1.0 Introduction

This document outlines the engineers' requirements for room design and placement within the overall layout. Each discipline has unique needs, so the information will be organized by discipline. Please note that some rooms may overlap in responsibility across multiple disciplines.

The layout for each building level adheres to fixed boundaries, allowing for some flexibility in room placement. While certain areas, such as restrooms, stairwells, and corridors, are fixed in position, all other rooms can be adjusted horizontally within the designated space. Rooms may expand into adjacent areas if necessary; however, vertical adjustments are not permitted. Clients may have specific preferences for room adjacencies, which will be taken into consideration during the design process. The following seven disciplines are represented:

a) Extra Low Voltage (ELV)

b) Electrical

c) Mechanical

d) Architecture

e) Civil/Structure

f) Mechanical

g) Cleanroom

h) Process

2.0 Extra Low Voltage (ELV)

Clients may specify preferred room adjacencies that must be accommodated. It is essential to pay special attention to fire code compliance (SCDF code), particularly for the FCC and MDF rooms, which must have doors that open outward at ground level to ensure direct access from outside the building. The security room should be located near the employee entrance for optimal accessibility. Additionally, the MDF and computer rooms should ideally be positioned close to one another to minimize the need for additional risers if they are on different floors. The telecommunications distribution room (TDR) is typically aligned across floors on the same grid to maintain consistency and optimize cable routing.

The following rooms fall under the Extra Low Voltage (ELV) discipline:

a) **Fire Command Centre (FCC):** Must have a minimum area of 6sqm as per code, though this is often considered not sufficient.

b) **Main Distribution Frame (MDF) Room:** Requires approximately 35 sqm. While it is possible to have two MDF rooms, typically one is sufficient to meet operational needs.

c) **Computer Room:** Requires approximately 300 sqm. This size is essential for housing multiple servers, workstations, and supporting infrastructure.

d) **Telecommunications Distribution (TDR) Room:** Each floor requires about 20 sqm, with multiple TDRs distributed throughout the building. The size must accommodate necessary telecommunications equipment while ensuring accessibility for maintenance. Distance considerations are vital to maintain signal integrity and meet performance standards.

e) **Security Room:** Approximately 35 sqm, ideally positioned near the employee entrance. This space should be large enough to house security personnel, equipment, and monitoring systems. Adequate size ensures efficient operation and quick response times, enhancing overall security management.

2.1 Fire Command Centre (FCC)

2.1.1 FCC Room Provision

The FCC must meet minimum size and operational space standards. These ensure that all critical monitoring and control systems for fire detection and protection are housed adequately, and that personnel can work without obstructions.

The disciplines that are responsible for this section is Architecture and ELV. FCC shall be provided as follows:

- For all large buildings under PG III (not applicable to primary school, secondary school, and junior colleges), IV, V, VI, VII and VIII with AFA greater than 5000m² or having a total occupant load exceeding 1000 persons. The calculation of AFA and occupant load shall exclude the aboveground or underground car park; or
- For all buildings belonging to PG III, IV, V, VI, VII, and VIII of more than 24m in habitable height.
- The FCC shall be of sound resistance construction having a sound attenuation of not less than 50dB.
- A vision panel not exceeding 150 mm by 300 mm may be incorporated into the door provided it is glazed with wired glass having the same fire resistance rating as the door.

The disciplines that are responsible for this section are Electrical:

- The FCC shall be adequately illuminated, and artificial lighting shall be on circuits that are separated from the general lighting and power circuit.
- Standby batteries shall be provided to power the artificial lighting in case of the normal power supply. The batteries shall be kept fully charged by a permanently connected charger.
- The capacity of the batteries shall be sufficient to operate the whole system for not less than 4 hours. In the case where an emergency generator is provided, the battery capacity may be reduced to half.

2.1.2 FCC Room Location

The Fire Command Centre (FCC) must be located at the same level as the fire engine accessway or fire engine access road.

The disciplines that are responsible for this section are Architecture and ELV:

- In the case of a site consisting of more than one building which required FCC in accordance with Cl.8.2.1, there shall be more than one FCC. For such cases, the SCDF shall be consulted.
- Shall be located at the same level as the fire engine accessway/ fire engine access road (Architecture)
- FCC entrance shall be located in the following order of priority:
    1. It shall be within 5m from entrance of the fire lift lobby at the designated storey of the station.
    2. In the case where there is no fire lift lobby, it shall be located within vicinity of the fire engine accessway or fire engine access road and within 5m from the entrance of one of the protected stairs serving all storeys of the development.
    3. It shall be at any other location as may be designated by the SCDF.
- The construction of enclosure, facilities and lighting of an FCC shall comply with the SS 546.

2.1.3 FCC Room Size

The disciplines that are responsible for this section are Architecture and ELV.

- An FCC shall be of adequate size to house all the terminals and supervisory/ control equipment etc. of the station's fire protection/ detection systems, as well as a free working space (unobstructed by door swing) of at least 6m² and minimum clear width of 2m.

2.1.4 FCC Main Equipment

This section covers the main equipment that must be installed in the FCC to ensure that all emergency systems are operational during an emergency. The equipment ranges from monitoring panels to communication and security systems.

The discipline that is responsible for this section is Architecture:

- Lift supervisory panel

The discipline that is responsible for this section is ELV:

- Control Station of the EVC Systems
- Audible fire alarm signal
- Main fire alarm panel or repeater / mimic panel, fire service signalling transmitter of the automatic fire alarm system
- Sprinkler indicator board
- Telephone connected to the external exchange
- Mechanical ventilation supervisory and control panel

2.1.5 FCC Supporting Equipment

This section covers the supporting equipment that must be installed in the FCC to ensure that all emergency systems are operational during an emergency.

The discipline that is responsible for this section is Architecture:

- Lift Supervisory Panel – Responsible for monitoring and managing the operation of lifts during emergencies.

The discipline that is responsible for this section is ELV:

- Background Music System – Integrated with a one-way emergency voice communication system rack for delivering critical messages.
- Workstation/Server Rack for Security Card Access & CCTV System – Ensures secure monitoring and control of security card access and surveillance systems.
- Workstation/Server Rack for Car Park Access Control System – Manages access control for parking facilities, maintaining security and control.
- Workstation/Server Rack for Fire Alarm's Colour Graphics System – Provides real-time graphical displays of fire alarm data for quick incident identification.
- Workstation/Server Rack for BMS/BAS and ACMV Systems – Monitors and controls the Building Management System (BMS) or Building Automation System (BAS), including Air-Conditioning and Mechanical Ventilation (ACMV) systems.
- Walkie-Talkie Charging Stations – Charging stations to keep walkie-talkies powered for effective communication during emergencies.
- UPS System – A Uninterruptible Power Supply (UPS) with a sealed battery capacity not exceeding 750Amp-hr to provide backup power for essential equipment.

2.1.6 FCC Room Mechanical Ventilation

Mechanical ventilation and air-conditioning systems in the FCC should provide sufficient air changes and be independent of the rest of the building to ensure no recirculation of smoke or hazardous gases.

This section is responsible by Mechanical Discipline.

- Air-conditioning and/ or mechanical ventilation where required for the FCC shall be provided with secondary power supply and shall be independent of each other and have ductworks independent of any other ductwork serving other parts of the station.
- The mechanical ventilation rate shall be 6 air change/hr.
- Supply air shall be drawn directly from the external/ air shaft; its intake point shall be arranged with exhaust outlets to avoid re-circulating of air/ smoke back into the room.
- Where the corresponding ducts run outside the FCC, they shall either be enclosed in a structure or constructed to give at least the same fire rating as the room which they serve or that of the room through which they traverse, whichever is higher.
- No fire damper shall be fitted in either the supply or exhaust duct required under this clause.
- Duct serving areas other than the FCC shall not pass through the FCC.

2.1.7 FCC Room Exit Sign

The correct placement of exit signs is crucial in guiding building occupants to safety during an emergency. This section outlines the requirements for exit sign placement, considering room layout, lighting conditions, and the presence of multiple exits.

This section is responsible by Electrical Discipline:

- When a room is provided with more than one door, exit signs shall be provided over the exit access doors intended to be used as means of escape.
- When an occupied space is provided with emergency lighting, exit sign is not required if there is only one exit access door.
- In a room without emergency lighting where the room is provided with only one door and the direct distance from the furthest distance in the room to the exit access door is 7m or less, exit sign is not required if there is only one exit access door.
- In a room without emergency lighting where the furthest point in the room to the exit access door exceeds 7m but does not exceed 13m, exit sign shall be provided over the door. Alternatively, the room can be provided with emergency lighting.
- In a room without emergency lighting where the furthest point in the room to the exit access door is 13m or less and wall of the room comprises not less than 50% clear glazing facing:
    - An internal corridor covered by emergency lighting.
    - An external corridor, or
    - The external of the building.
- Exit sign is not required to be provided over the exit access door.