trim:

Sloan	Delta
Cambridge Brass	Chicago Faucet

PART 2 Products

2.1 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: Architectural drawings to govern.
- .5 Fixtures to be product of one manufacturer and of same type.

- .6 Trim to be product of one manufacturer and of same type.

2.2 WATER CLOSETS

.1

WC type	Mounting		Bowl		Flush valve		Flush tank	Barrier-free/Accessible
	Wall	Floor	Elong	Reg	Exp'd	Conc'd		
WC-1		X	X		X			
WC-2		X	X		X			X

- .2 WC-1: American Standard Maderna Flowise Right Height Elongated floor mount toilet for flush valve, 4.8 litres/flush.
- .3 WC-2: American Standard Maderna Flowise Right Height Elongated floor mount toilet for flush valve, for barrier-free/accessible, 4.8 litres/flush.

.2 Water Closet Flush Valves

.1 WCV-1 and WCV-2 Water closet flush valve exposed, manual

- .1 Sloan model 111-1.28-CP-YG Royal exposed manual flushometer for top spud toilet.
- .2 Chrome plated.
- .3 4.8 L/flush factory set flow
- .4 Quiet action diaphragm type flush valve with dual filter bypass
- .5 Non-hold open feature
- .6 A.D.A. triple seal oscillating handle
- .7 Extended seat bumper
- .8 V.P. smooth design stop cap on back-check angle stop (screwdriver operated)
- .9 High pressure vacuum breaker

.3 Water Closet Seats

- .1 Seat: Centoco model 820STS.001 toilet seat, white, elongated, open front, extra heavy duty, stainless steel check hinges, stainless steel or solid brass insert post.

2.3 URINALS

.1 U-1: wall-mounted, 1.9 litre flush, vitreous exposed flush valve, top spud.

- .1 Urinal: American Standard model 6042.005 vitreous china, washdown type, integral trap. CA-321 fixture carrier, epoxy coated top and bottom universal steel hanger plates, heavy gauge epoxy coated steel offset uprights with welded feet supports, plated hardware.

.2 Urinal Flush Valves

- .1 UFV-1 Urinal flush valve, exposed, manual.
- .2 Sloan model 186-0.5-CP Royal exposed manual flushometer for top spud urinal.
- .3 Chrome plated.
- .4 1.9 L/flush factory set flow
- .5 Quiet action diaphragm type flush valve with dual filter bypass
- .6 Non-hold open feature
- .7 A.D.A. triple seal oscillating handle
- .8 V.P. smooth design stop cap on back-check angle stop (screwdriver operated)
- .9 High pressure vacuum breaker

2.4 WASHROOM LAVATORIES

- .1 L-1: Wall-hung with semi-pedestal P-trap cover:
 - .1 American Standard model 0955.001EC/0559.020EC wall hung basin, center hole only, vitreous china, rear overflow, recessed self-draining faucet ledge, 32 mm water assembly, open grid strainer. WCA-411-CA-481 basin carrier, concealed arms, wall flanges to attach to backing plate secured in wall with locking device and levelling screws, heavy gauge steel uprights with integral welded feet, supporting steel plate for semi-pedestal, wall mounted steel support plate with plated hardware.
- .2 L-2 Undercounter mount:
 - .1 American standard model 9482.000.020 undercounter basin, vitreous china, rear overflow, 32mm waste assembly, open grid strainer, undermount clips.
- .3 Washroom Lavatory Trim.
LT-1 and LT-2
 - .1 American Standard model 2506LDHLV10.101 Moments Single Handle Faucet
 - .2 Chrome plated finish
 - .3 Center hole only
 - .4 Brass construction
 - .5 Washerless ceramic disc valve cartridges
 - .6 120 mm projection
 - .7 Vandal resistant pressure compensating
 - .8 3.8 LPM non-aerating laminar flow outlet
 - .9 Metal lever handle
 - .10 Less pop-up drain
 - .11 9.5 mm compression inlets
 - .12 Braided flexible supply hoses
 - .13 Integral hot water limit stop
 - .14 Lawler TMM-1070 below deck mechanical water mixing valve, bronze body, temperature adjusting dial, 10mm inlets and outlet compression fittings, high temperature thermoplastic limit stop, shut-off with automatic reset when temperature exceeds 48.8 degrees C, integral checks.

2.5 FIXTURE PIPING

- .1 Hot and cold water supplies to fixtures:
 - .1 Chrome plated flexible supply pipes with screwdriver stop, reducers, escutcheon.
- .2 Waste:
 - .1 Brass P trap with cleanout on fixtures not having integral trap.
 - .2 Chrome plated in exposed places.

2.6 CHAIR CARRIERS.

- .1 Factory manufactured floor-mounted carrier systems for wall-mounted fixtures.

PART 3 Execution

3.1 INSTALLATION

- .1 Mounting heights:
 - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
 - .2 Wall-hung fixtures: as indicated, measured from finished floor.
 - .3 For barrier-free washrooms: to comply with most stringent of either NBCC or CAN/CSA B651, or Provincial Building Accessibility Act and Regulations.

3.2 ADJUSTING

- .1 Conform to water conservation requirements specified this section.
 - .1 Adjustments.
 - .1 Adjust water flow rate to design flow rates.
 - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
 - .3 Adjust flush valves to suit actual site conditions.
 - .4 Adjust urinal flush timing mechanisms.
 - .5 Automatic flush valves for urinals and waterclosets: set controls to prevent unnecessary flush cycles during silent hours.
 - .2 Checks.
 - .1 Water closets, urinals: flushing action.
 - .2 Aerators: operation, cleanliness.
 - .3 Vacuum breakers, backflow preventers: operation under all conditions.
 - .3 Thermostatic controls.
 - .1 Verify temperature settings, operation of control, limit and safety controls.

END OF SECTION

PART 1 General

1.1 SUMMARY

- .1 Section includes:
 - .1 The supply and installation of plumbing fixtures and trim.
- .2 Products installed but not supplied under this section as indicated elsewhere in the Contract:
 - .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
 - .2 Equipment installed by others.
 - .1 Connect with unions.
 - .3 Equipment not installed.
 - .1 Capped for future connection by others.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 74 20 –Waste Managing and Disposal.
- .3 Section 01 78 10 – Closeout Submittals.
- .4 Section 02 81 01 – Hazardous Materials.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B45 Series, Plumbing Fixtures.
 - .2 CAN/CSA-B125, Plumbing Fittings.
 - .3 CAN/CSA-B651, Barrier-Free Design.
- .2 City of Winnipeg Accessibility Design Standard.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS – Material Safety Data Sheets in accordance with Section 02 81 01 – Hazardous Materials.
 - .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.
 - .1 Indicate, for all fixtures and trim:
 - .1 Dimensions, construction details, roughing-in dimensions.
- .3 Closeout Submittals:

- .1 Submit maintenance data in accordance with Section 01 78 10 – Closeout Submittals
- .2 Include:
 - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing maintenance.
 - .3 List of recommended spare parts.

1.5 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Waste Management and Disposal.
 - .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.6 ACCEPTABLE PRODUCT

- .1 Fixtures:
 - American Standard
 - Crane
 - Eljer
 - Kindred
 - Fiat
 - Architectural Metal Industries
 - ELKAY
- .2 Trim:
 - Cambridge Brass
 - Chicago Faucet
 - Powers Crane
 - Sloan

PART 2 Products

2.1 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: Architectural drawings to govern.
- .5 Fixtures in any one location to be product of one manufacturer and of same type.
- .6 Trim in any one location to be product of one manufacturer and of same type.

2.2 SERVICE SINKS

- .1 MS-1 Square Mop sink
 - .1 Sink: Terazzo composed of pearl gray marble chips and Portland cement ground smooth and sealed to resist stains, floor mounted, 254 mm high, Size: 610 x 610 cast brass drain with stainless steel strainer, 75mm outlet.
 - .1 Acceptable product: Stern Williams MTB-2424
 - .2 Supply Fitting:
 - .1 American Standard 8354.112 yoke wall mounted two handle scullery faucet
 - .2 Chrome plated finish
 - .3 Flexible installation within the range of 252 mm and 254 mm
 - .4 Cast brass body
 - .5 Integral stops
 - .6 Washerless ceramic disc valve cartridges
 - .7 22.7 LPM (6.0 GPM) unrestricted hose end outlet
 - .8 Spout with atmospheric vacuum breaker and bucket hook
 - .9 237 mm (9-5/16") from wall to outlet
 - .10 Lever handles
 - .11 Top brace
 - .12 Offset shank with 13 mm (1/2") NPT female inlets and integral supply stops
 - .13 Stern Williams T-35 hose and wall hook, 914mm long hose with 19 mm chrome coupling, stainless steel wall bracket
 - .14 Stern Williams model T-40 mop hanger, stainless steel #4 finish, 610 mm long with 3 rubber spring loaded clips
 - .15 Stern Williams BP back splash panel, 20 GA (0.9 mm) type 304 stainless steel
- .2 MS-2 Corner Mop sink
 - .1 Sink: Terazzo composed of pearl gray marble chips and Portland cement ground smooth and sealed to resist stains, 2-sided integral tilling flange, floor mounted, 305 mm high, Size: 610 x 610 cast brass drain with stainless steel strainer, 75mm outlet.
 - .1 Acceptable product: Stern Williams SBC-1402
 - .2 Supply Fitting:
 - .1 American Standard 8354.112 yoke wall mounted two handle scullery faucet
 - .2 Chrome plated finish
 - .3 Flexible installation within the range of 252 mm and 254 mm
 - .4 Cast brass body
 - .5 Integral stops
 - .6 Washerless ceramic disc valve cartridges
 - .7 22.7 LPM (6.0 GPM) unrestricted hose end outlet
 - .8 Spout with atmospheric vacuum breaker and bucket hook

- .9 237 mm (9-5/16") from wall to outlet
 - .10 Lever handles
 - .11 Top brace
 - .12 Offset shank with 13 mm (1/2") NPT female inlets and integral supply stops
 - .13 Stern Williams T-35 hose and wall hook, 914mm long hose with 19 mm chrome coupling, stainless steel wall bracket
 - .14 Stern Williams model T-40 mop hanger, stainless steel #4 finish, 610 mm long with 3 rubber spring loaded clips
 - .15 Stern Williams BP back splash panel, 20 GA (0.9 mm) type 304 stainless steel
- .3 STAINLESS STEEL COUNTER-TOP SINKS
- .1 S-1: single compartment, ledge-back.
 - .1 Franke ALBS6805/316-1/3 stainless steel single bowl countertop mount sink, grade 18-8 20 GA. (0.9 mm) type 316 stainless steel, self-rimming, backledge, satin finish rim and bowls, mounting kit provided, fully undercoated to reduce condensation and resonance, factory-applied rim seal. Nominal Dimensions: 511 mm (20-1/8") wide x 521 mm (20-1/2") long x 127 mm (5") high
 - .2 Trim:
 - .1 American Standard 4175F22.560 Colony Soft Single Handle Faucet
 - .2 Chrome plated finish
 - .3 8" (203 mm) centerset
 - .4 Metal deck plate
 - .5 216 mm (8-1/2") projection
 - .6 8.3 LPM (2.2 GPM) aerator outlet
 - .7 Memory position at preferred temperature settings
 - .8 Flexible hose supply connections.
 - .9 Lawler TMM-1070 Below Deck Mechanical Water Mixing Valve, bronze body, temperature adjusting dial, 10 mm (3/8") inlets and outlet compression fittings, high temperature thermostatic limit stop, shut-off with automatic reset when temperature exceeds 120 °F (48.8 °C), integral checks, offer temperature range from full cold through 46 °C (114.8 °F).
 - .10 Provide tempered hot water to hot side of faucet.
 - .11 McGuire LFH170BVRB faucet supplies, chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, combination V.P. Loose key handles, escutcheon and stainless steel braided flexible risers.
 - .12 Waste fitting: 3-1/2" (89 mm) crumb cup waste assembly with 1-1/2" (38mm) tailpiece, cast brass P-trap with cleanout.
 - .3 Shut off valves underneath counter.

2.3 FIXTURE PIPING

- .1 Hot and cold water supplies to each fixture:
 - .1 McGuire LFH Faucet Supplies, chrome plated finish polished brass, commercial duty 1/4 turn ball valve angle stops, 13 mm (1/2") I.D. Inlet x 127 mm (5") horizontal extension tubes, combination V.P. Loose key handles, escutcheon and stainless steel braided flexible risers.
- .2 Waste:
 - .1 Brass P trap with cleanout on each fixture not having integral trap.
 - .2 Chrome plated in all exposed places.

2.4 CARRIERS

- .1 Factory manufactured floor-mounted carrier systems for all wall-mounted fixtures

PART 3 Execution

3.1 INSTALLATION

- .1 Mounting heights:
 - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
 - .2 Wall-hung fixtures: as indicated, measured from finished floor.
 - .3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651, or Provincial Buildings Accessibility Act and Regulations.

3.2 ADJUSTING

- .1 Conform to water conservation requirements specified this section.
- .2 Do adjustments prior to pre-commissioning.
- .3 Adjustments.
 - .1 Adjust water flow rate to design flow rates.
 - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .4 Checks.
 - .1 Aerators: operation, cleanliness.
 - .2 Vacuum breakers, backflow preventers: operation under all conditions.
- .5 Thermostatic controls.
 - .1 Verify temperature settings, operation of control, limit and safety controls.
- .6 Report verification checks in Commissioning Manual.

END OF SECTION

PART 1 General

1.1 SUMMARY

- .1 Section includes:
 - .1 The supply and installation of showers and trim.
- .2 Products installed but not supplied under this section as indicated elsewhere in the Contract:
 - .1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.
 - .2 Equipment installed by others.
 - .1 Connect with unions.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 20 –Waste Managing and Disposal.
- .3 Section 01 78 10 - Closeout Submittals.
- .4 Section 02 81 01 – Hazardous Materials.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B45 Series, Plumbing Fixtures.
 - .2 CAN/CSA-B125, Plumbing Fittings.
 - .3 CAN/CSA-B651, Barrier-Free Design.
- .2 City of Winnipeg Accessibility Design Standard.
- .3 American Society of Sanitary Engineering (ASSE)

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit WHMIS MSDS – Material Safety Data Sheets in accordance with Section 02 81 01 – Hazardous Materials.
 - .1 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Indicate for all fixtures:
 - .1 Dimensions, construction details, roughing-in dimensions.

- .3 Closeout Submittals:
 - .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 10 – Closeout Submittals.
 - .2 Include:
 - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing, maintenance.
 - .3 List of recommended spare parts.

1.5 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 –Waste Managing and Disposal.
 - .2 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.6 ACCEPTABLE PRODUCT

- .1 Trim:
 - American Standard
 - Delta
 - Sloan

Part 2 Products

2.1 MANUFACTURED UNITS

- .1 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
- .2 Exposed plumbing brass to be chrome plated.
- .3 Number, locations: Architectural drawings to govern.
- .4 Trim in any one location to be product of one manufacturer and of same type.

2.2 INDIVIDUAL SHOWER STALL SHOWERHEAD

- .1 SH-1 : individual, vandal-proof showerhead, non-handicapped.
 - .1 American Standard 1662.604 water-saving soft spray hand shower, 5.7 LPM (1.5 GPM), spray pattern adjust from conventional spray to gentle flow to massage, easy clean spray nozzles, 24" (610 mm) slide bar

- .2 American Standard Moments shower pressure balance in-wall shower rough valve, cast brass body, ceramic disc valve cartridges, integral hot water limit stop, check stops, brass wall plate, metal lever handle.
 - .3 American Standard 1660.400.002 hand shower in-line vacuum breaker, polished chrome finish, installed between supply outlet and shower hose.
 - .4 Watts FD-100-C-L floor drain, epoxy coated cast iron, anchor flange, 5" (127mm) adjustable square nickel bronze strainer, reversible clamping collar with primary & secondary weepholes.
- .2 Fixture Piping
- .1 Waste:
 - .1 Brass P trap with cleanout on each fixture.

Part 3 Execution

3.1 INSTALLATION

- .1 Mounting heights:
 - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
 - .2 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651.

3.2 ADJUSTING

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments.
 - .1 Adjust water flow rate to design flow rates.
- .3 Checks.
 - .1 Vacuum breakers, backflow preventers: operation under all conditions.
 - .2 Thermostatic controls. Verify temperature settings, operation of control, limit and safety controls.
 - .3 Report verification checks in Commissioning Manual.

END OF SECTION

PART 1 General

1.1 SUMMARY

- .1 Section includes:
 - .1 The supply and installation of drinking fountain fixtures and trim.
- .2 Products installed but not supplied under this section:
 - .1 Install rough-in for equipment supplied by others, complete with valves on cold water supplies, waste and vent.
 - .2 Equipment installed by others.
 - .1 Connect with unions.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 20 –Waste Managing and Disposal.
- .3 Section 01 78 10 - Closeout Submittals.
- .4 Section 02 81 01 – Hazardous Materials.

1.3 REFERENCES

- .1 Air Conditioning and Refrigeration Institute (ARI)
 - .1 ARI 1010, Self-Contained, Mechanically Refrigerated Drinking-Water Coolers.
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B45 Series, CSA Standards on Plumbing Fixtures.
 - .2 CAN/CSA-B125, Plumbing Fittings.
 - .3 CAN/CSA-B651, Barrier-Free Design.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit WHMIS MSDS – Material Safety Data Sheets in accordance with Section 02 81 01 – Hazardous Materials.
- .3 Submit shop drawings and product data in accordance with Section 01 33 00 – Submittal Procedures.
- .4 Indicate for all fixtures:
 - .1 Dimensions, construction details, roughing-in dimensions.
- .5 Closeout Submittals:
 - .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 10 – Closeout Submittals.

- .2 Include:
 - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing, maintenance.
 - .3 List of recommended spare parts.

1.5 DELIVERY STORAGE AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20 –Waste Managing and Disposal.
 - .2 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 Products

2.1 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: Architectural drawings to govern.

2.2 DRINKING FOUNTAINS

- .1 DF-1: Elkay model ZWS-EDFPBM114K wall hung drinking fountain
 - .1 Sensor, touchless activation with auto 20-second shut off (bottle filler)
 - .2 18 GA. (1.2 mm) type 300 nickel bearing stainless steel fountain body
 - .3 Lead-free design
 - .4 Front push button control
 - .5 Flexi-Guard safety bubbler
 - .6 Stainless steel bottle filler wrapper with ABS plastic alcove
 - .7 Quick fill rate of 1.5 gpm
 - .8 Innovative Green Ticker counts bottles saved from waste
 - .9 WaterSentry Plus 3000-gallon capacity filtration system
 - .10 NSF/ANSI 42 & 53 certified
 - .11 LED Visual Filter Monitor shows replacement when necessary
 - .12 Valve with built-in flow regulator to provide constant stream from 20 to 105 psi water pressure
 - .13 Integrated silver ion anti-microbial protection in key areas
- .2 Trim:

- .1 McGuire LFHST11LK drinking fountain supply, chrome plated finish polished brass, straight stops, 10 mm (3/8") I.P.S. Inlet, V.P. Loose key.
- .3 Carrier:
 - .1 Watts model CA-311 Fixture Carrier, steel hanger plate, heavy gauge epoxy coated steel offset uprights with welded feet supports, plated hardware. Minimum space required: for one unit: 102 mm (4") for two to six units in a row: 152 mm (6") finished metal stud wall to back of pipe space.

2.3 FIXTURE PIPING

- .1 Cold water supplies to each fixture:
 - .1 McGuire LFHST11LK drinking fountain supply, chrome plated finish polished brass, straight stops, 10 mm (3/8") I.P.S. inlet, V.P. loose key, escutcheon.
- .2 Waste:
 - .1 McGuire 8872C P-Trap, chrome plated, heavy cast brass adjustable body, with slip nut, 32 mm (1-1/4") size, with cleanout, shallow wall flange and seamless tubular wall bend.

PART 3 Execution

3.1 INSTALLATION

- .1 Mounting heights:
 - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
 - .2 Wall-hung fixtures: measured from finished floor.
 - .3 Physically handicapped: to comply with most stringent of either NBCC, CAN/CSA B651 or Provincial Building Accessibility Act and Regulations.
- .2 Drinking fountains and water coolers:
 - .1 In accordance with ARI 1010.

3.2 ADJUSTING

- .1 Conform to water conservation requirements specified this section.
- .2 Adjustments.
 - .1 Adjust water flow rate to design flow rates.
 - .2 Adjust water cooler, drinking fountain flow stream to ensure no spillage.
- .3 Checks.
 - .1 Refrigerated water coolers: operation, temperature settings.
 - .2 Thermostatic controls. Verify temperature settings, operation of control, limit and safety controls.
 - .3 Report checks and verifications in Commissioning Manual.

END OF SECTION