1.1 **GENERAL**

1.2 Related SFU Technical Requirements

   .1 *Section 20 00 05 Mechanical - General Requirements*
   .2 *Section 22 05 00 Plumbing - General Requirements*
   .3 SFU Standard Fire Hydrant Drawings
   .4 *Section 28 31 00 Fire Detection and Alarm*
   .5 *Division 27A Audiovisual*

1.3 **Coordination Requirements**

   .1 Coordinate with SFU Facilities.
   .2 Contact SFU Facilities for water supply information.
   .3 Coordinate verification of the sprinkler system with the City of Burnaby. Contact City of Burnaby in advance of verification to provide opportunity for work crews to be present during verification.
   .4 Whenever fire protection may be temporarily suspended, in buildings/facilities with Occupancy Permit, a Fire Watch must be called for which conforms to the requirements of the Fire and Rescue Services branch of the Burnaby Fire Department.

1.4 **Description**

   .1 Additional SFU fire protection design and approval requirements. These general requirements also apply to fire system design requirements found in other sections.

2.1 **MATERIAL AND DESIGN REQUIREMENTS**

2.2 **Submission of Design Philosophy**

   .1 The Mechanical Consultant shall submit to SFU Facilities a design philosophy for the proposed building mechanical and plumbing systems.
   .2 Submit to SFU Facilities a design philosophy for the proposed building fire protection systems. Major components of the philosophy must be accepted in principle by Building Operations before the project can proceed to Construction. Consultants are expected to produce designs that meet user needs and allow Building Operations to continue to meet those needs in the future in a safe efficient manner.

2.3 **General**

   .1 New and renovated facilities at SFU are to be fully sprinkler protected regardless of code requirements. SFU is largely self-insured and has adopted this policy to manage risk and enhance the safety of its facilities to the benefit of faculty, staff, students, and visitors. Fire sprinkler protection at the University is consistent to standard industry practice. Deviations are intended to increase system longevity and provide flexibility for subsequent renovation.
   .2 NFPA Codes (latest edition) shall be used to determine level of protection required.
   .3 SFU's fire protection systems shall meet latest applicable NFPA codes as modified by or Burnaby Fire Department policy in effect at SFU.
.4 Required fire flows must be calculated for all new buildings and be included in the approval process.

.5 All fire protection systems shall be designed by Consultants specializing in fire protection design. Mechanical Engineers wishing to undertake the designs must demonstrate that they possess fire protection design experience. The intent of this requirement is to ensure that designs do not only meet the minimum code requirements but meet specific building requirements which can only be evaluated by an expert in the field.

.6 All contract documents and ‘as built/record’ drawings must meet criteria outlined in NFPA 13, Chapter 6.0, Plans and Calculations. All calculations must be sealed by a Professional Engineer registered in British Columbia.

.7 Specify fire pumps only after consulting with SFU Facilities.

.8 Fire Hydrants
   .1 The Burnaby Fire Department requires minimum height dimensions of 381 mm to the bottom of the lowest butt or 457 mm to the centre of the lowest butt. Refer to SFU standard fire hydrant drawing for details.

.9 Information on water supply available for fire fighting must be obtained from SFU Facilities.

.10 General requirements for mechanical systems included in the fire protection system are contained in Section 20 00 05 Mechanical - General Requirements and Section 22 05 00 Plumbing - General Requirements.

.11 Fire Hose Cabinets are not preferred. Where applicable, existing fire hose cabinets shall be deleted (eg projects revising non-sprinklered to fully sprinklered spaces). Coordinate requirements with SFU and applicable codes.

2.4 Controls

.1 Building fire alarm systems operate separately from BAS.

.2 Contractor to allow for programming and creation of graphic displays on their existing graphical user interface. Active graphic points, complete with custom user messages will also be provided, i.e. each and every addressable device will be indicated on a graphical display (two graphics per floor minimum).

.3 The active state of field alarm devices (Fire Alarm and Supervisory Alarm) shall automatically open the appropriate floor plan display at the SFU Fire Signal Receiving Centre and at the Satellite Fire Signal Receiving Centre. Active point(s) objects on the display will indicate status with colour change as defined by CAN/ULC fire alarm and SFU standards. All other graphical display interface terminals shall be individually configurable to provide automatic graphic display or not, at SFU discretion. Vendor to configure these terminals as directed by SFU.

.4 Graphics must be completed and installed prior to system verification. All active graphic points to be tested at the SFU Fire Signal Receiving Centre by actual device operation. The test results for each graphic point is to be included in the verification report.

.5 All fire alarm system text descriptions used in the fire alarm system shall comply with SFU standards for format and building identification. The point description text shall be submitted and approved by SFU prior to installation.
The fire alarm system shall be provisioned with 3 form C dry relay contacts at the control unit for connection to the SFU Common Alarm Panel (CAP). One contact each for common Fire Alarm, Supervisory Alarm, and System Trouble. Contacts to be true dry metal contacts with >100MOhm impedance to earth at 24VDC.

2.5 Final Functional Testing

.1 Certify fire systems have been tested to meet requirements of SFU and authorities having jurisdiction.

.2 Insulate or conceal work only after testing and approval by Building Inspector.

.3 Conduct tests in presence of Building Inspector.

.4 Contact SFU Facilities in advance of verification to provide opportunity for work crews to be present during verification.

.5 State specifically what equipment and systems are to be tested.

.6 SFU Facilities requires that the successful vendor provide the same fire technicians for the duration of the site commissioning and verification. The verifying technician(s) shall provide the system demonstration and review of the verification report for acceptance by SFU.

.7 The verification must be carried out in accordance with CAN/ULC-S537 standards. The successful vendor must provide a copy of the verification report as per CAN/ULC-S537 standards.

.8 The contractor must rectify any/all deficiencies found during the system verification prior to submittal of the verification report.

.9 Any modifications to the system during verification must be re-verified according to CAN/ULC-S537 procedures.

.10 SFU staff will be present during the fire system verification to ensure that all of the necessary standards are adhered to and that all deficiencies are addressed before the system is accepted.

.11 SFU may, at its discretion, hire an outside commissioning consultant to accompany the successful vendor during their fire system verification to ensure that all procedures, codes and standards are adhered to (e.g., CAN/ULC 536, 537). SFU staff and/or its commissioning consultant will be the sole authority on system acceptance.

.12 Test fire systems in accordance with authorities having jurisdiction and as specified elsewhere.

.13 Piping

.1 Maintain test pressure without loss for 48hr unless otherwise specified.

.2 Test fire systems in accordance with authorities having jurisdiction and as specified elsewhere.

.14 Operate all control valves to verify proper operation of the valve and associated tamper switch.

.15 Operate all test connections to verify water flow switch operation in approximately 30 seconds.
.16 Pressurize all dry system piping to 40 psi of air pressure for 24 hours in order to verify leak-tight installation. The piping system shall not allow a loss of pressure over 1 ½ psi in 24 hours. All leaks resulting in a loss over 1 ½ psi shall be repaired and the system retested.

.17 Operate the dry system inspector’s test connection. Record the following information: time for valve to operate, time to receive water at inspector’ test connection, static supply water pressure, system air pressure and air pressure at valve release. The inspector’s test connection shall receive water within 60 seconds of its operation.

.18 SFU Facilities, City of Burnaby and the Fire Department shall witness final inspections and tests.

.19 Provide as built drawings, and a fire alarm verification to SFU Facilities and City of Burnaby when the job is complete.

2.6 Fire Pumps and Generators

.1 See Section 20 00 05 Mechanical - General Requirements for requirements for Fire Pumps and Generators.

.2 See Section 25 05 00 Building Management Systems (BMS) Design Guidelines for requirements for control systems for fire pumps and generators.

2.7 Painting

.1 Specify painting of all exposed only fire protection piping and equipment. Color shall be red.

.2 Specify at least one coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

.3 Refer also to Section 09 90 00 Painting and Coating.

2.8 Use of Booster Pumps

.1 Fire fighting water pressures should not require booster pumps for buildings up to 7 stories. Obtain SFU Facilities approval for any booster pumps for buildings less than 7 stories.

2.9 System Drains

.1 System drains shall be pipe to floor drains, provide minimum 3” deep traps or to direct storm connection.

.2 All low point drain valves shall be mounted at maximum 2m AFF. and the associated piping shall allow for discharge into a floor drain or to the building exterior.

2.10 Spare Parts

.1 Specify spare parts to suit location and critical nature of projects.

.2 Furnish the following spare parts in accordance with Section 01 77 00 Closeout Procedures as follows:

.1 Design Consultants shall specify sufficient numbers of spare sprinkler heads of all types used on the project. One set of packing for each pump. One casing joint gasket for each size pump.

2.11 Building Fire Protection Water Service
.1 Each building shall have a separate water service. No building shall be fed from another building.

.2 Provide an approved backflow prevention assembly, complete with monitored tamper switches on isolation valves, for every building fire protection system. (Refer to SFU Technical Requirements, Section 22.11.18 Backflow/Cross Connection Control for details).

.3 Drains should discharge to a sanitary drain, not a storm drain.

### 2.12 Fire Sprinkler Systems/Standpipes

.1 Provide floor control valves and drains on each floor within a stair enclosure in multi-story buildings.

.2 Floor control valves and piping may be concealed if a sufficiently sized access panel is provided to allow for maintenance and testing.

.3 The design criteria for the fire sprinkler system shall be established per NFPA 13.

.4 Provide a shut off valve (to be easy accessible and visible) at the base of each standpipe. Do not locate in crawl space.

.5 Provide access to all fire protection equipment.

### 2.13 Products and Materials

.1 All materials and equipment in the system shall be new and current products of a manufacturer regularly engaged in the production of such materials and equipment. For example:

.1 Pipe, fittings and couplings, hangars and supports, earthquake bracing, valves, and sprinklers.

### 2.14 Fire Alarm and Related Equipment

.1 All fire alarm related equipment to be as follows (due to life cycle/duty cycle issues any exceptions to be approved by SFU Facilities):

.1 Flow Switch shall be Potter VSR-F, VSR-SF (smaller pipe diameters).

.2 Water Flow Alarm Pressure Switch shall be Potter WFS-5.

.3 Tamper Switch shall be Potter OSYSU-2 for OSY valves. Butterfly isolation valves shall be equipped with two internal, single-pole, double-throw monitoring switches.

.4 High-Low Water Pressure Switch shall be Potter PS120-2A.

.5 High-Low Air Pressure Switch shall be Potter PS40-2A.

.6 Pressure Switch (Excess Pressure Pump) shall be Furnas 69HAU1.

.7 Pressure Switch (Air Compressor) shall be Furnas 69HAU3.

.2 Each fire alarm device to have its own individual address.

### 2.15 Sprinklers Subject to Freezing

.1 Provide a dry system, not an anti-freeze system.

.2 Where sprinklers must be wet, and are subject to freezing, it must be heat traced, and connected to the fire alarm panel.
2.16 Dry Pipe Alarm Valve

.1 All dry pipe systems shall be ULC listed.

.2 Provide a dry pipe alarm valve, trim package, accelerator and air maintenance device, all by the same manufacturer. For example, Grinnell and/or Viking.

2.17 Air Compressor

.1 Provide ULC listed air compressor or maintenance device, sized to completely refill the system within 30 minutes. The air compressor must be quiet, (Max. 60 dbA) unless in a basement mechanical room.

.2 Air Compressor must be oil, floor mount, no tank, and must have a stand-alone Furnas 69HAU3 pressure switch for cut-in and cut-out, and a Potter PS40-2A for low air pressure.

.3 Set the dry pipe system air pressure at the maximum recommended by the information sheet for the dry pipe valve or at 20 psi greater than the standard calculated trip pressure.

.4 All ½” check valves must have a soft seat.

.5 Compressor must be wired to an emergency electrical panel.

.6 All Pre-Action System and Dry System compressors shall be dedicated to Life Safety and shall not serve any other purpose.

.7 All Pre-Action System and Dry System compressors shall be mounted using suitable vibration isolation, using flexible air line that is rated to a minimum of 1.5 times the maximum rating of the compressor and with at least 1m clear space above and on one side to allow for maintenance.

2.18 Inspector’s Test and Drains

.1 Provide inspectors test valves for each floor of each system. For dry systems the inspector’s test shall be located at the hydraulically most remote part of the system. Discharge into a drain riser located adjacent to the system riser or into a drain for a remote inspectors test valve when provided, for example, in dry systems. The valve shall be readily accessible.

.2 Provide main drains at all system and floor control valves. Discharge shall be into drain risers for a multi-story building. Drain risers and main drain for single story buildings shall discharge to a safe location outside the building wherever possible. Provide splash blocks to limit damage to landscaping. Where outside discharge cannot be achieved, discharge shall be to minimum 6-inch floor drain, with a funnel. Do not pipe any sprinkler system drain line directly into a drain; there must be at least a ½” gap between the pipe and the funnel/drain.

.3 Provide auxiliary drains at all low points of the system. Provide an auxiliary drain for each floor of the building within a building stairwell hydraulically remote from the floor control assembly. The drain shall consist of, as a minimum, a valve, a ¾” brass nipple with ¾” male hose threads, and cap.

2.19 Fire Department Connection

.1 The check valve and ball drip shall be located in the mechanical room.

.2 A fire department connection shall be provided on the system riser, and installed in an area
.3 A sign indicating “Auto Sprinkler” or similar shall be provided as a part of the escutcheon. A separate red sign with white lettering shall be permanently affixed to the building. The sign should read “Fire Department Connection”, with the letters 2” (inch) high, and the building address underneath with the letters 1” (inch) high.

.4 Provide 2 ½” polished brass hose valves with a cap and chain. Turn the outlet at an angle of 45° from the wall.

2.20 Hose Valve

.1 Hoses are not to be racked in the cabinets and shall be folded over and rolled up.

2.21 Spare Sprinkler Cabinet

.1 Provide spare sprinklers and escutcheons for 10% of each type and style of sprinkler used in accordance with NFPA 13 and proportioned based upon the number of each type and style of sprinkler used on the job. Include a wrench for each type of sprinkler in the cabinet. The cabinet is to be red with a nameplate indicating "SPARE SPRINKLER CABINET".

2.22 Signs

.1 Provide all control, drain and test valves with signs identifying the type of valve and the area (floor or portion of the building) affected by the valve. Submit the wording to SFU Facilities for approval, for example:

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LEVEL 3 SPRINKLER
© TAMPER SWITCH
SUPERVISORY M1-25
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.2 The signs are to be hung by a chain from the device.

.3 Signs shall also indicate, especially on dry pipe systems, those valves which should be kept normally open or normally closed.

2.23 Pressure Gauge

.1 Provide a 3 ½” diameter pressure gauge with the appropriate scale at the main incoming water. Also at each valve station, base of every riser, above and below alarm valves, before and after check valves, at any compressors or pumps, and at any pressure switches.

2.24 Sprinkler Head Guard

.1 Provide ULC Listed sprinkler head guards for sprinkler heads subject to mechanical damage.

2.25 Drum Drip

.1 Provide a drum drip per NFPA 13 at the low drain points on a dry system.

***END OF SECTION***