1.1 **GENERAL**

1.2 **Coordination Requirements**

.1 SFU Facilities

1.3 **Description**

.1 The Burnaby campus is fed at 64,000 volts from two separate power lines from two different BC Hydro substations as a transmission customer. Poles carry both lines up the same right of way on the east side of the mountain. Each line feeds a 64-12 kV transformer in the substation yard. BC Hydro can switch both transformers to one line if necessary. The substation building contains 12 kV switchgear that routes three sets of main and backup power feeds to 3 “receiving substations” (nodes) on campus via underground ducted high voltage cables. These nodes are located at TC, TASC1 and Saywell Hall. All 12 kV power outside of buildings is run through underground concrete encased cable ducts. Over 100 manhole duct chambers connect these duct sections to carry high voltage and data cables between buildings. There is no overhead power wiring on campus.

.2 The original receiving substation at TC fed power to all buildings on campus. The two new receiving substations in TASC 1 and Saywell Hall are designed to gradually connect to and power many of the buildings currently fed from TC. This will reduce reliance on that location and its single point of failure issues. New underground cable ducts have been constructed to enable this re-configuration. When this is complete, the following groups of buildings will be fed as shown:

Saywell Hall - Blusson, Saywell, Education, RC Brown, AQ, Maggie Benston/ Theatre, new SUB and the Library; the Water Tower building may also be fed from here in the near future
TASC 1 - SSB, TASC 1, TASC 2, Facilities, ASB, Kinesiology, Physics, Biology and Chemistry
TC - Gym, TC, West Mall and the Residence buildings

.3 The 69 kV transformers are designed as N+1. The campus load will reach the capacity of one transformer in the next few years. Prior to that a third 69 kV transformer will be installed at the substation yard. A new 12 kV switchgear lineup in the substation building will have to be added at that time.

.4 Several buildings are fed directly from BC Hydro at the distribution rate, not through the campus grid. These include Discovery 1 and 2, Animal Care and the Water Tower building. The proposed Corix biomass heating plant will be fed directly from BC Hydro.

.5 **Building substation**

From each of the 3 receiving substations, a main and a backup set of power cables run to a group of buildings. At or near each building there is a pair of junction boxes (JB’s) where main and backup power is tapped off, then daisy chains to the next building JB’s.

.6 In this way each building receives two 12 kV power feeds. This passes through disconnect switches (load breaks) and 12 kV breakers in the electrical vault. Key interlocks are used for both load breaks and 12 kV breakers to ensure only one source at a time can be connected to
The main 12 kV breakers can be operated locally or remotely. To deal with power problems or to isolate components for maintenance, the buildings can be switched from the main to the standby power feed. A “mimic board” at the TC 011 electrical room connects to many of the building substations for remote monitoring and control of the 12 kV breakers. A second mimic board was installed in the TASC 1 vault, and will be connected to most of the remaining building substations in the near future.

Most buildings convert 480 volts to 120/208 volts for plug loads and some lighting. These transformers range from 30 to 225 kVA in most cases. The oldest ones are gradually being replaced with “PowerSmith” high efficiency transformers, model series 80 R. This is also the standard transformer for new installations or renovations due to its high quality and superior part load energy efficiency.

2.1 MATERIAL AND DESIGN REQUIREMENTS

All new buildings shall be supplied from the underground 12 KV distribution system, with a few exceptions.

Power to new small buildings may be fed at 480 Volts from a nearby building, with approval of SFU Facilities.

Refer to Standard Drawing No. E1-1 for details on for the supply feeders into each building. Any deviation from the standard details must be reviewed and approved by SFU Facilities prior to construction.

Note that a ground of equivalent size (in general a 4/0) shall be installed to each building switch room. This ground conductor shall tie into the existing ground system and also be connected to an accessible ground bus on which all equipment and service grounds are to be terminated. Provisions shall be made for at least two spare connecting points for additional grounding, other than for the Telephone Company, fire alarm, etc.

Some buildings may have individual PF correction capacitor banks; all new projects must be reviewed for suitability with existing systems.

Each building substation must have surge suppression.

Before handover, a coordination study as well as power systems commissioning must have been successfully completed.

All transfer switches must be make-before-break type.

***END OF SECTION***