1.1 **GENERAL**

1.2 **Related Technical Requirements**

.1 Division 27, Section 27 05 05 Communication Rooms Design Guidelines – 2.6

.2 Division 28, Section 28 31 00 Fire Detection and Alarm

1.3 **Coordination Requirements**

.1 SFU Facilities and Environmental Health and Safety should be involved with both planning/design stages and commissioning of new generator installations and renewals of existing. This to include tank locations, anti-siphoning, piping, genset enclosures, and transfer switches etc.

.2 SFU IT.

1.4 **Description**

.1 Generator for emergency and stand-by power.

2.1 **MATERIALS AND DESIGN REQUIREMENTS**

2.2 **General Requirements**

.1 All buildings are required to have a generator for life safety equipment. (Non-life safety) equipment requiring a generator will be addressed on a case-by-case basis.

.2 When a generator is installed, the following equipment shall be connected to the life safety source.

.1 All active smoke control equipment and controls

.2 Fire Alarm Control Panel

.3 Emergency and exit lighting

.4 Heat Trace wiring

.5 Sprinkler system equipment (dry and pre-action system compressors, excess pressure and fire pumps, heating systems for water service rooms, etc.)

.6 Sanitary sump pumps and storm sump pumps

.7 Main electrical room lighting and least one convenience receptacle

.4 If a generator is installed, then all emergency power shall be supplied from it and battery packs shall not be used other than at the generator/transfer switch location to allow for breakdown maintenance.

.5 In general, fume and bio-hazard hoods should not be supplied from life safety power. Alternate proposals to supply fume and bio-hazard hoods from emergency power may be discussed with SFU Facilities.

.6 In general, elevators not designated as “Elevator for Use by Firefighters” by the BC Building Code should not be powered from generators unless specifically required to be by the BC Building Code. Alternate proposals to supply non-designated elevators from life safety power may be discussed with SFU Facilities.

.7 Emergency generators shall supply only life safety requirements except as otherwise noted or as required by the BC Building Code.
.8 Emergency generators shall be diesel fuel type only.

.9 Emergency generators shall have a minimum 24-hour run time under 100% loading without refueling.

.10 All generators shall be capable of being refueled from ground level. The refueling location shall be accessible for fuel trucks to park within 5 meters.

.11 Confirm positive fuel prime to all fuel pumps.

.12 Fuel level, generator run and generator trouble should be pulled as 3 separate dry contacts for connection from generators.

.13 Critical alarms will be monitored through fire alarm system. See Section 28 31 00 Fire Detection and Alarm for fire alarm system for monitoring of generator and transfer switches.

.14 In buildings where generators are installed a 5-20R receptacle supplied by a dedicated over current device shall be installed immediately below each panel that derives its supply from the life safety distribution.

2.3 Generator Housing and Location

.1 Generators to be primarily located at ground level in separate enclosures. Generators can ONLY be located at roof level if they can be replaced by lifting with a mobile crane.

.2 If located at roof level, locate diesel exhaust away from potential air intakes and open windows. Provide ample vibration isolation and a fuel pumping system to allow for refuelling from ground level.

.3 Generators should be housed in areas which are large enough to allow for maintenance, testing and repair, and remove and replace components, without having to remove portions of the structure in which they are mounted.

.4 Generator areas should be provided with room lighting, power, ventilation and heat (from generator supply) for maintenance. Marine lights should be provided for status.

.5 The areas shall be insulated and heated so as to minimize maintenance on the units.

.6 Generator rooms and transfer switch locations shall be provided with an emergency battery lighting pack for breakdown safety and maintenance on the units.

2.4 Equipment Type

.1 Generators shall be sourced from original equipment suppliers such as Cummins, Cat or equivalent so that parts are readily available and locally supplied and supported.

.2 Fuel filters shall be Racor pleated filters or SFU approved equal.

.3 Obtain approval list of acceptable manufacturers and products from SFU Facilities. System shall be compatible with existing SFU operating control systems.

2.5 Loadbank Requirements

.1 If generators are only carrying a light load from the building, a loadbank shall be installed so
that the generator runs at fifty percent of rated load at a minimum. This loadbank shall be of such a design that resistors can be taken out as building loads increase over time.

.2 To assist with maintenance, generators shall have a second circuit breaker on the generator output prior to the transfer switch. This is for tying in load banks for annual testing without disturbing cables and lugs of normal loads, as per CSA C282-05 B18. The output of the second breaker shall extend to a terminal box complete with connecting lugs or camlok connections.

2.6 Time Delay

.1 The time delay on restoral to utility should be set to fifteen minutes, rather than the normal ten minutes. Allowing the generator to continue running for fifteen minutes after the reset of the transfer switch to the utility is better for the generator and ensures smoother power transfer in the event of multiple interruptions and power surges (which occur frequently on an outage).

2.7 Automatic Transfer Switches

.1 Automatic Transfer Switches (ATS) shall be supplied with fully rated double-bypass capability.

.2 A point shall be monitored downstream of the transfer switch to ensure successful transfer - transfer switch has proper function (power is on load side of switch).

.3 The entire ATS & bypass assembly shall be certified to CSA C22.2 No. 178.

.4 ATS shall have a minimum 18 cycle Withstand and Close-on Rating on all equipment rated at 800 amps and greater.

.5 ATS bypass/isolation handles shall be permanently attached & require a maximum of two steps to perform bypass/isolation operation.

.6 ATS main contacts and bypass contacts shall be fully withdrawable on equipment rated at 800 amps and greater.

.7 All components within the ATS shall be supplied and supported by the ATS provider.

.8 Closed Transition Transfer Switches (CTTS) shall include a separate redundant protection relay to prevent any possible back feed to the utility. All methods of providing this form of protection shall be submitted to SFU Facilities for approval prior to equipment installation.

.9 CTTS redundant backfeed protection may be a reverse power relay set not more than 10% of the generator rating or extended parallel relay set at not more than 300mSec.

.10 Transfer switches shall be Asco, (or equivalent).

2.8 Fuel Tanks

.1 All diesel fuel tanks shall be above ground and double walled unless a single walled tank is contained by a separate containment tank, for example, a day tank.

.2 Underground tanks that are inherited with their piping systems shall be pressure tested every two years. Above ground tanks shall be visually inspected once per year and pressure tested every five years.

.3 Fuel storage tanks shall be protected from freezing.
2.9 Maintenance Manuals

.1 Complete sets of manuals, (these shall include operators, owners, troubleshooting, full repair manuals as well as any disks and software diagnostics), shall go to the shop level before sign off and acceptance of units. Coordinate type and quantity with Division 01, Section 01 78 23 Operation and Maintenance Data.

.2 A complete set of manuals for each Transfer Switch shall be provided. The manuals shall include all schematics and wiring diagrams for actual supplied components. Generic manuals will not be accepted.

2.10 Emergency Lighting Battery Packs

.1 Emergency lighting battery packs, where used, shall be ‘Ready-Lite’, 12V only, 360 watt units. The battery packs shall not be self-testing as this disturbs the building users.

.2 Heads to be 9 watt units mounted on manufacturer supplied shelf and shall not be hard wired to the AC supply. The units shall be mounted on a manufacturer supplied shelf designed for the purpose and plugged into a receptacle only and shall be rated for 120 VAC.

***END OF SECTION***