1.1 **GENERAL**

1.2 **System Description**

.1 The City of Burnaby has no responsibility beyond supply to water tower – everything downstream is SFU’s responsibility. SFU operates under its own Water Operating Permit under the authority of Fraser Health Authority and the BC Drinking Water Protection Act.

2.1 **MATERIALS AND DESIGN REQUIREMENTS**

2.2 **Responsibilities**

.1 SFU Facilities is primarily responsible for operation, maintenance, and overall stewardship of the water distribution system.

.2 Unless otherwise agreed in writing, the project Designer is responsible for all design, permit, and inspection requirements of the B.C. Plumbing Code.

.3 The design engineer shall obtain a construction permit from the City of Burnaby for each new installation as well as for any modification of watermains in water transmission or distribution systems, including appurtenances like valves, standpipes or hydrants. These could be watermain projects for the replacement of old pipes, extension, upgrade or looping of the water network, or service connections larger than 3” in diameter.

.4 The Project Designer must incorporate all specific requirements for Metering, Design and Materials and Execution of this section into the contract drawings in the form of job-specific notes. Only making reference to SFU Owners’ Technical Requirements in the drawings is not sufficient.

2.3 **Water Distribution Standards & Policies**

.1 The latest revisions of the following standards shall apply to water distribution at SFU.

.1 City of Burnaby Engineering Design Criteria
.2 B.C. Master Municipal Construction Documents (MMCD).
.3 B.C. Water & Waste Association (BCWWA).
.4 American Water Works Association.
.5 CSA Standards (as applicable).

.2 Should there be discrepancies in the above standards or with this document, the City of Burnaby Design Criteria will prevail with the SFU Facilities Mechanical Superintendents approval.

2.4 **Water Service Connections**

.1 The first step to install new or substantially modified connections to the water distribution system at SFU is to seek approval from SFU Facilities.

.2 Note that a Plumbing Permit is also normally required as a plumbing requirement of the B.C. Building Code.

.3 Project design drawings shall provide building load for both peak domestic consumption in litres/second, and fire flow required in litres/second. SFU Facilities reserves the right to request the calculations used to estimate the peak consumption and fire flows.
.4 Any new connections to the water distribution system will be reviewed for consistency with SFU Owners’ Technical Requirements standards.

.5 At the request of the project, a flow test will be performed at the adjacent hydrant to the proposed service connection and the test results are to be provided in writing.

2.5 Metering

.1 A water meter shall be provided, complete with control valves, backflow preventer and chamber, at all commercial, industrial and institutional service connections, in accordance with the City of Burnaby Waterworks Regulation Bylaw No. 3325 and the latest version of the City Water Service, Water Billing & Water Meter Installation Guide.

.2 Water submetering requirements include metric output in cubic meters and pushing the data to the BMS Archiver. For full details, refer to Division 20, Section 20 00 06 Meters.

2.6 Service Connections and Water Mains

.1 Water service connections shall be designed per City of Burnaby Design Criteria.

.2 The Project is responsible for permanent capping of un-used stub-outs.

.3 A parallel configuration consisting of two parallel lines each with DCVA is the standard for water entry into a building. Refer to SFU standard detail M-1 for details on SFU preferred DCVA design.

.4 If the building’s main water station inside the mechanical room is on the roof, a 1.5 inch hose connection on the combined fire/domestic water service shall be installed at ground level in an accessible location.

.5 Design consultants shall provide new irrigation service connection tie-in details including chamber location and size, pipe size, material, isolation valve (minimum 2” diameter off main), meter, strainer, backflow preventer and chamber drain connection to the storm system. When a solenoid valve is required to activate water flows, a water hammer arrestor shall be installed upstream of the solenoid valve.

.6 Pipe shall be Class 50 ductile iron pipe manufactured to AWWA C151; cement mortar lined to AWWA C104 and coated 1 mil. thick asphalt.

.7 Copper, up to 75 mm diameter, type K, joints brazed only.

.8 Joints shall be single rubber gasket for push-on bell and spigot type joints to AWWA C111, Tyton or approved equal.

.9 Flanged joints shall be AWWA C110; flat faced conforming to ANSI B16.1, Class 125.

.10 Fittings shall be ductile to AWWA C110 suitable for pressure rating of 2415 kPa. Cement mortar lined to AWWA C104. Minimum design pressure for piping 1,210 kPa.

.11 Bolts shall be medium carbon steel or Martensitic steel, ASTM A325 heavy hex finished, hot-dip galvanized to ASTM A153. Coarse threads shall have Class 2A tolerance before galvanizing. Bolt sizes to AWWA110.

.12 Nuts shall be heavy steel hex carbon steel to ASTM A563 Grade C hot-dip galvanized to
2.7 Valves and Valve Boxes

.1 Gate Valves shall be manufactured to AWWA C509, ductile iron body, resilient seated, non-rising steam, hub or flanged ends.

.2 Stem seal shall be O-ring type. Valves to be complete with 50 mm square nut for underground operation. Manufacturer shall be Clow, or equal approved by SFU Facilities.

.3 Circular valve boxes shall be Nelson-type as manufactured by Terminal City or Dobney Foundry. Valve box riser pipe to be 150 mm diameter PVC DR35.

.4 Maximum distance between isolating distribution valves to be 100 m.

.5 Maximum depth of valve knuckles to be 600 mm.

2.8 Hydrants

.1 Fire Hydrants to be 150 mm diameter Terminal City type C-71-P hydrants subjected to hydrostatic pressure test of 2070 kPa in compliance with AWWA C502.

.2 Not more than 180 m apart, or 90 m from building.

.3 Minimum size of pipe connection 150 mm.

.4 Fire hydrant shall have isolating valve not more than 6 m in front of it.

2.9 Heavy Equipment Loads on Buried Pipe

.1 Loads on shallow buried pipe shall be evaluated in the design and construction planning phases. AWWA M41, Section 4.3 can be used as a guide for this evaluation.

3.1 EXECUTION REQUIREMENTS

3.2 Preparation

.1 As per MMCD Section 02666.

3.3 Trenching

.1 As per MMCD Section 02666.

.2 Trench alignment and depth as shown on Contract Drawings or as approved otherwise by SFU Facilities.
3.4 Granular Bedding

.1 As per MMCD Section 02666.

.2 Minimum soil cover to be 1.0 m.

.3 For pipe bedding use clean granular pipe bedding, graded gravel, 19 mm (-), MMS type 1. Bottom thickness shall be a quarter of pipe diameter, or minimum 100 mm thick. Top shall be minimum 300 mm thick. Sides shall be minimum 225 mm to maximum 300 mm thick.

.4 Place granular bedding (sand) material across full with of trench bottom in uniform layers to 100 mm depth.

.5 Use imported bedding when proposed work is installed under through paved areas, when Utilities Mechanical Engineer deems native material unsuitable for backfill, or when trench has been excavated in rock. Otherwise for trench backfill, native backfill may be used if free of rock greater than 25 mm and located in boulevards or easements. Approval by SFU Facilities is required.

3.5 Pipe Installation

.1 As per MMCD Section 02666.

.2 Utility Separation: A minimum 3 m horizontal clearance is required from either sanitary sewer or storm sewer piping, when they run parallel to water main. If this clearance cannot be met, water piping can be installed closer with prior approval from SFU Facilities. Refer to MMCD Design Guideline Manual Section 1.4, and Vancouver Coastal Health’s Water Supply System Construction Permit Guidelines and Application Form (see 2.1.4 this section). Installation may be approved provided water pipe is installed above sanitary or storm sewer piping with minimum vertical clearance 0.5 m and water main joints are wrapped. When crossing sanitary sewers at 90° angle, the water pipe shall be encased with 20 MPa concrete of minimum thickness 150 mm. If concrete is not desirable, joints of the water main can be wrapped with heat shrink plastic or packed with compound and wrapped with petroleum tape in accordance with the latest version of the AWWA Standards C217, and C214 or C209.

.3 Minimum 750 mm clearance is required from all other services.

.4 When crossing electric duct bank (crossing shall be done at 90°), run pipe with minimum vertical clearance 150 mm from the bottom of electric duct bank. If crossing of electrical ductbank cannot be done in this manner, then encase water pipe in one larger plastic pipe projecting minimum 500 mm from either side of electric ductbank.

.5 Test and/or bleed points consisting of Corporation cocks, sized to achieve minimum flushing velocity of 0.8 m/s in accordance with AWW C651, to be provided where shown on Contract Drawings or as required by Utilities Mechanical Engineer for pressure testing and flushing.

.6 Requirements for piping into the building’s mechanical room as per drawing 1140-UT-01WaterStationSchematic.

.7 Requirements for replacing cast iron or asbestos cement watermains at utility excavations are to be as shown in drawing 1140-UT-09 Water Mains at Excavations. Where water pipes cross under wall foundations, they must be built of ductile iron for a distance of at least 3 metres on either side of the wall, to avoid settlement cracking.
.8 When excavating over existing A/C or cast iron watermains, only controlled density backfill shall be used. No compaction is permitted.

### 3.6 Valve Installation

.1 As per MMCD Section 02666.

.2 At every valve and fitting install up to 3 m length of tie rods on each side of valve/fitting and each branch, when pipe couplings are used.

### 3.7 Hydrants

.1 As per MMCD Section 02666.

.2 For Hydrants not in service, place an orange painted sign, 30 cm x 30 cm, lettered “Not in Service” on the main port.

### 3.8 Thrust Blocks

.1 As per MMCD Section 02666.

.2 Place concrete thrust blocks between valves, tees, wyes, plugs, caps, bends and undisturbed ground as shown on the Contract Drawings or as directed by Mechanical Distribution Engineer.

.3 Thrust blocks to undisturbed soil shall be provided, complete with bearing area and block volume.

### 3.9 Pipe Surround and Backfill

.1 As per MMCD Section 02666.

.2 Upon completion of pipe laying and before backfilling, Contractor shall notify SFU Facilities in advance for inspection.

.3 After inspection of work in place, surround and cover pipes.

.4 For trench backfill native backfill material may be used in boulevard and easement areas if free of rock greater than 25 mm. Approval from SFU Facilities is required.

### 3.10 Cleaning and Preliminary Flushing

.1 As per MMCD Section 02666.

.2 Water may be supplied from SFU fire hydrants upon application for a Hydrant Permit

### 3.11 Testing and Flushing Procedures

.1 As per MMCD Section 02666.

.2 Contractor shall notify SFU Facilities well in advance of testing.

.3 Perform all tests in presence of SFU Facilities.

.4 Testing Procedure & Report as per MMCD Section 02666
.5 A concise, written and signed report shall be provided via facsimile to SFU Facilities.

3.12 Disinfection and Flushing

.1 As per MMCD Section 02666.

.2 Perform disinfection procedure and residual chlorine test in presence of Mechanical Distribution Engineer.

.3 Maintain water chlorinating level (free chlorine concentration mm. 25 mg/L) in new piping for minimum 24 hours.

.4 Before connection to SFU water system, flush piping clean until maximum free chlorine concentration is less than 0.3 mg/L.

3.13 Testing New Mains

1. After disinfection and flushing, the new main is filled with potable water and sampled for total coliform and E. coli bacteria (bug test) every 350 m.

2. If a sample fails the test, the main shall be flushed and the sampling repeated. If flushing does not result in an acceptable test, the main should be disinfected again.

3.14 Shutdowns & Connections

.1 Shutdowns must be requested in writing adhering to SFU’s campus-wide standard shutdown procedures.

.2 Operating valves on the water distribution system shall only be performed by SFU Facilities.

.3 Connections to existing waterworks system may be made by Contractor with approved design and proper notification.

.4 Notify SFU Facilities with a minimum 24 hours in advance of scheduled connection.

.5 Make connections in presence of SFU Facilities. To prevent damage to existing utilities, excavate the last 300 mm over utility by hand.

.6 Hot tapping is generally not accepted. If there are exceptional circumstances, hot tapping may be requested in writing, and done only with prior written permission from SFU Facilities.

***END OF SECTION***