

CAIRO CAPITAL

INFRASTRUCTURE GUIDELINES FOR OFFICE BUILDINGS

NTRA

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Telecommunication spaces

The building structures detailed in this document have been prepared based on current plot development plan Within Cairo Capital City and are provided as illustrations and guidance. It is understood that each individual building will have specific floor plans, wall layouts and distinct room locations that will necessitate customized cable pathways and node locations. A number of telecom rooms will be required in a building depending on its characteristics.

General specifications

In multi-story office buildings, the telecom rooms should be vertically aligned and linked by a shared containment system. This containment system must not reduce the minimum requested space. The rooms must be easily accessible 24 hours a day and secured from unauthorized entry.

Telecom rooms should be clean and free from any items not directly related to the specifications in this document such as Utility pipes, Sprinkler systems, and Windows.

All telecom spaces and pathways must be controlled using best available practices. It should be noted that rodents often gnaw cables resulting in damage and the potential for service disruption. Hence, special attention should be given to preventing rodents from entering telecom spaces and pathways.

The walls, floor and ceiling should be painted and treated with anti-dust and anti-static coating to minimize dust and static electricity. Walls and ceilings shall receive primer and finish coat of light color paint.

Safety considerations

All telecom rooms must comply with Cairo Capital administration and national authority standards and regulations, such as those issued by civil defense and utility companies. Although this, it is expected that the following will be provided:

- All telecom spaces should be fitted with smoke detectors connected to the building management system.
- All telecom spaces should be fitted with emergency lighting.
- All containment openings to telecom spaces must be sealed with a regulation fire retardant material.
- All doors to telecom rooms must be fire retardant with a minimum rating of 2 hours.
- All doors to telecom rooms must be outward opening with an automatic door closer system.
- All doors to telecom rooms must be labelled.
- The room must be free from contaminants.
- All telecom rooms should have basic firefighting provision of handheld CO2 cylinder type extinguishers.

- All telecom spaces must not be directly beneath or next to wet areas such as:
 - Showers
 - Washrooms
 - Swimming pools
 - Garbage area

If the building developer has any concerns over safety, especially fire protection and suppression systems, this should be raised with Cairo Capital administration.

Environmental considerations

All telecom rooms must be maintained at $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and the relative humidity at $50\% \pm 10\%$. However, floor telecom room can be maintained within $30^{\circ}\text{C} \pm 3^{\circ}\text{C}$ temperature range.

Telecom rooms must not be in close proximity to any sources of the following:

- Heat
- Moisture
- Corrosive atmospheric
- High voltages
- Radio frequency interference (RFI)
- Electro-magnetic interference (EMI)

Telecom Rooms Specifications

The Main Telecom Room (MTR)

A main telecom room must be provided on basement or ground floor for all multi-story office buildings. This room will be used for the termination of telecom fibre optic cables and to house telecom equipment, if needed, now or in the future. It is obligatory that the following will be provided:

- The minimum combined room dimension should be 4m x 4m x 3m (W x D x H) and maybe increased depending on the functions and features of the building. Detailed layout of MTR room shown in Appendix_1_Figure_1
- The three meters' clearance height specified is the minimum finished clearance after taking into account allowances for raised floors (if used), overhead cable trays and any other obstructions such as lighting fixtures and beams.
- Depending on the telecom room usage, a 'raised floor' must be required inside the MTR having active equipment, A minimum of three meters' height above the base floor of the room should be provided.
- The floor level of the room must be constructed at the same level as the outside access or corridor. If this cannot be met, then a suitable ramped entry with an anti-slip surface must be provided.
- A threshold step must also be provided inside the room under the raised floor to prevent any ingress of water from outside the room.
- The door of the main telecom room must have outward opening with size not smaller than 900mm x 2100mm (W x H).

- The door should be labelled 'Main Telecom Room'.
- All cables in the main telecom room must be properly routed to the desired destinations.
- For cluster buildings, all the requirements of a single tower still apply. One of the buildings will be selected as the location for the main telecom room, which usually stands in the center of the cluster or often closest to the main telecom duct entry points. The details of this arrangement should be discussed with Cairo Capital Administration.

Floor Telecom Room (FTR)

A floor telecom room must be provided on each floor of all multi-story office buildings. The floor telecom room is required to provide a flexible point for the installation, pulling and maintenance of telecom cables. It is obligatory that the following will be provided:

- Floor telecom room must have a minimum dimension of 2m x 1m x 3m (W x D x H). Detailed layout of FTR room shown in Appendix_1_Figure_2
- The floor telecom room should be provided with two outward opening doors with a minimum total opening of 1500mm x 2100mm (W x H).
- The door should be labelled (Floor Telecom Room).
- In high rise buildings, which usually exceed 30 floors, proper planning and consideration must be given to the FTR space and dimension, which might be increased. It is highly important to seek Cairo Capital Administration advice to understand the concept of high rise building infrastructure design.

Roof top Service Room (RSR)

Rooftop service room must be provided on the roof of all multi-story office buildings and access must be provided to the building riser system. It is obligatory that the following will be provided:

- Rooftop service room must have a minimum dimension of 3m x 3m x 3m (W x D x H). Detailed layout of FTR room shown in Appendix_1_Figure_3
- The door dimension must be 900mm x 2100mm (W x H) and opening outwards.
- The door should be labelled 'Roof Telecom Room'.
- The rooftop service room must have a minimum distributed floor load rating of 10 KN/m².
- Space must be reserved on the rooftop of the building for the installation of digital signage systems or service donor antennas such as mobile base stations (BTS). This will vary from building to building, but will typically be at the corners of the building or on any raised structure on the rooftop.

Office Consolidation Cabinet

Commercial/Governmental Open space office

In case of open space office floor with no pre- defined offices, the building's developer should install one indoor wall mount ODF inside the FTR as shown in Appendix_1_Figures_5, This should be with the following minimum specifications:

- The size of the ODF will depend on the number of fiber cores required based on the floor area served. In addition, free wall space inside the FTR must be reserved for future offices terminations.
- Fitted with RJ45 UTP patch panel.
- Fitted with fiber terminal box.
- Dual 15A switched socket power outlet fed from a dedicated circuit breaker on the domestic supply.
- Sufficient cable entries to accommodate the incoming terminated cables.
- Not close to sources of water or heat and any electrical distribution or bus bars.
- A consolidation cabinet must be labelled with served office unit number.

Commercial/Governmental pre-defined office

A Wall Mount Distribution Box is a space to house network termination equipment. It also serves as the distribution point for all wiring of service points within the office.

A Distribution Box may be provided in predefined office. This should be a distribution box with the following minimum specifications:

- Minimum internal dimensions 250mm x 350mm x 120mm (L x W x D).
- Wall mount at 1.2m high measured from the finished floor level up to the bottom edge of the box. Details of distribution box shown in Appendix_1_Figure_4
- Dual 15A switched socket power outlet fed from a dedicated circuit breaker on the domestic supply.
- Sufficient cable entries to accommodate the incoming terminated cables.
- Secured locking cover.
- Adequate ventilation with ambient temperature maintained at $30^{\circ}\text{C} \pm 3^{\circ}\text{C}$.
- Not close to sources of water or heat and any electrical distribution or bus bars.
- A distribution box must be labelled with office unit number.

Added Building Management services

In case of adding building management services (CCTV, Public address, access control, smart metering, etc...), the building's developer should install one indoor wall mount ODF inside the FTR. This should be with the following minimum specifications:

- Minimum internal dimensions 600mm x 600mm x 300mm (H x W x D).
- Wall mount or flushed mount installation at 1.2m high measured from the finished floor level up to the bottom edge of the cabinet.
- Fitted with RJ45 UTP patch panel.
- Fitted with fiber terminal box.

- Dual 15A switched socket power outlet fed from a dedicated circuit breaker on the domestic supply.
- Sufficient cable entries to accommodate the incoming terminated cables.
- A consolidation cabinet must be labelled with Building unit number.

Electro-Mechanical Requirements

Main Telecom Room (MTR)

For MTR, the following requirements need to be provided:

- SMDB inside the room fed from power supply (with generator backup) for fixed equipment.
- 2x32A TP isolators to be provided.
- 2 nos. 13A twin sockets fed from the essential power supply with dedicated 20A circuit breaker.
- AC and DC earth bars connected to the dedicated earth pits with resistance less than 1ohm.
- Dedicated A/C system (ducted split FCU) with duty and standby units with proper interlocking, to maintain the room temp. at 20+/-3°C.
- Room should be provided with adequate lighting and comply with the fire and safety requirements like smoke detector, fire alarm, emergency light etc. as per local authority standards. Any water sprinklers to be avoided.
- 2 nos. handheld CO2 cylinder extinguishers to be provided inside the room.

Floor Telecom Room (FTR)

For FTR the following requirements need to be provided:

- Adequate lighting and 1x13A twin socket fed from the normal building supply with dedicated 20A circuit breaker.
- Room should comply with the fire and safety requirements like smoke detector, fire alarm, emergency light etc. as per local authority standards. Any water sprinklers to be avoided.
- 1x handheld CO2 cylinder extinguisher.

Rooftop Service Room(RSR)

For RSR the following requirements need to be provided:

- All requirements mentioned in Passive MTR must be followed.
- Add 1x63A TP isolator fed with dedicated feeder from essential power supply (with generator backup) for antenna equipment.

Pathways

General Specifications

The following requirements must be applied to all containment systems:

- The containment system must be designed so that installed cables do not exceed the minimum specified bend radius.
- All metal containment parts must be free from sharp edges and earth bonded.
- Telecom riser openings must be sealed with a suitable fire retardant material.
- Cable trays must be easily accessible in common areas to facilitate any future provision of additional cables.
- Any cable trays that are in areas accessible to the public and less than 3m above the floor must be covered.
- Containment systems must not run through areas exposed to excessive heat, moisture, corrosive atmospheric or environmental conditions, high voltages, radio frequency interference (RFI) or electro-magnetic interference (EMI).
- For all containment systems, a minimum separation must be maintained from sources of electromagnetic interference.
- The building developer must to consider redundant containment systems, particularly in governmental or prestigious developments. New Capital Administration must be contacted at the design stage to discuss any such requirements.

Vertical Containment

The following requirements must be applied to all vertical containment systems:

- Risers must be provided in multi-story buildings to allow the installation of telecom cables from the main telecom room to the floor telecom rooms, and rooftop service rooms.
- Hot-Dip Galvanized (HDG) slotted steel cable trays must be provided in the risers to carry the telecom cables between all the telecom rooms. It is recommended that the main telecom room and floor telecom closets should be designed so that they are vertically aligned within the building.
- Two Cable trays with minimum dimensions of 500mm x 100mm (W x H) are required with Heavy Duty Return Flange (HDRF) for fiber optic cables. If it is not possible to provide all the cable trays running vertically then horizontal trays of the same size should be provided.

Horizontal Containment

The following requirements must be applied to all horizontal containment systems:

- The horizontal containment for routing cables from the floor telecom room to consolidation points on the served floor can use a number of systems (cable trays, conduits, etc.). The solution will depend on the characteristics of the building.
- Conduits must only be used when the consolidation point locations are permanent, and the flexibility to modify the routing is not required.

- Intermediate PVC junction/pull boxes must be provided on individual runs that exceed 30m with minimum size of 300mm x 300mm x 150mm (H x W x D).
- PVC junction/pull boxes must also be provided where an individual conduit run has a sharp change in direction.
- The cable tray with minimum dimensions 200mm x 50mm (W x H) with Heavy Duty Return Flange (HDRF) must be provided as a main route from floor telecom room to main corridors and then branches to each consolidation cabinet through cable trays of 50mm x 50mm (W x H).
- For wireless service, indoor-antennas, Cable trays must be provided to route service antenna cables from the floor telecom room to all common corridors including all lift lobbies in all floors including podium and basement. One Heavy Duty Return Flange (HDRF) cable tray 150mm x 50mm (W x H) must be provided.

Infrastructure Requirements from Cairo Capital Administration

Cairo Capital Administration employs a wide network of underground ducts which enable the deployment of Smart Services networks and telecom networks using fiber throughout Cairo Capital City.

The Cairo Capital Administration will facilitate connection of each building, controller, and any other type of field apparatus.

In Cairo Capital, the underground ducts and cable chambers which enable the deployment of the Cairo capital Access Network, are designed to meet the needs for future services in an efficient, safe, harmonized and cost effective way, while avoiding further repetitive or remedial civil works. It provides an optimum routing for cables within the Cairo Capital environment while providing good protection and work party access.

Entry box “Hand-Hole”

- Entry boxes are required to install telecom cables through the lead-in duct. The type and size of entry/pull boxes will depend on the characteristics of the building development with minimum size 800x800x800mm.
- The quantity and location of the entry boxes will depend on the route from the main telecom room to the network , additional boxes must be provided at all turning points of lead-in, if necessary.
- Entry boxes must be included wherever the duct system has right-angles or sharp bends or other factors to facilitate cable pulling.

The following specifications must be followed:

- Constructed with reinforced concrete.
- Fitted with a ductile iron frame and cover.
- Minimum load rating 400kN.
- Cover to be marked ‘Telecom’.
- An earth rod must be provided with a resistance of less than 5 ohms.

Infrastructure Requirements from Building Developers

Building Entry- Lead-In ducts

The lead-in ducts systems are designed to meet Cairo Capital Administration requirements to serve the development, building or property and the same duct quantity and size to be extended towards the building and toward the network.

The lead-in duct specifications are as follows:

- Made from black HDPE.
- Minimum Quantity & size 2X100mm
- Upmost part of ducts must be buried to a depth of 700mm below finished ground level.
- Clearly marked above ground level for easy location.
- Sloping away from the building.
- Protected by concrete when running under permanent paved surfaces.
- Sealed at each end to prevent the ingress of any materials such as water, sub-soil, gas, and pests.
- An entry/pull box must be installed for any right-angled or sharp bends in the lead-in duct route.
- If required at the entry to the main telecom room, a wide-angle long radius bend (factory made) may be provided; alternatively, an entry box may also be provided.
- All ducts must include a draw rope made of twisted mildew and rot resistant polypropylene; minimum outside diameter of 6mm; minimum tensile strength of 2400lbs/1000kg/.

Building Entry- Cable Trays

- Where lead-in ducts cannot be routed directly into the main telecom room, Hot- Dip Galvanized (HDG) slotted steel cable trays must be provided as an alternative. These trays must be easily accessible in common areas to facilitate any future provision of additional cables. However, if these trays are in an area accessible to the public and are less than 3m above the floor then the trays must be covered.
- In such cases, cable tray of minimum dimensions 300mm x 100mm (W x H) will be required for each plot entry point.

Design Approval Process

All development projects within Cairo Capital City are governed by the Cairo Capital City Administrative (CCCA), It provides building developers with the policies and procedures for the approval and execution of development projects within Cairo Capital City.

All designers of development projects within Cairo Capital City are required to approach Cairo Capital City Administrative (CCCA), to ensure the development is compatible and capable for City Service provisioning.

This provides the occasion for designers to get advice on the City Services that are being provided within Cairo Capital City, The requirements of the building structure being developed in order to be compatible with City Services provisioned will be provided.

It is mandatory that the design consultants get approval for the design, in their project development within Cairo Capital City from Cairo Capital City Administrative (CCCA).

Appendix 1

Main Telecom Room

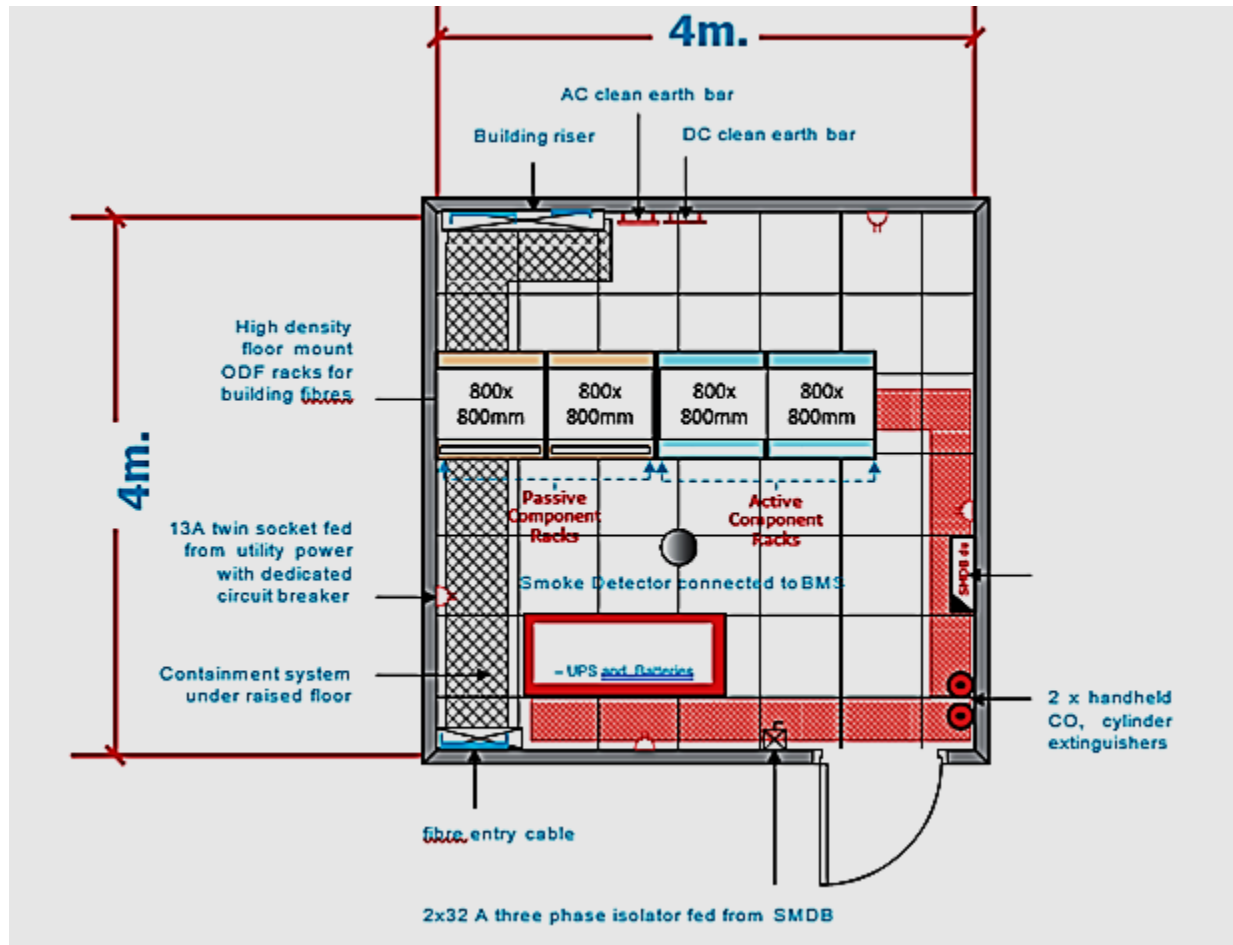


FIGURE 1 MAIN TELECOM ROOM

note:

- Number of Units – Up to 1000 Units

Floor Telecom Room

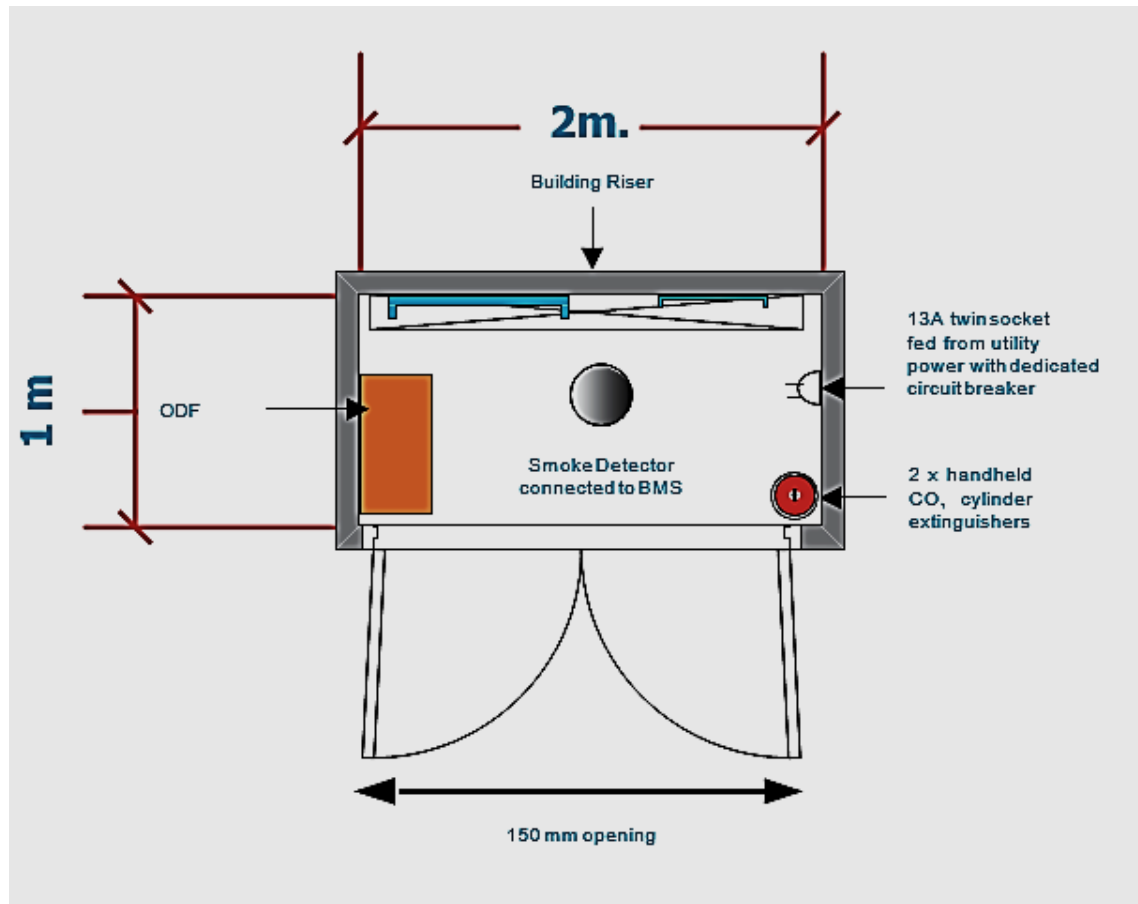


FIGURE 2 FLOOR TELECOM ROOM

Roof Top Services Room

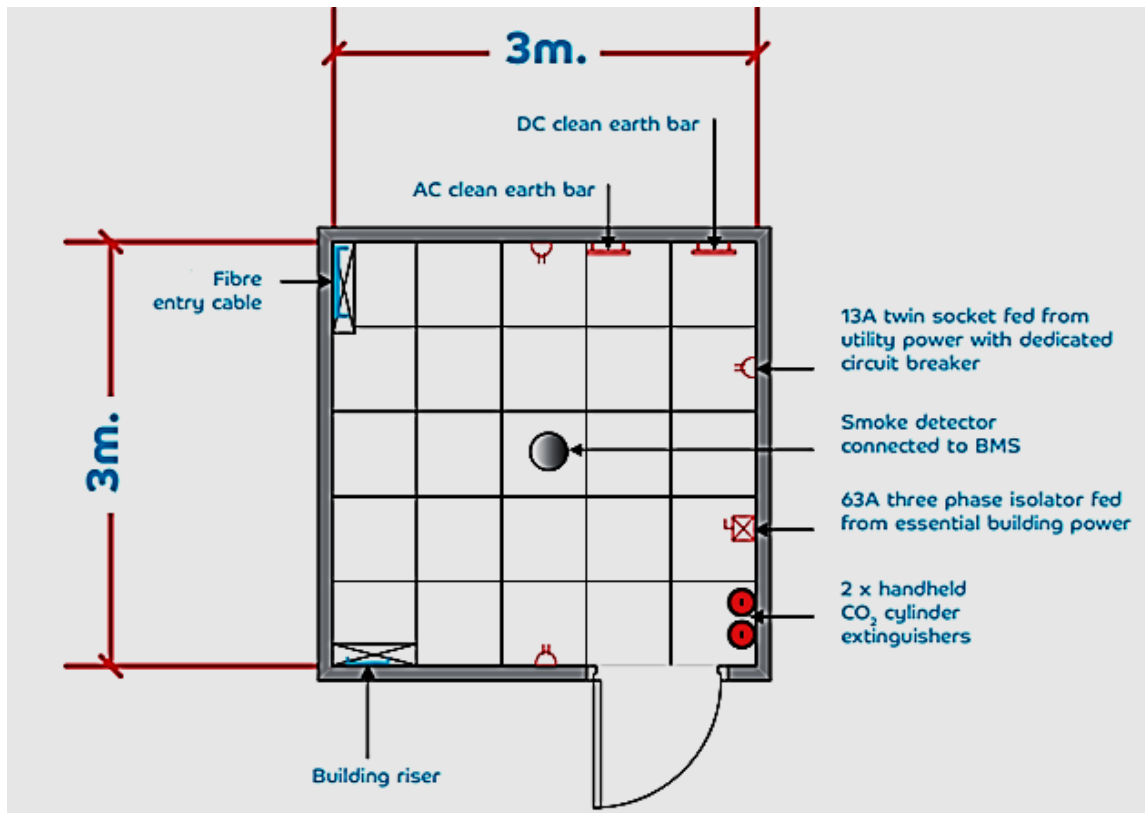


FIGURE 3 ROOFTOP SERVICES ROOM

Wall Mount Distribution Box for pre-defined office

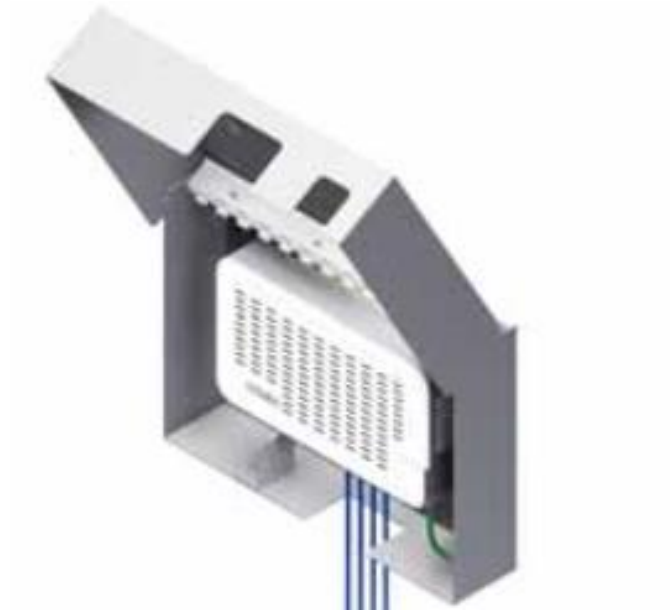


FIGURE 4 WALL MOUNT DISTRIBUTION BOX FOR PRE-DEFINED OFFICE

Wall Mount ODF in the FTR

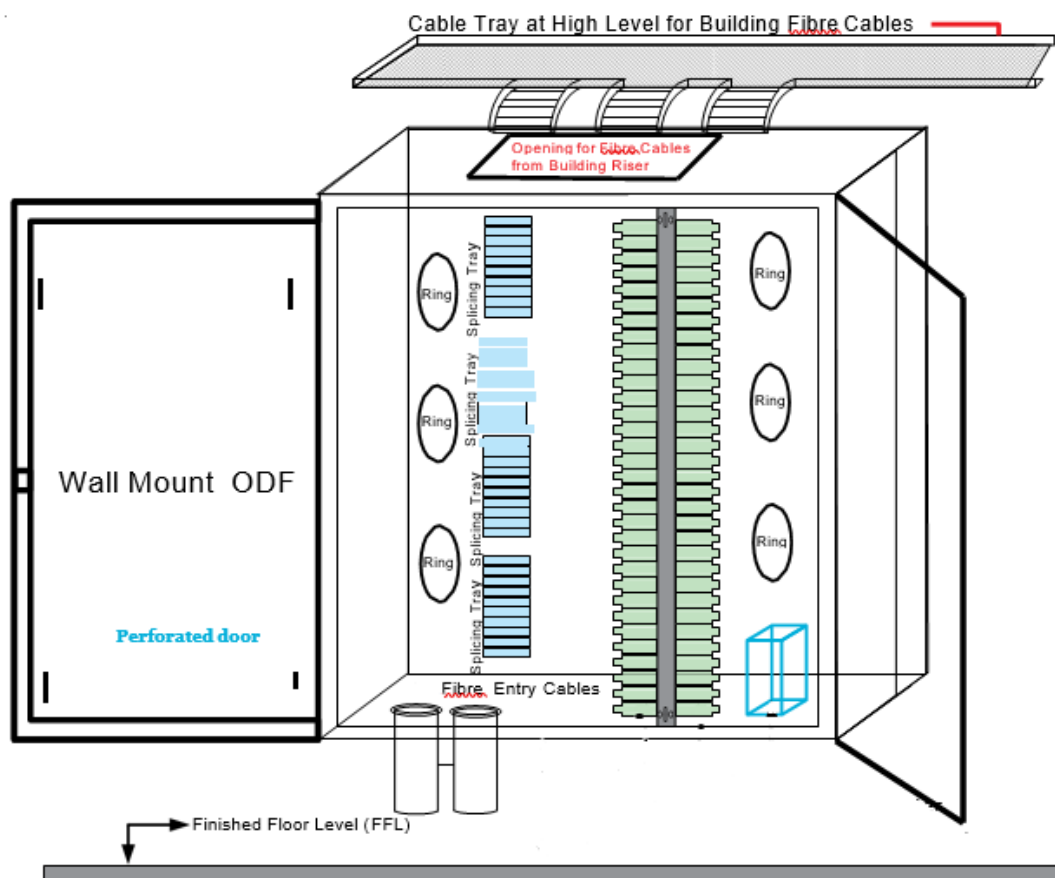


FIGURE 5 WALL MOUNT ODF