

1 General

1.1 REFERENCES

- .1 Where Standards and Codes are referenced within this specification, use newest version published and in force at time of tender.

1.2 CODES AND FEES

- .1 Apply for, obtain and pay for all fees, permits, etc., under this Section as necessary for the work hereinafter specified to conform to the laws and regulations of the City of Regina and the Province of Saskatchewan.
- .2 All work shall be in accordance with the requirements of the National Building Code, National Plumbing Code (& Saskatchewan Supplement), Canadian Standards Association, Canada Fire Underwriter's Association, Saskatchewan Department of Labour, SaskPower, Saskenergy & the local authorities having jurisdiction.
- .3 Before starting any work, submit the required specifications and drawings along with proposed installation methods to the governing authorities for their approval. Changes or alterations required by any authorized inspector shall be completed without extra charges.

1.3 TRIAL USAGE

- .1 Engineer may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.4 PROTECTION OF OPENINGS

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.5 PAINTING

- .1 To applicable Sections for Interior Painting and for exterior painting.
- .2 Prime and touch up marred finished paintwork to match original.
- .3 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.6 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

- .1 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.
- .2 Where specified elsewhere in Specifications, manufacturers to provide demonstrations and instructions.
- .3 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.

1.7 MECHANICAL DRAWINGS

- .1 Drawings are diagrammatic, indicating general arrangement of equipment, piping, sizes of equipment and openings. Drawings are not to be scaled.
- .2 Contractor shall follow drawings in layout of work and shall review Electrical, Structural and Architectural contract documents coordinate with related trades to locate all spaces where mechanical work is specified. Contractor to make system layout adjustments as required to suit actual site conditions. Changes due to site conditions or lack of coordination with other trades shall be completed at no extra charge.
- .3 The drawings and specifications shall be used together and what is called for by either shall apply as if called for by both.

1.8 SUPPORTS, BASES, SERVICING PLATFORMS

- .1 Concrete bases shall be provided by the general contractor. Mechanical Contractor to provide pad locations and sizes to general contractor, based on requirements and final positions of actual equipment being installed. Adjust floor drain positions to suit base locations.
- .2 Provide for floor-supported equipment, reinforced concrete housekeeping bases poured directly on structural floor slab 100 mm thick minimum, extended 100 mm minimum beyond equipment supports. Provide anchor bolts or inserts as recommended by the equipment manufacturer for mounting and anchoring equipment.
- .3 Provide structural equipment, ductwork & piping supports to allow support from either the floor, wall or ceiling/roof structure. Provide OSHA approved equipment servicing platforms, catwalks and ladders complete with railings to enable servicing and adjustment of mechanical equipment. Construct of welded or bolted structural steel members with checker plate or reinforced expanded metal grate walkways. If structural design or certification is required, include associated costs in tender.

- .4 Provide rigid anchors for ducts and pipe immediately after vibration connections to equipment.

1.9 IDENTIFICATION

- .1 Identify piping, ductwork and equipment throughout with pre-manufactured coloured banding, labels and direction of flow arrows. Paint natural gas lines yellow, throughout their entire length. Include service labeling and direction of flow arrows. See table for Labeling Conventions.
- .2 All existing labels shall be replaced to match new labels.
- .3 Labeling conventions (pipe diameters include insulation thickness):
 - .1 Piping up to 32mm dia: Brady B-689 high performance coiled wrap-around, 1/2" letter height
 - .2 Piping 40mm to 50mm dia: Brady B-689 high performance coiled wrap-around, 3/4" letter height
 - .3 Piping 63mm to 150mm dia: Brady B-689 high performance coiled wrap-around, 1 1/4" letter height
 - .5 Ductwork Brady B-946 self-sticking vinyl, 3 1/2" letter height

ID	Service	Label Colour	Text Colour
COND	Condensate from coils	Orange	
	Black		
HWS	Hot water heating supply	Grey	
	Black		
HWR	Hot water heating Return	Grey	
	Black		
DCW	Domestic Cold Water	Green	
	White		
DHW	Domestic Hot water supply	Green	
	White		
DHR	Domestic hot water recirc	Green	
	White		
SAN	Sanitary Piping	White	
	Black		
ST	Storm piping	White	
	Black		

R410a	R410a Refrigerant pipe White	Green	
SUPPLY	Supply air ductwork Black	White	
RETURN	Return air ductwork Black	White	
EXHAUST	Return air ductwork	White	Black

- .5 Tag valves with brass metal tag, with adhesive label. See table for colour convention. Include service & valve # and description of valve duty. When valves are located above suspended ceilings, provide Brady Valve-Finder ceiling tack to identify valve location.
- .6 Permanently attach to each piece of equipment a custom 2 ½" x 5" adhesive label, with clear computer generated lettering, 12mm high. Each nameplate shall have the equip. ID as listed in the equipment schedule.
- .7 Include on nameplates, CRN numbers, Underwriter's Laboratories and CSA approval numbers, size, equipment model, manufacturer's name, serial number, voltage, cycle, phase and power of motors, pump design flow rates at design head, fan airflow rates at design static pressure, rpm, fan class, maximum fan rpm for classification, bearing sizes, and belt sizes. Provide a place for the TAB Balancer to record the following (final) measured values: Flow, Pressure, RPM.
- .8 Submit proposed nameplate arrangements for review and approval.
- .9 Locate nameplates so that they are easily read. Do not insulate or paint over plates.
- .10 Location of Identification:
- .1 Locate markers on piping systems so they can be read from floor platform.
 - .2 Identify piping & ductwork runs at 30' intervals and at least once in each room.
 - .3 Identify both sides where piping passes through walls, partitions and floor platform.
 - .4 Identify piping at starting and ending points of runs and at each piece of equipment.
 - .5 Identify piping at major manual and automatic valves immediately upstream of valves. Where this is not possible, place identification as close to valve as

possible.

- .6 Identify branch, equipment or building served after such valve.
- .7 Identify location of fan-coils, VAV terminal units, terminal heat / cool units and other equipment above T-bar ceilings with stick-on clear labels with equipment identifier number, ie; FC-305 Use Arial size 10 font. Locate labels on Tee's in vicinity of equipment.
- .8 Submit sample equipment nameplates, controls tags, valve tags, equipment location labels, pipe banding with flow arrows & service, duct identification for review as part of shop drawing submission.
- .9 All fire dampers, smoke dampers and control dampers shall be labeled.

1.10 EQUAL AND ALTERNATE MATERIALS & EQUIPMENT

- .1 Refer to Instructions to Bidders.
- .2 Submit request for equals for approval or rejection no later than 10 days prior to closing of tender for mechanical trade. Approval is required in writing from the engineer during the tendering period.
- .3 The Contract documents establish the quality standard and any equal or alternate submitted must meet these standards in order to gain approval. Mechanical Contractor is responsible for any additional installation and design costs associated with the use of equipment other than that which is specified by manufacturer and model number in the contract documents (regardless if it is a listed or applied for and approved equal or alternate).
- .4 Equipment manufacturers listed below are approved alternatives in principle and are subject to requirements of drawings and specifications. Consultant and/or Owner will require physical examination of any other equipment submitted for consideration as equal or alternate by equipment suppliers. Equipment suppliers shall bear all associated costs.
- .5 Equal equipment manufacturers must supply equipment that meets or exceeds capacities, performance, noise criteria and overall quality of scheduled equipment.
 - Access Doors: Mifab CAD-DW (drywall), Mifab CAD-FR (rated drywall).
 - Acoustical and Thermal Insulation: Certainteed, Manville, Knauf.

- Air Separators: Armstrong, Bell & Gossett, Taco.
- Air Vents: Sarco, Spirovent, Taco.
- Automatic Control System Installers: Taylor Group (to match base building)
- Back Flow Preventers: Watts.
- Balancing Agencies: TAB Enterprise, Quality Air, Air Tech
- Ball Valves: Apollo, Dahl, Grinnell, Crane, Toyo, Kitz.
- Butterfly Valves: Crane, Grinnell, Jenkins, Keystone, Victaulic, Neles Jamesbury.
- Cabinet & Unit Heaters: Dunham Bush, Rosemax, McQuay, Trane, Engineered Air, Sterling.
- Centrifugal Exhaust Fan: Trane, McQuay, Greenheck, Cook.
- Check Valves (Spring Loaded): Centre Line, Mueller, Singer, Moygro.
- Clean Outs: Watts-Ancon, Enpoco, Zurn.
- Diffusers & Grilles (non-security applications): E.H. Price, Nailor Industries, Titus.
- DX Split Systems: LG, Mitsubishi, Daikin
- Exhaust Fans: Cook, Greenheck, Acme
- Expansion Joints and Compensators: Hyspan, Senior Flexonics.
- Fan Coils: McQuay, Liebert, E.H. Price, Nailor.
- Filters - Media type: CamFarr, AAF
- Fire Extinguishers, Hose connections & Cabinets: Canadian Firehose, National Fire Equipment.
- Flexible Ductwork: Flexmaster, Thermaflex, Wiremold.
- Flexible, braided stainless steel hose: Tyco.
- Gate Valves: Crane, Emco, Jenkins, Toyo, Keystone.
- Gauges & Indicators: Trerice, Marsh.
- Grooved pipe systems: Victaulic, Shurjoint
- In Line Fans (Centrifugal): Greenheck, Delhi, Cook.
- Insulation jackets - Removable: spirax Sarco, SUM Canada
- Identification labels & tags - piping, ductwork, valves: Brady
- Motors (over ½ hp): Baldor, Toshiba, U.S. Motor, General Electric
- Plumbing Trim - Lavatories, sinks - manually operated: Delta
- Plumbing Trim - infrared: Sloan
- Plumbing Fixtures (stainless steel sinks): Steel Queen, Kindred
- Plumbing trim - Showers: Sloan, Delta
- Plumbing Fixtures Carriers: Watts-Ancon, Wade, Zurn.
- Pressure Independent Flow Control Valves: Griswold, Nexus, FlowTech, Tour & Anderson
- Relief Valves: Singer, Watts.
- Sprinkler Systems: Grinnell, Vipond, Viking, Tyco.
- Strainers: Mueller
- Terminal Air Units: Nailor Industries (to match existing)
- Trap Primers: Zurn, Watts

- Vacuum Breakers: Febco, Watts.
- Valves - heating systems: Kitz, Toyo, Crane, Victaulic
- Valves - check - heating systems: Kitz, Toyo, Apollo, Moygro
- Valves - ball - plumbing fixture isolation: Dahl
- Vibration Isolation: Vibro-Acoustics, Vibron.
- Water Mixing Valves: Symmons, Powers.
- Water Treatment - heating & chilled water systems: Energy Guard Water Technologies, GE Betz, Emerald Industries.

1.11 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for incorporation into manual specified in - Closeout Submittals.
- .2 Operation and maintenance manual to be approved by, and final copies deposited with, Engineer before final inspection.
- .3 Format of manuals shall be as follows:
- .4
 - .1 Refer to Supplementary Conditions Section and General Requirements Section. Required information is to be arranged into the following Sections of Building Maintenance Manuals. Four copies are to be provided in hard cover silver embossed piano hinge binders. Provide additional volumes to not exceed 80% binder capacity.
 - .2 Tab-1.0 Mechanical Systems: title page with clear plastic protection cover.
 - .3 Tab-1.1 List of Mechanical Drawings.
 - .7 Tab-1.2 List of Equipment Suppliers and Contractors: Provide complete list of equipment suppliers and contractors, including address and telephone number.
 - .4 Tab-1.3 Description of Systems: Provide as-built operational controls sequences.
 - .5 Tab-1.4 Maintenance and Lubrication Division: Provide detailed preventative maintenance and lubrication schedule for each of the major components to include daily, weekly, monthly, semi-annual and yearly checks and tasks. Explain how to proceed with each task required for each piece of typical equipment such as bearings, drives, motors and filters. Compile this information for each typical piece of equipment separate from the shop drawings section.
 - .6 Tab-Certification (2.0, 2.1, etc.): Include copy of test data degreasing and flushing of heating system analysis of system water taken at time system was put into operation, hydrostatic or air tests performed on piping systems, equipment alignment certificates, copy of balancing data for air and water systems, copy of valve tag identification and pipe colour code, inspection approval certificates for plumbing system, hot air heating and ventilation systems operational tests on gas fired equipment.
 - .7 Tab-Shop Drawings and Maintenance Bulletins (3.0, 3.1, etc.): Provide

- materials as received in compliance with clause "Shop Drawings".
- .8 The divider tabs shall be laminated Mylar plastic, and coloured according to section. The colouring is as follows: Mechanical Systems - 1.0 - 1.5 - Orange, Certification - 2.0 - 2.4 - Green, Shop Drawings and Maintenance - 3.0 - 3.17 - Yellow. Plastic tabs with type insertions will not be accepted.
 - .9 Submit documents to the Consultant for approval 2 months prior to project completion. Substantial performance shall not be approved without this submission.
 - .10 Provide a minimum of twelve (12), one day visits during the one year warranty period of the building to check that building operators are operating and maintaining schedules up to date. Forward complete written report to the Consultant after each visit.
- .3 Operation data to include:
 - .1 Control schematics for each system including environmental controls.
 - .2 Description of each system and its controls.
 - .3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for each system and each 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 shall 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 data sheets with point of operation.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified elsewhere.
 - .4 Testing, adjusting and balancing reports as specified in Testing, Adjusting and Balancing.
 - .6 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Engineer for approval. Submission of individual data will not be accepted unless so directed by Engineer.
 - .2 Make changes as required and re-submit as directed by Engineer.
 - .7 Additional data:
 - .1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.

1.12 AS-BUILT DRAWINGS

- .1 Site records:
 - .1 Contractor to have 1 set of reproducible sepias made from mechanical prints. Provide sets of white prints as required for each phase of the work. Mark there on all changes as work progresses and as changes occur. This shall include changes to mechanical systems, control systems and low voltage control wiring.
 - .2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection at all times.
- .2 As-built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing (TAB), 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 Engineer for review and make corrections as directed.
 - .4 TAB to be performed using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.
- .3 Submit copies of as-built drawings for inclusion in final TAB report.

1.13 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and product data in accordance with - Submittal Procedures.
- .2 Shop drawings and product data shall show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances. eg. access door swing spaces.
- .3 Shop drawings and product data shall be 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 Identification of all construction & operating characteristics as listed in equipment schedules & specifications.
 - .4 Manufacturer to certify as to current model production.
 - .5 Certification of compliance to applicable codes.

1.14 SLEEVES, OPENINGS, PENETRATIONS

- .1 Provide and set sleeves for pipes and ducts through foundations, walls, floor, and partitions.
- .2 Sleeves shall be iron pipe where they are located in foundation walls, beams, footings, waterproofing floors. Other locations, 20 gauge galvanized sheet metal.

- .3 Sleeves of sufficient diameter to allow free movement for expansion, on insulated pipes, sleeves shall accommodate insulation.
- .4 Sleeves shall be flush with walls, partitions and ceilings. In pipe chases, or where concealed, extend sleeves 40 mm above floor. In finished areas, 6 mm above floor.
- .5 Sleeves below grade shall be water-proof caulked with suitable non-shrinking flexible material on both sides of wall. Sleeves in floors, where water is to be kept out, shall be caulked with graphite packing and waterproof sealant.
- .6 In pipes or ducts through walls and floors, pack space around pipe and sleeve with U.L.C. approved non-combustible fire stop material. Provide ULC listed fire-stop devices for plastic piping penetrating fire separations, where required by code. Pipe & duct penetrations through mechanical area floors & walls to be watertight. Provide raised concrete curbs as required. Provide chrome plated escutcheons to all piping through walls, floors, partitions within millwork or in finished areas.
- .7 All piping & ductwork through roof shall be flashed in accordance with roofing suppliers recommendations.
- .8 Provide roof curbs, insulated minimum 600mm high, complete with waterproof flashing for roof penetrations, exhaust fans, intake / relief hoods & HVAC units. Extend roof membrane up curb & flash in accordance with roofing suppliers recommendations.
- .9 Verify all openings in advance of work as required. Relocate improperly located holes or sleeves at no extra cost.
- .10 Drill for expansion bolts, hanger rods, brackets, and supports.
- .11 Do no coring, cutting or burning of structural or precast members of building frame without obtaining prior written approval from the Consultant.
- .12 Set sleeves in conjunction with the general contractor for all holes larger than 100mm or core holes as required. Lay out is the responsibility of this trade.
- .13 All patching of finished construction of building shall be performed under the sections of specifications covering those materials.

1.15 CLEANING

- .1 Clean interior and exterior of all systems.
- .2 Allow for full flushing, cleaning, disinfecting of each piping system to meet the

requirements of chemical treatment contractor / equipment manufacturer, and project owner.

1.16 TEMPORARY MECHANICAL SERVICES

- .1 Do not use permanent HVAC systems or components for ventilation during construction. Seal off all supply and return openings to the space.
- .2 Coordinate with controls contractor to verify boxes are closed and air to space is minimized.

1.17 WARRANTY

- .1 One year warranty in accordance with General Conditions.
- .2 During warranty period all defective material, improper material or workmanship shall be made good without expense to the Owners.
- .3 Arrange for provision of extended equipment / controls warranties where required within the specifications.

1.18 MONTHLY PROGRESS CONFIRMATION

- .1 Appended to each monthly progress claim, provide summary of materials & equipment on site and general progress since last progress claim. Progress claims will not be reviewed until this information is provided.
- .2 10% of equipment and fixture billing will be held back until fans / pumps / motors / toilets etc. have been bumped or operation verified. Demonstration shall be successful prior to releasing equipment hold back.

1.19 DEMOLITION

- .1 Maintain clean working environment during work. Seal all duct openings throughout project to prevent dust and debris from entering ductwork.
- .2 No part of the mechanical infrastructure or equipment shall be used for temporary heating / ventilation during project.
- .3 Co-ordinate partial or entire building shut downs/tie ins well in advance with building operator.
- .4 Contractor to relocate devices and equipment as indicated on plans. Extend services from existing location to new location.
- .5 Piping and ductwork being removed shall be capped in an air tight manner back to the respective main. Provide insulation over capped end.

- .6 All equipment intended to be reused shall be protected. Any equipment required to maintain functionality, components or controls erroneously removed by the contractor shall be replaced at no cost to the owner.
- .7 Removed fans, diffusers, vav boxes, controllers, valves, thermostats, etc not being re- used shall be turned over to the owner.
- .8 Equipment, piping, hangars, devices, ductwork not being reused shall be removed. No unused services or debris shall remain in ceiling space once project is completed.

1.20 WASTE MANAGEMENT AND DISPOSAL

- .1 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .2 Refer to specification sections for further requirements.
- .3 Anything removed from the building but not turned over to owner shall be the contractor's responsibility to dispose of.

2 Products

2.1 NOT USED

- .1 Not Used.

3 Execution

3.1 NOT USED

- .1 Not Used.

End of Section

1 General

1.1 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION

- .1 Install rough-in for equipment, complete with valves on hot and cold water supplies, waste and vent.
- .2 Equipment installed.
 - .1 Connect with unions.
- .3 Equipment not installed.
 - .1 Capped for future connection.

1.2 REFERENCES

- .1 Air-Conditioning and Refrigeration Institute (ARI)
 - .1 ARI 1010-94, Self-Contained, Mechanically Refrigerated Drinking-Water Coolers.
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B45 Series-99, CSA Standards on Plumbing Fixtures.
 - .2 CAN/CSA-B125-98, Plumbing Fittings.
 - .3 CAN/CSA-B651-M95, Barrier-Free Design.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings and product data in accordance with Submittal Procedures.
- .2 Indicate, for all fixtures:
 - .1 Dimensions, construction details, roughing-in dimensions.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in 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.

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 Drinking fountains: Refer to schedule on drawings.
- .6 Fixture piping.
 - .1 Hot and cold water supplies to each fixture:
 - .1 Flexible metal supply pipes each with Dahl quarter turn ball valve, reducers, escutcheon.
 - .2 Waste:
 - .1 Brass P trap with cleanout on each fixture not having integral trap.
 - .2 Chrome plated in all exposed places.
- .7 Chair carriers.
 - .1 Factory manufactured floor-mounted carrier systems for all wall-mounted fixtures.

3 Execution

3.1 INSTALLATION

- .1 Refer to architectural for all fixture locations, heights and final placement.
- .2 All installations shall be done in accordance with manufacturer recommendations. Provide all accessories and maintain service clearances.
- .3 Any products not performing to manufacturer literature shall be replaced at the expense of the contractor.
- .4 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.
- .2 Drinking fountains, bottle filler and water coolers :
 - .1 In accordance with ARI 1010.
 - .2 provide wall carrier.

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.
- .4 Thermostatic controls.
 - .1 Verify temperature settings, operation of control, limit and safety controls.

End of Section

1 General

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
 - .1 ANSI/ASME B16.15-85(R1994), Cast Bronze Threaded Fittings, Classes 125 and 250.
 - .2 ANSI/ASME B16.18-84(R1994), Cast Copper Alloy Solder Joint Pressure Fittings.
 - .3 ANSI/ASME B16.22-95, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
 - .4 ANSI/ASME B16.24-91, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150 and 300.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM A307-00, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - .2 ASTM B88M-99, Specification for Seamless Copper Water Tube (Metric).
 - .3 ASTM F492-95, Specification for Propylene and Polypropylene (PP) Plastic-Lined Ferrous Metal Pipe and Fittings.
- .3 American Water Works Association (AWWA)
 - .1 ANSI/AWWA C111/A21.11-00, Rubber Gasket Joints for Ductile-Iron and Fittings.
- .4 Canadian Standards Association (CSA)
 - .1 CSA B242-M1980(R1998), Groove and Shoulder Type Mechanical Pipe Couplings and General Instructions No.1 (2000).
- .5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS)
 - .1 MSS-SP-67-95, Butterfly Valves.
 - .2 MSS-SP-70-98, Cast Iron Gate Valves, Flanged and Threaded Ends.
 - .3 MSS-SP-71-97, Cast Iron Swing Check Valves Flanged and Threaded Ends.
 - .4 MSS-SP-80-97, Bronze Gate, Globe, Angle and Check Valves.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with Submittal Procedures.
- .2 Submit data for valves.
- .3 Submit confirmation that pipe and fittings are manufactured from minimum 50% recycled materials.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in Closeout Submittals.

2 Products

2.1 PIPING

- .1 Domestic hot, cold and recirculation systems, within building.
 - .1 Above ground: copper tube, hard drawn, typeL: to ASTM B88M.
 - .2 Buried or embedded: copper tube, soft annealed, typeK: to ASTM B88M, in long lengths and with no buried joints.
 - .3 Produce from minimum 50% recycled materials.

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.

2.3 JOINTS

- .1 Rubber gaskets, 1.6 mm thick: to ANSI/AWWA C111/A21.11.
- .2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .3 Solder: Lead Free.
- .4 Teflon tape: for threaded joints.
- .5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket.
- .6 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 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 Valves - Bronze.
- .3 NPS2-1/2 and over, in mechanical rooms, flanged:
 - .1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Valves - Cast Iron: Gate, Globe, Check.
- .4 NPS2-1/2 and over, other than mechanical rooms, flanged:
 - .1 Non-rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet specified Valves - Cast Iron: Gate, Globe, Check.

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 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 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 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 Valves - Bronze.
- .3 NPS2-1/2 and over, flanged:
 - .1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, regrind seat, bronze disc, bolted cap specified Valves - Cast Iron: Gate, Globe, Check.

2.7 BALL VALVES

- .1 NPS2 and under, screwed:
 - .1 Class 150.
 - .2 Bronze body, chrome plated brass ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon seat, steel lever handle as specified Valves - Bronze.
- .2 NPS2 and under, soldered:
 - .1 To ANSI/ASME B16.18, Class 150.
 - .2 Bronze body, chrome plated brass ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon seat, steel lever handle, with NPT to copper adaptors as specified Valves - Bronze.

2.8 BUTTERFLY VALVES

- .1 NPS2 1/2 and over, lug:
 - .1 To MSS-SP-67, Class 200.
 - .2 Cast iron body, ductile iron chrome plated disc, stainless steel stem, EPT liner.
 - .3 Lever operated, NPS6 and over, gear operated.
- .2 NPS2 1/2 and over, grooved ends:
 - .1 Class 300, bubble tight shut-off, bronze body.
 - .2 Operator:
 - .1 NPS4 and under: lever handle.
 - .2 NPS6 and over: gear operated.

3 Execution

3.1 INSTALLATION

- .1 Install in accordance with Canadian and Provincial Plumbing Code, and Local Authorities having Jurisdiction.
- .2 Install pipe work in accordance with Installation of Pipe Work, supplemented as specified herein.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Install DCW piping below and away from DHW and DHR and other hot piping so as to maintain temperature of cold water as low as possible.
- .5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.
- .6 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 provide 12 ga tracer wire where lines are buried
- .7 Grooved fittings to be used only where exposed or in accessible locations above t-bar ceilings. Grooved fittings shall not be used in inaccessible locations.

3.2 VALVES

- .1 Isolate equipment, fixtures and branches with gate, butterfly or ball valves.
- .2 Balance hot & tempered water recirculation systems using pressure independent flow control valves located at all branches.

3.3 PRESSURE TESTS

- .1 Conform to requirements of Specifications.
- .2 Test pressure: greater of 1 1/2 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 to verify that system is clean. 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.
- .2 Upon completion, provide laboratory test reports on water quality for Engineer approval.

3.7 START- UP

- .1 Timing: Start up after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Certificate of static completion has been issued.
 - .4 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 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
 - .4 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 HWC in accordance with Testing Adjusting and Balancing (TAB) of Mechanical Systems.
 - .3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
 - .4 Sterilize HWS and HWC 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 of 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 Include certificate of water flow and pressure tests conducted on incoming

water service, demonstrating adequacy of flow and pressure.

End of Section

1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM B32-96, Specification for Solder Metal.
 - .2 ASTM B306-99, Specification for Copper Drainage Tube (DWV).
 - .3 ASTM C564-95a, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- .2 Canadian Standards Association (CSA)
- .3 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
- .4 CAN/CSA-B70-97, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .5 CAN/CSA-B125-98, Plumbing Fittings.

1.2 PRODUCT DATA

- .1 Submit product data in accordance with Submittal Procedures.
- .2 Submit confirmation that pipe & fittings are manufactured from minimum 50% recycled materials.

2 Products

2.1 COPPER TUBE AND FITTINGS

- .1 Above ground sanitary 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 , to ASTM B32.
 - .3 Produce from minimum 50% recycled materials.

2.2 CAST IRON PIPING AND FITTINGS

- .1 Buried sanitary and vent minimum NPS3, to: CAN/CSA-B70, with one layer of protective coating.
 - .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 Caulking lead: to CSA B67.
 - .2 Cold caulking compounds.

- .3 Produce from minimum 50% recycled materials.
 - .2 Above ground sanitary and vent: to CAN/CSA-B70.
 - .1 Joints.
 - .1 Hub and spigot.
 - .1 Caulking lead: to CSA B67.
 - .2 Mechanical joints.
 - .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.
 - .3 Produce from minimum 50% recycled materials.
- 3 Execution
- 3.1 INSTALLATION
- .1 In accordance with Installation of Pipework.
 - .2 Install in accordance with Canadian Plumbing Code, and Saskatchewan Supplement, and requirements of 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).

End of Section

1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 The installation of drainage waste and venting piping - plastic.
- .2 Related Sections:
 - .1 Section 23 05 01 - Installation of Pipework.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM D2235-01, Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
 - .2 ASTM D2564-02, Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 Canadian Standards Association (CSA International).
 - .1 CSA-Series B1800-02, Plastic Nonpressure Pipe Compendium.
 - .2 CSA-B181.2-02, PVC Drain, Waste and Vent Pipe and Pipe Fittings.
 - .3 CSA-B182.1-02, Plastic Drain and Sewer Pipe and Pipe Fittings.

2 Products

2.1 PIPING AND FITTINGS

- .1 ABS piping for buried DWV piping to:
 - .1 CSA-B181.1.
 - .2 CSA-B181.2.
 - .3 CSA-B182.1.
 - .4
- .2 XFR PVC piping with approved ULC fire stopping system where permitted by AHJ for above ground DWV piping to:
 - .1 CSA-B181.1.
 - .2 CSA-B181.2.
 - .3 CSA-B182.1.
 - .4 CAN/ULC S102.2. in accordance with standard pipe and fittings shall not exceed a Flame-Spread rating of 25 and shall not exceed a Smoke-Developed classification of 50.

2.2 JOINTS

- .1 Solvent weld for PVC: to ASTM D2564.
- .2 Solvent weld for ABS: to ASTM D2235.

3 Execution

3.1 INSTALLATION

- .1 In accordance with Section 23 05 01 - Installation of Pipework.
- .2 Install in accordance with Canadian Plumbing Code.
- .3 Do not use for high temperature fluids such as hot water heater drains, unless drain coolers are provided.

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 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 every floor or 4.5 m (whichever is less).

3.4 VERIFICATION

- .1 Verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification, include:
 - .1 Materials and resources.
 - .2 Storage and collection of recyclables.
 - .3 Construction waste management.
 - .4 Resource reuse.
 - .5 Local/regional materials.
 - .6 Low-emitting materials.

End of Section

1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM A126-95(2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - .2 ASTM B62-93, Specification for Composition Bronze or Ounce Metal Castings.
- .2 American Water Works Association (AWWA)
 - .1 AWWA C700-95, Cold Water Meters-Displacement Type, Bronze Main Case.
 - .2 AWWA C701-88, Cold Water Meters-Turbine Type for Customer Service.
 - .3 AWWA C702-92, Cold Water Meters-Compound Type.
- .3 Canadian Standards Association (CSA)
 - .1 CSA-B64 Series-01, Backflow Preventers and Vacuum Breakers.
 - .2 CSA-B79-94(R2000), Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
 - .3 CSA-B356-00, Water Pressure Reducing Valves for Domestic Water Supply Systems.
- .4 Plumbing and Drainage Institute (PDI)
 - .1 PDI-G101-96, Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
 - .2 PDI-WH201-92, Water Hammer Arresters Standard.

1.2 SUBMITTALS

- .1 Submit shop drawings and product data in accordance with Submittal Procedures.
- .2 For product data, indicate dimensions, construction details and materials for items specified herein.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in Closeout Submittals.
- .2 Data to include:
 - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list.

2 Products

2.1 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.

- .2 Access covers:
 - .1 Wall access: face or wall type, polished nickel bronze cover with flush head securing screws, beveled edge frame complete with anchoring lugs.
 - .2 Floor access: rectangular and:
 - .1 Plugs: bolted bronze with neoprene gasket.
 - .2 Cover for unfinished concrete floors: cast iron, gasket, vandal-proof screws.
 - .3 Cover for terrazzo finish: polished nickel bronze 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.

2.2 WATER HAMMER ARRESTORS

- .1 Stainless steel construction, bellows type: to PDI-WH201.

2.3 VACUUM BREAKERS

- .1 To CSA-B64 Series.

3 Execution

3.1 INSTALLATION

- .1 Install in accordance with Canadian Plumbing Code, and Saskatchewan Supplement, and requirements of local authority Having Jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.2 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.

3.3 WATER HAMMER ARRESTORS

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

3.4 TRAP SEAL PRIMERS

- .1 Install for floor drains and elsewhere, where required by Authority Having Jurisdiction.
- .2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space.
- .3 Install soft copper tubing to floor drain.

3.5 START- UP

- .1 General:
 - .1 In accordance with Commissioning: General Requirements, supplemented as specified herein.
- .2 Timing: Start-up only after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Certificate of static completion has been issued.
 - .4 Water treatment systems operational.

3.6 TESTING AND ADJUSTING

- .1 General:
 - .1 In accordance with Commissioning: General Requirements, 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, removability 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 Access doors:

- .1 Verify size and location relative to items to be accessed.
- .8 Cleanouts:
 - .1 Verify covers are gas-tight, secure, yet readily removable.
- .9 Water hammer arrestors:
 - .1 Verify proper installation of correct type of water hammer arrester.
- .10 Wall, Ground hydrants:
 - .1 Verify complete drainage, freeze protection.
 - .2 Verify operation of vacuum breakers.
- .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 Commissioning Reports:
 - .1 In accordance with Commissioning: Reports, supplemented as specified herein.
- .14 Training:
 - .1 In accordance with Training of O&M Personnel, supplemented as specified herein.
 - .2 Demonstrate full compliance with Design Criteria.

End of Section

1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B45 Series-99, Plumbing Fixtures.
 - .2 CAN/CSA-B125-98, Plumbing Fittings.
 - .3 CAN/CSA-B651-M95, Barrier-Free Design.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings and product data in accordance with Submittal Procedures.
- .2 Indicate, for all fixtures and trim:
 - .1 Dimensions, construction details, roughing-in dimensions.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in 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.

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.
- .7 Refer to fixture schedule on drawings.
- .8 Fixture piping.
 - .1 Hot and cold water supplies to each fixture:
 - .1 Flexible metal supply pipes each with quarter turn ball valve, reducers, escutcheon.
 - .3 Waste:
 - .1 Brass P trap with cleanout on each fixture not having integral trap.
 - .2 Chrome plated in all exposed places.

3 Execution

3.1 INSTALLATION

- .1 Mounting heights:
 - .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
 - .2 Contractor shall manufacture heavy duty 316 stainless steel shroud, brushed finish to match existing shroud. The intent of the new shroud is to allow for the domestic water piping and accessories to be pulled forward to accommodate new sanitary connection.
 - .3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651.
- .2 Apply joint sealant at perimeter of fixtures. Refer to Section 07 92 10.

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 pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Checks.
 - .1 Aerators: operation, cleanliness.
 - .2 Vacuum breakers, backflow preventers: operation under all conditions.
 - .3 Wash fountains: operation of flow-actuating devices.
- .4 Thermostatic controls.
 - .1 Verify temperature settings, operation of control, limit and safety controls.

End of Section