

PART 1 - GENERAL

- 1.1 SUBMITTALS
- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Shop drawings to show:
    - .1 Mounting arrangements.
    - .2 Operating and maintenance clearances.
  - .3 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.
  - .4 Closeout Submittals:
    - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
    - .2 Operation and maintenance manual approved by, and final copies deposited with, Departmental 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:
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1.1 SUBMITTALS  
(Cont'd)

.4 (Cont'd)

.5 (Cont'd)

.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 plumbing.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental 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 Departmental Representative will provide 1 set of reproducible mechanical drawings. 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 to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink 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 plumbing, 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).

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|-----------------------------------|-------------|---|
| <u>1.1 SUBMITTALS</u><br>(Cont'd) | .4 (Cont'd) |   |
|                                   | .9 (Cont'd) |   |
|                                   | .3          | Submit to Departmental Representative for approval and make corrections as directed.  |
|                                   | .4          | Perform testing, adjusting and balancing for plumbing 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 plumbing report.  |
| <u>1.2 QUALITY ASSURANCE</u>      | .1          | Quality Assurance: in accordance with Section 01 45 00 - Quality Control.   |
| <u>1.3 MAINTENANCE</u>            | .1          | Furnish spare parts in accordance with Section 01 78 00 - 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 00 - Closeout Submittals. |
|                                   | .3          | Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.   |

### PART 3 - EXECUTION

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| <u>3.1 PAINTING REPAIRS AND RESTORATION</u> | .1 | Prime and touch up marred finished paintwork to match original. |
|   | .2 | Restore to new condition, finishes which have been damaged.     |
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- 3.2 DEMONSTRATION
- .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 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
  - .3 Instruction duration time requirements as specified in appropriate sections.
- 3.3 PROTECTION
- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1.

- 1.2 REFERENCES .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
- .1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.
  - .2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
  - .3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  - .4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 ASTM International Inc.
- .1 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2 ASTM A 536-84(2004)e1, Standard Specification for Ductile Iron Castings.
  - .3 ASTM B 88M-05, Standard Specification for Seamless Copper Water Tube (Metric).
- .3 Canadian Standards Association (CSA International)
- .1 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.
- .4 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
- .1 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
- .5 Transport Canada (TC)
- .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

- 1.3 ACTION AND INFORMATIONAL 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 insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
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1.3 ACTION AND  
INFORMATIONAL  
SUBMITTALS  
(Cont'd)

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- .3 Closeout Submittals:  
.1 Provide maintenance data for  
incorporation into manual specified in  
Section 01 78 00 - Closeout Submittals.

1.4 SUSTAINABLE  
REQUIREMENTS

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- .1 Construction:  
.1 Construction requirements detailed in  
Section 01 47 15 - Sustainable Requirements:  
Construction form integral part of this  
project including materials and products of  
this Section. Sustainable construction  
requirements include:  
.1 Specific construction requirements  
for project.

PART 2 - PRODUCTS

2.1 PIPING

- .1 Domestic hot, cold and recirculation  
systems, within building.  
.1 Above ground: copper tube, hard drawn,  
type K L M: to ASTM B 88M.  
.2 Buried or embedded: copper tube, soft  
annealed, type K L: to ASTM B 88M, 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 NPS and larger: ANSI/ASME B16.18 or  
ANSI/ASME B16.22 roll grooved to CSA B242.

2.3 JOINTS

- .1 Rubber gaskets, latex-free 1.6 mm thick: to  
AWWA C111.  
.2 Bolts, nuts, hex head and washers: to  
ASTM A 307, heavy series.
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<u>2.3 JOINTS</u> (Cont'd)	.3	Solder: 95/5 tin copper alloy.
	.4	Teflon tape: for threaded joints.
	.5	Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket. .1.
	.6	Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner. .1.
<u>2.4 GATE VALVES</u>	.1	NPS 2 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.
	.2	NPS 2 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.
<u>2.5 BALL VALVES</u>	.1	NPS 2 and under, screwed: .1 Class 150. .2 Bronze Forged Brass body, chrome plated brass stainless steel ball, PTFE adjustable packing, brass gland and PTFE Bunan TFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze. .3.
	.2	NPS 2 and under, soldered: .1 To ANSI/ASME B16.18, Class 150. .2 Bronze body, chrome plated brass stainless steel ball, PTFE adjustable packing, brass gland and PTFE Bunan seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze. .3.
<u>2.6 PROTECTIVE CONDUIT</u>	.1.	

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### PART 3 - EXECUTION

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| <u>3.1 APPLICATION</u>    | .1 | Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets. |
| <u>3.2 INSTALLATION</u>   | .1 | Install in accordance with NPC Province(s) Territory Territories Plumbing Code and local authority having jurisdiction.  |
|                           | .2 | Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.  |
|                           | .3 | Assemble piping using fittings manufactured to ANSI standards.   |
|                           | .4 | Install CWS piping below and away from HWS and HWC 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:<br>.1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.<br>.2 Bend tubing without crimping or constriction. Minimize use of fittings.            |
| <u>3.3 VALVES</u>         | .1 | Isolate equipment, fixtures and branches with gate butterfly ball valves.  |
|                           | .2 | Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.   |
| <u>3.4 PRESSURE TESTS</u> | .1 | Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.  |
|                           | .2 | Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.  |
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3.5 FLUSHING AND CLEANING .1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean copper to Provincial Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

3.6 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.

3.7 DISINFECTION .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction approval of Departmental Representative Engineer Consultant.

.2 Coordinate with Section 33 11 16 - Site Water Utility Distribution Piping and Section 33 11 16.01 - Incoming Site Water Utility Distribution Piping.

.3 Upon completion, provide laboratory test reports on water quality for Departmental Representative Engineer Consultant approval.

3.8 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.

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- 3.8 START-UP (Cont'd)
- .3 (Cont'd)
    - .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 piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
    - .5 Check control, limit, safety devices for normal and safe operation.
  - .4 Check control, limit, safety devices for normal and safe operations.
  - .5 Rectify start-up deficiencies.
- 3.9 PERFORMANCE VERIFICATION
- .1 Scheduling:
    - .1 Verify system performance after pressure and leakage tests and disinfection are 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 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 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, and ensure no residuals remain as result of flushing or cleaning.
- 3.10 CLEANING
- .1 Clean in accordance with Section 01 74 11 - Cleaning.

## PART 1 - GENERAL

- 1.1 REFERENCES
- .1 American Society for Testing and Materials International, (ASTM).
    - .1 ASTM B 32-08, Standard Specification for Solder Metal.
    - .2 ASTM B 306-02, Standard Specification for Copper Drainage Tube (DWV).
    - .3 ASTM C 564-03a, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
  - .2 Canadian Standards Association (CSA International).
    - .1 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.
    - .2 CAN/CSA-B125-05, Plumbing Fittings.

## PART 2 - PRODUCTS

- 2.1 COPPER TUBE AND FITTINGS
- .1 Above ground sanitary storm and vent Type DWV to: ASTM B 306.
    - .1 Fittings.
      - .1 Cast brass: to CAN/CSA-B125.3.
      - .2 Wrought copper: to CAN/CSA-B125.3.
    - .2 Solder: lead free, tin-95:5, type TA, to ASTM B 32.
- 2.2 CAST IRON PIPING AND FITTINGS
- .1 Buried sanitary storm and vent minimum NPS 3, to: CAN/CSA-B70, with one layer of protective coating of.
    - .1 Joints.
      - .1 Mechanical joints.
        - .1 Neoprene or butyl rubber compression gaskets: to ASTM C 564 or CAN/CSA-B70.
        - .2 Stainless steel clamps.
      - .2 Hub and spigot.
        - .1 Caulking lead: to CSA B67.
        - .2 Cold caulking compounds.
  - .2 Above ground sanitary storm and vent: to CAN/CSA-B70.
    - .1 Joints.
      - .1 Hub and spigot.
        - .1 Caulking lead: to CSA B67.
      - .2 Mechanical joints.
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| 2.2 CAST IRON       | .2 | (Cont'd) |  |
| PIPING AND FITTINGS | .1 | (Cont'd) |  |
| (Cont'd)            |    |          | .1 Neoprene or butyl rubber<br>compression gaskets with stainless<br>steel clamps. |

### PART 3 - EXECUTION

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| <u>3.1 APPLICATION</u> | .1 | Manufacturer's instructions: comply with<br>manufacturer's written recommendations,<br>including product technical bulletins,<br>handling, storage and installation<br>instructions and datasheets. |
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| <u>3.2 INSTALLATION</u> | .1 | Install in accordance with National Plumbing<br>Code, Provincial Plumbing Code and local<br>authority having jurisdiction. |
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| <u>3.3 TESTING</u> | .1 | Pressure test buried systems before<br>backfilling.                   |
|                    | .2 | Hydraulically test to verify grades and<br>freedom from obstructions. |

## PART 1 - GENERAL

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| <u>1.1 REFERENCES</u> | .1 | ASTM International Inc.<br>.1 ASTM D 2235-04, Standard Specification for Solvent Cement for Acrylonitrille-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.<br>.2 ASTM D 2564-04e1, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems. |
|                       | .2 | Canadian Standards Association (CSA International).<br>.1 CAN/CSA-Series B1800-06, Thermoplastic Nonpressure Pipe Compendium - B1800 Series.  |

## PART 2 - PRODUCTS

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| <u>2.1 PIPING AND FITTINGS</u> | .1 | For buried DWV piping to:<br>.1 CAN/CSA B1800. |
| <u>2.2 JOINTS</u>              | .1 | Solvent weld for PVC: to ASTM D2564.           |
|                                | .2 | Solvent weld for ABS: to ASTM D2235.           |

## PART 3 - EXECUTION

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|-------------------------|----|---|
| <u>3.1 APPLICATION</u>  | .1 | Manufacturer's instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions and datasheets. |
| <u>3.2 INSTALLATION</u> | .1 | Install in accordance with National Plumbing Code, Provincial Plumbing Code and local authority having jurisdiction.  |
| <u>3.3 TESTING</u>      | .1 | Pressure test buried systems before backfilling.  |
|                         | .2 | Hydraulically test to verify grades and freedom from obstructions.  |
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3.3 TESTING  
(Cont'd)

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PART 1 - GENERAL

- 1.1 Summary
- .1 Section Includes:
    - .1 Materials and installation for plumbing specialties and accessories.
  - .2 Related Sections:
    - .1 Section 01 33 00 - Submittal Procedures.
    - .2 Section 01 78 00 - Closeout Submittals.
- 1.2 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 B 62-02, Specification for Composition Bronze or Ounce Metal Castings.
  - .2 Canadian Standards Association (CSA)
    - .1 CSA-B79-94(R2000), Floor, Area and Shower Drains, and Cleanouts for Residential Construction.
  - .3 Plumbing and Drainage Institute (PDI)
    - .1 PDI-WH201-92, Water Hammer Arresters Standard.
- 1.3 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 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.
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| <u>1.3 Submittals<br/>(Cont'd)</u> | .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 00 - Closeout Submittals.<br>.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.<br>.2 Details of operation, servicing and maintenance.<br>.3 Recommended spare parts list. |

## PART 2 - PRODUCTS

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| <u>2.1 Floor Drains</u> | .1 | Floor drains and trench drains: to CSA B79.   |
|                         | .2 | Type 1: general duty; cast iron body round as indicated, adjustable head, nickel bronze strainer with secure fasteners, integral seepage pan, and clamping collar.  |
| <u>2.2 Cleanouts</u>    | .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:<br>.1 Wall access: face or wall type, polished nickel bronze square cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.<br>.2 Floor access: rectangular cast iron body and frame with adjustable secured nickel bronze top:<br>.1 Plugs: bolted bronze with neoprene gasket.<br>.2 Cover for unfinished concrete floors: nickel bronze square, gasket, vandal-proof screws.<br>.3 Cover for terrazzo finish: polished nickel bronze with recessed cover for filling with terrazzo, vandal-proof locking screws. |
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<u>2.3 Non-freeze Wall Hydrants</u>	.1	Surface mount recessed type with integral vacuum breaker, NPS (3/4) hose outlet, removable operating key. Polished bronze finish.
<u>2.4 Water Hammer Arrestors</u>	.1	Stainless steel construction, bellows type: to PDI-WH201.
<u>2.5 Back Flow Preventers</u>	.1	To CSA-B64 Series.
	.2	Application: as indicated.
	.3	Reduced pressure principle type.
	.4	Double check valve assembly:
	.1	Acceptable material:
	.5	Back flow preventer with intermediate vacuum breaker:
	.1	Acceptable material:
<u>2.6 Vacuum Breakers</u>	.1	To CSA-B64 Series vacuum breaker, atmospheric.
<u>2.7 Hose Bibbs and Sediment Faucets</u>	.1	Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc and chrome plated in finished areas.
<u>2.8 Trap Seal Primers</u>	.1	Brass, with integral vacuum breaker, NPS 1/2 solder ends, NPS 1/2 drip line connection, electronic solenoid valve.
<u>2.9 Strainers</u>	.1	860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
	.2	NPS 2 and under, bronze body, screwed ends, with brass cap.

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| <u>2.10 Oil Interceptors</u> | .1 | Fiberglass construction, include baffles and piping to retain oil and permit wastewater flow.          |
|                              | .2 | PVC cement welded type socket ports for pipe connection.   |
|                              | .3 | Cast iron access way and cover. AASHTO M306. Traffic load rated. 610mm diameter cover with 6mm gasket. |
|                              | .4 | 200L capacity, for dimensions and installation details, see drawings.                                  |
|                              | .5 | Standard of acceptance: Proceptor OMC50.   |

### PART 3 - EXECUTION

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| <u>3.1 Application</u>              | .1 | Manufacturer's Instructions:<br>.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions and datasheets. |
| <u>3.2 Installation</u>             | .1 | Install in accordance with National Plumbing Code of Canada, provincial codes, and local authority having jurisdiction.   |
|                                     | .2 | Install in accordance with manufacturer's instructions and as specified.  |
| <u>3.3 Cleanouts</u>                | .1 | Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required by code and as indicated.  |
|                                     | .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.  |
| <u>3.4 Non-Freeze Wall Hydrants</u> | .1 | Install 600mm above finished grade and as indicated.  |
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3.5 Water Hammer Arrestors .1 Install on branch supplies to fixtures or group of fixtures.

3.6 Hose Bibbs and Sediment Faucets .1 Install at bottom risers, at low points to drain system, and as indicated.

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 Departmental Representative.

.3 Install soft copper or plastic tubing to floor drain.

3.8 Oil Interceptor .1 Install with sufficient space, as indicated, for maintenance in accordance with manufacturers instruction.

3.9 Start-up .1 General:

.1 In accordance with Section 01 91 13- General Commissioning (Cx) Requirements: General Requirements, supplemented as specified herein.

.1 Timing: start-up only after:

.1 Pressure tests have been completed.

.2 Disinfection procedures have been completed.

.3 Certificate of static commissioning  
been issued

.3 Water treatment systems operational.

.3 Provide continuous supervision during start-up.

3.10 Testing and Adjusting .1 General:

.1 Test and adjust plumbing specialties and accessories in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified.

.2 Timing:

3.10 Testing and  
Adjusting  
(Cont'd)

- .2 (Cont'd)
  - .1 ter start-up deficiencies rectified.
  - .2 ter certificate of completion has been issued by authority having jurisdiction.
- .2 Application tolerances:
  - .1 Pressure at fixtures: +/-
  - .1 Flow rate at fixtures: +/- 20%.
- .3 Adjustments:
  - .1 Verify that flow rate and pressure meet design criteria.
  - .2 Make adjustments while flow rate or withdrawl is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.
- .4 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.
- .5 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.
- .6 Cleanouts:
  - .1 Verify covers are gas-tight, secure, yet readily removable.
- .7 Hose bibbs, sediment faucets:
  - .1 Verify taht flow and pressure meet criteria.
  - .2 Check for leaks, replace compression washer if required.
- .8 Commissioning Reports: in accordance with Section 01 91 13 - General Commissioning (Cx)  
Requirements: reports, supplemented as specified.

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| 3.10 Testing and<br>Adjusting<br>(Cont'd) | .9  | Training: provide training in accordance with Section 01 91 13 - General Commissioning (Cx)<br>Requirements: Training of O&M Personnel, supplemented as specified.   |
|   | .10 | Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.<br>.1 Leave Work area clean at end of each day.   |
|   | .11 | Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.   |
|   | .12 | Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 774 21 - Construction/Demolition Waste Management and Disposal 01 35 21 - LEED Requirements.<br>.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility. |
|   | .13 | Protect installed products and components from damage during construction.   |
|   | .14 | Repair damage to adjacent materials caused by plumbing specialties and accessories installation.   |
| Activties                                 | .1  | Training: provide training in accordance with Section 01 91 13 - General Commissioning (Cx)<br>Requirements: Training of O&M Personnel.  |

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS .1.

- 1.2 REFERENCES .1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
  - .2 CAN/CSA-B125.3-05, Plumbing Fittings.
  - .3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

- 1.3 ACTION AND INFORMATIONAL 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 washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 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): minimum pressure required for flushing.
- .4 Shop Drawings:
- .1 Provide drawings stamped and signed by professional engineer registered or licensed in Province s Territory ies of, Canada.

- 1.4 CLOSEOUT SUBMITTALS .1 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.
-

## PART 2 - PRODUCTS

- |                                 |          |       |   |            |             |        |
|---------------------------------|----------|-------|---|------------|-------------|--------|
| <u>2.1 SUSTAINABLE MATERIAL</u> |          | .1    | Sustainable Requirements:   |            |             |        |
|                                 |          | .1    | Materials and resources in accordance with Section 01 47 15 Sustainable Requirements: Construction.   |            |             |        |
|                                 |          |       |   |            |             |        |
| <u>2.2 MANUFACTURED UNITS</u>   |          | .1    | Fixtures: manufacture in accordance with CAN/CSA-B45 series.  |            |             |        |
|                                 |          |       |   |            |             |        |
|                                 |          | .2    | Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.  |            |             |        |
|                                 |          |       |   |            |             |        |
|                                 |          | .3    | Exposed plumbing brass to be chrome plated.   |            |             |        |
|                                 |          |       |   |            |             |        |
|                                 |          | .4    | Number, locations: as indicated.  |            |             |        |
|                                 |          |       |   |            |             |        |
|                                 |          | .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    | Water closets:  |            |             |        |
| WC type                         | Mounting |       | Bowl  | Flush tank | Handicapped |        |
|                                 | Wall     | Floor | Elong   | Reg        | Exp'd       | Conc'd |
| WC-1                            | X        | X     | X   | X          | X           |        |
|                                 |          | .1    | WC-1: wall-mounted, exposed flush valve, top spud, maximum 6 litres/flush for handicapped.  |            |             |        |
|                                 |          | .1    | Top of seat to be between 400 mm and 460 mm from finished floor.  |            |             |        |
|                                 |          | .2    | Bowl: vitreous china, wall hung, syphon jet, elongated rim.   |            |             |        |
|                                 |          |       |   |            |             |        |
|                                 |          | .8    | Water Closet Flush Valves:  |            |             |        |
|                                 |          | .1    | Flush valve: exposed, polished chrome, externally adjustable, diaphragm type with NPS 1 screwdriver angle stop, oscillating handle, wall and spud escutcheons and vacuum breaker. Adjustable from 3.8-17 litres/flush, set to 5.7 litres/flush. |            |             |        |
|                                 |          |       |   |            |             |        |
|                                 |          | .9    | Water Closet Seats:   |            |             |        |
|                                 |          | .1    | Seat white elongated open moulded solid plastic cover - stainless steel check hinges, insert posts.   |            |             |        |
|                                 |          |       |   |            |             |        |
|                                 |          | .10   | Washroom Lavatories:  |            |             |        |
|                                 |          | .1    | L-1: wall-hung, for handicapped.  |            |             |        |
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|--|--------------|--|
| 2.2 MANUFACTURED<br>UNITS<br><u>(Cont'd)</u> | .10 (Cont'd) |  |
|  | .1 (Cont'd)  |  |
|  | .1           | Vitreous china, low shelf, with integral back, contoured front, shallow front basin, front overflow, soap depressions, supply openings on 299 mm centres, concealed supports. Sizes: 675 x 500 mm. |
|  | .11          | Washroom Lavatory Trim:  |
|  | .1           | Wheelchair supply fitting with gooseneck spout, aerator, 150 mm blade handles with indexed buttons, bent tailpiece.  |
|  | .1           | Provide accessories to limit maximum flow rate to 8.35 l/minute at 413 kPa.  |
|  | .2           | Waste fitting: pop-up plug and chain.  |
|  | .12          | Fixture piping:  |
|  | .1           | Hot and cold water supplies to fixtures:   |
|  | .1           | Chrome plated rigid flexible supply pipes with screwdriver handwheel stop, reducers, escutcheon.   |
|  | .2           | Waste:   |
|  | .1           | Brass P trap with clean out on fixtures not having integral trap.  |
|  | .2           | Chrome plated in exposed places.   |
|  | .13          | Chair carriers:  |
|  | .1           | Factory manufactured wall mounted carrier system for wall mounted fixtures.  |

### PART 3 - EXECUTION

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|-------------------------|----|--|
| <u>3.1 APPLICATION</u>  | .1 | Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets. |
| <u>3.2 INSTALLATION</u> | .1 | Mounting heights:  |
|                         | .1 | Barrier free: to most stringent NBCC CAN/CSA B651.   |
| <u>3.3 ADJUSTING</u>    | .1 | Conform to water conservation requirements specified this section.   |
-



- 3.4 CLEANING .1 Clean in accordance with Section 01 74 11 -  
Cleaning.  
.1 Remove surplus materials, excess  
materials, rubbish, tools and equipment.

## PART 1 - GENERAL

### 1.1 RELATED REQUIREMENTS

.1.

### 1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
  - .2 CAN/CSA-B125.3-05, Plumbing Fittings.
  - .3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

### 1.3 ACTION AND INFORMATIONAL 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 fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

### 1.4 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data in accordance with Section 01 78 00 - 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.

## PART 2 - PRODUCTS

### 2.1 SUSTAINABLE MATERIAL

- .1 Materials and products in accordance with Section 01 47 15 Sustainable Requirements: Construction.

### 2.2 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

- 2.2 MANUFACTURED  
UNITS  
(Cont'd)
- .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.
  - .6 Trim to be product of one manufacturer.
  - .7 Stainless steel counter-top sinks.
    - .1 SC-1: single compartment, non-ledge back:
      - .1 From 1.0 mm thick type 302 stainless steel, self-rimming, undercoated, clamps. Overall sizes: 790 x 520 x 203 mm.
      - .2 Trim: chrome plated brass, with swing spout, aerator, single lever handle, washerless controls, accessories to limit maximum flow rate to 8.35 litres/minute at 413 kPa, spray fitting.
      - .3 Waste fitting: integral stainless steel basket strainer/stopper, tailpiece, cast brass P-trap with cleanout.
  - .8 Laundry tubs:
    - .1 LT-1: single compartment.
      - .1 Stain-resisting porcelain enamelled steel, baked enamel steel stand, front apron, waste plug with rubber stopper, adjustable tailpiece, cast brass trap with cleanout. Sizes: 560 x 560 mm with 78 L capacity tub.
      - .2 Trim: rough brass supply fitting with mounting bracket, hose end, swing spout, indexed lever handles, vacuum breaker, aerator, accessories to limit maximum flow rate to 8.35 L/minute at 413 kPa.
  - .9 Fixture piping:
    - .1 Hot and cold water supplies to each fixture:
      - .1 Chrome plated rigid flexible supply pipes each with screwdriver handwheel stop, reducers, escutcheon.
    - .2 Waste:
      - .1 Brass P trap with clean out on each fixture not having integral trap.
      - .2 Chrome plated in all exposed places.
  - .10 Chair carriers:

2.2 MANUFACTURED UNITS (Cont'd)	.10 (Cont'd)	.1 Factory manufactured floor-mounted carrier systems for all wall-mounted fixtures.
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PART 3 - EXECUTION

<u>3.1 APPLICATION</u>	.1	Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
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<u>3.2 INSTALLATION</u>	.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.
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<u>3.3 ADJUSTING</u>	.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.
	.4	Thermostatic controls: .1 Verify temperature settings, operation of control, limit and safety controls.

<u>3.4 CLEANING</u>	.1	Clean in accordance with Section 01 74 11 - Cleaning. .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
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## PART 1 - GENERAL

- |  |    |   |
|--|----|---|
| <u>1.1 REFERENCES</u>                          | .1 | Canadian Standards Association (CSA International)<br>.1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.<br>.2 CAN/CSA-B125.3-05, Plumbing Fittings.<br>.3 CAN/CSA-B651-04, Accessible Design for the Built Environment. |
| <u>1.2 ACTION AND INFORMATIONAL SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.  |
|  | .2 | Product Data:<br>.1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.                      |
|  | .3 | Sustainable Design Submittals:<br>.1 LEED Submittals: in accordance with Section 01 35 21 - LEED Requirements.  |
| <u>1.3 CLOSEOUT SUBMITTALS</u>                 | .1 | Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 00 - Closeout Submittals.  |
|  | .2 | Include:<br>.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.<br>.2 Details of operation, servicing, maintenance.<br>.3 List of recommended spare parts.                      |

## PART 2 - PRODUCTS

- |                                 |    |  |
|---------------------------------|----|--|
| <u>2.1 SUSTAINABLE MATERIAL</u> | .1 | Sustainable Requirements:<br>.1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction. |
|---------------------------------|----|--|
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2.2 MANUFACTURED  
UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- .3 Exposed plumbing brass to be chrome plated.
- .4 Number, locations: as indicated.
- .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 Individual shower stall showerhead.
  - .1 SH-1: individual showerhead.
    - .1 Chrome plated brass or moulded plastic, non-clog, with adjustable spray, ball joint, standard chrome plated bent arm and escutcheon. Limit maximum flow rate to 9.5 l/minute at 550 kPa.
    - .2 Barrier free, stainless steel, electronic, sensor proximity type, activated by infra-red.
      - .1 Sensor: waterproof, with impact-resistant, anti scratch coated plastic lens, sensitivity adjustable from 100 mm to 450 mm.
      - .2 Water conservation: 3 minute maximum run time.
      - .3 Controls: interchangeable receptacles for stainless steel sheathed sensor and modular plug-type solenoid connections, single double 24 18 VAC 12 VDC, slow-closing commercial solenoids for 860 kPa, 85 degrees C.
      - .4 Transformer: 120/24 18 VCA, Class 2 12 VDC, UL and CSA listed, hardware box type, sized for up to 8 solenoids.
      - .5 Equipped with manual override button.
  - .2 Shower supply valve:
    - .1 Pressure-balanced-actuated element, volume control, 40 degrees C maximum setting, strainer and check-stops on each inlet, dial or lever handle.
  - .3 PSC-1: metal shower cabinet.
    - .1 Cabinet: bonderized white baked enamel finish on galvanized steel.
    - .2 Sizes: as indicated x x mm high.

- 2.2 MANUFACTURED .7 (Cont'd)  
UNITS .3 (Cont'd)  
(Cont'd)
- .3 Base: moulded stone with chrome plated brass strainer and tailpiece.
  - .4 Accessories: soap dish, plastic curtain and hooks.
  - .4 PSC-2: plastic shower cabinet.
    - .1 Cabinet: polypropylene.
    - .2 Sizes: as indicated x x mm high.
    - .3 Base: moulded stone with chrome plated brass strainer and tailpiece.
    - .4 Accessories: soap dish, plastic curtain and hooks.
  - .8 Group showers:
    - .1 Master Thermostatic Mixing valve:
      - .1 Bronze body, non-corrosive parts, liquid-filled thermostatic element, safety limit feature set at 45 degrees C maximum, built-in union-strainer-stop-check on each inlet, balanced independently seated hot and cold water poppets, tamper-resistant outlet temperature to hold as set even with:
        - .1 50% drop in either inlet pressure.
        - .2 13 degrees C maximum fluctuation in hot water temperatures.
        - .3 85% restriction in outlet flow.
      - .2 Capacity: 9.5 L/min shower head at 310 kPa.
    - .2 Accessories:
      - .1 Approximately 75 mm dia. dial thermometer on mixing valve outlet.
      - .2 Ball valve and union for shut-off and volume control on mixing valve outlet.
      - .3 Additional valved cold water branch for cold water run-out to showerheads.
      - .4 Escutcheons on pipes entering enclosure.
      - .5 Piping, valves, fittings in enclosure: chrome plated.
    - .3 Enclosure for thermostatic mixing valve:
      - .1 450 x 610 mm from 1.6 mm thick steel, surface flush mounted cabinet with 2.5 mm thick door with full length piano hinges, glass viewing panel, and key-operated tumbler lock.
      - .2 Finishes:
        - .1 Exterior: white primer.
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- |                                       |             |   |
|---------------------------------------|-------------|---|
| 2.2 MANUFACTURED<br>UNITS<br>(Cont'd) | .8 (Cont'd) |   |
|                                       | .3 (Cont'd) |   |
|                                       | .2          | Interior: white primer and<br>white gloss enamel.   |
|                                       | .9          | Fixture piping:   |
|                                       | .1          | Hot and cold water supplies to each<br>fixture.   |
|                                       | .1          | Chrome plated rigid flexible<br>supply pipes each with screwdriver<br>handwheel stop, reducers, escutcheon. |
|                                       | .2          | Waste:  |
|                                       | .1          | Brass P trap with cleanout on each<br>fixture not having integral trap.                                     |
|                                       | .2          | Chrome plated in all exposed<br>places.   |

### PART 3 - EXECUTION

- |                  |    |  |
|------------------|----|--|
| 3.1 APPLICATION  | .1 | Manufacturer's Instructions: comply with<br>manufacturer's written recommendations,<br>including product technical bulletins,<br>handling, storage and installation<br>instructions, and datasheets. |
| 3.2 INSTALLATION | .1 | Mounting heights:  |
|                  | .1 | Standard: to comply with manufacturer's<br>recommendations unless otherwise indicated<br>or specified.   |
|                  | .2 | Physically handicapped: to comply with<br>most stringent of either NBCC or CAN/CSA<br>B651.  |
| 3.3 ADJUSTING    | .1 | Conform to water conservation requirements<br>specified this section.  |
|                  | .2 | Adjustments:   |
|                  | .1 | Adjust water flow rate to design flow<br>rates.  |
|                  | .2 | Adjust pressure to fixtures to ensure<br>no splashing at maximum pressures.  |
|                  | .3 | Checks:  |
|                  | .1 | Aerators: operation, cleanliness.  |
|                  | .2 | Vacuum breakers, backflow preventers:<br>operation under all conditions.   |
|                  | .4 | Thermostatic controls:   |



<u>3.3 ADJUSTING</u>	.4	(Cont'd)
<u>(Cont'd)</u>	.1	Verify temperature settings, operation of control, limit and safety controls.

<u>3.4 CLEANING</u>	.1	Clean in accordance with Section 01 74 11 - Cleaning.
	.1	Remove surplus materials, excess materials, rubbish, tools and equipment.