

NEW CAPITAL

INTERNAL INFRASTRUCTURE GUIDELINES

NTRA

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Objective

The purpose of “Internal Infrastructure Guidelines” is to give design consultants a list of considerations that are to be completed during the design and construction of their relevant project developments within New Capital Project. The details provided is the minimum requirements of for the buildings, primarily to develop and deploy FTTH (Fiber To The Home), based on GPON technology.

It is mandatory that all design consultants conform to the “Internal Infrastructure Guidelines”, to ensure Smart Service compatibility and capability for their relevant project development, during the building permit application process.

Target Audience

This document is intended for use by Design consultants involved in design of services in project developments within New Capital City. The design consultants are obligated to coordinate with the utilities and services providers designated by the city owner during the preliminary design and detailed design stages.

Scope

To provide the internal infrastructure and associated requirements for different residential building types. The various types of residential buildings are grouped as medium high-rise buildings and independent villas.

Disclaimer

The information provided in this document is to help design consultants to accommodate the containments and cabling requirements for smart services into their project development designs. It shall not be considered as a design document.

The information detailed in this document is not to be considered as a work instruction. The information provided is to assist design consultants understand the type and nature of containment requirement for smart services in their project developments within the New Capital City.

General requirements

Entry box

- Entry box is an underground joint box built, exclusively to allow installation of New Capital underground cable network to the customer's premises.
- The entry box is a reinforced concrete structure, with a heavy duty Ductile Iron Frame and Cover of rating grade 'A' and size is 60x60x80 cm. The cover shall have marking as "Telephones"
- The location of the entry box, depends on the location of existing/proposed New Capital external line plant
- The entry box should be constructed at a maximum distance of 1 meter from plot line. If it is not practical to install within the plot, then install it outside the plot. Due to the variables involved, it is essential to consult New Capital administration at the design stage, to decide the location of the entry box and entry pipe. The contractors must not deviate from the agreed location.
- An earth rod must be provided at the entry box. The required earth resistance should not exceed more than 5 ohms.
- For entry box size details please refer to Table No. 1

Entry pipes (Lead-in ducts)

- These ducts are to be extended from the entry box towards premises and towards New Capital line plant location.
- The entry pipe should be of uPVC material and of black color
- Entry pipes should be laid at a depth of 60 cm from the proposed finished paving level. The entry pipe must be protected with concrete to prevent damages.
- Entry pipe should be extended to the entry box and beyond to the nearest existing provider plant location, or 1 meter from plot limit or as advised by provider
- The open ends of the entry pipe must be properly sealed, to prevent entry of sub-soil materials and ingress of water
- Location of entry pipes must be clearly marked, above ground for easy location
- Building contractors shall be responsible to locate the installed entry pipes on site
- No right-angled sharp bends should be installed throughout the duct length, except one wide-angle, long radius bend (factory made) at the terminating end of the duct, inside the main telecom room. Alternatively, at the location of the wide angle bend, a cable pull box of minimum size 600(L) x 700(W) x 800(D) mm must be provided.
- Entry pipes must be assigned, exclusively for telecommunication services.
- Entry pipes must be provided with a draw rope made of nylon of minimum 6 mm diameter
- For the number and size of entry pipes, for the various types of buildings, please refer to Table No. 1

Main telecom room

- Main telecom room should be a dedicated room. This is to be provided either on the ground floor or basement for the purpose of terminating telecommunication cables and to house the present & future telecom equipment. The room must be exclusively for telecom use.
- The room must be easily accessible to provider technicians 24 hr./day, (all days including weekends). The room must be clean, dry and free from dust and secured from unauthorized entry.
- Adequate lighting and minimum of four 20 Amp and 240 volt A.C. Mains outlet from a dedicated circuit breaker should be provided.
- The room must be air-conditioned/ air circulated secured depending on the telecom room usage
- The room must be provided with a good earth rod of not more than 5 ohms
- The door opening for the room should swing outwards
- The floor, roof and surrounding wall of the telecom room, should be free of any concealed water/drainage pipes and air-conditioning ducts passing through
- The room must be provided with an emergency light, smoke detector and a fire alarm, If the telecom room is proposed in the basement the duct entry to building must be sealed air and water tight
- For the main telecom room size, please refer to Table No. 1

Floor telecom room

- Floor telecom room is a dedicated room and required on each floor for the purpose of routing and/or terminating telecommunication cables. The room should be exclusively for telecom use refer to Table No. 1.
- The room must readily be accessible to personnel and equipment 24 hr./day, (all days including weekends). The room must be clean, dry and free from dust and secured from unauthorized entry.
- The door opening for the closet should swing outwards, when opened for the floor telecom closet size, please refer to Table No. 1.

Roof-top telecom room

- Roof-top telecom room, is a dedicated room to be provided on the roof-top of the proposed multi-storey buildings, exclusively for telecom use and secured from unauthorized entry. The minimum roof-top telecom room size should be 3(L) x 3(W) x 3(H) meter.
- The floor loading of this area must be maximum possible, to support future installation of telecommunications equipment.
- The location of the room should be within the vertical structure of the building, to extend related facilities required such as air-conditioning, 3-phase power (Distribution Board) DB, earthing less than 5 ohms, adequate lighting, one 13 amp 240 v AC power socket and one telephone socket.
- The room must be provided with an emergency light, a smoke detector and a fire alarm

- The room must be easily accessible to authorized personal 24 hr./day, (all days including weekends). The room must be clean, dry and free from dust and secured from unauthorized entry.

Risers from main telecom room to individual floors

- The risers are required in multiple-storey buildings for the installation of telecom fiber optic cables from main telecom room to other floors, as detailed below:-
 - o Galvanized slotted iron cable trays (minimum 200x50 mm HDRF (Heavy Duty, Return Flange) should be provided from the main telephone room, to each telephone closet and extended up to the roof telephone room
 - o The risers to each floor must be symmetrical and vertically in line with the main telecom room.
 - o However, where the main telecom room, floor telephone closet and roof telecom rooms are to be located one below the other in vertical line, a continuous cable tray / conduits must be provided with pull boxes/access panels at every turning point and at interval of 15 meters each, up to the main telecom room.
 - o Right angle or sharp bends are to be avoided

Floor distribution box

- Floor distribution boxes are metallic boxes, concealed, located on the wall, where the internal conduit from every flat is terminated. These empty boxes, should be located close to the risers and can be more than one, depending upon the number of flats and conduits proposed to be terminated. These distribution boxes facilitate to route the fiber optic cables to the premises direct and the number of cables corresponds to the number of flat/premises.
- The distribution boxes should be of size not less than 30(L) X 30(H) X 15(D) flush mounted on wall and should be fixed inside the telecom room of each floor. A suitable hinged cover must be provided
- It should be installed at a height of 120 cm above the finished floor level
- The conduits leading from the floor distribution box towards flat, should not be less than 25 mm diameter
- Adequate safe working space is to be provided around each location
- The distribution boxes on a floor, should not be linked to or serve any other floor of the building
- The distribution boxes location should never be near any electrical junction box or bus bars. Adequate safe working space should be provided in front of each box
- A single conduit of at least 25 mm (1 inch) internal dia., of uPVC material should be provided from each floor distribution box to the indoor equipment cabinet of each residence, flat and other independent areas in the same floor

Telecom Requirements	Single villa	Building area up to 3000 m2
Entry Box	Size: 60x60x80 cm. Location: Within the compound and at Max 1 m from compound wall line	Size: JRC 12 Joint Box Location: Within the property, near plot line. Additional Boxes at all turning points of lead-in
Entry Pipes/ Duct	A single (2") inch pipes/duct towards the villa & single x (2") inch pipes/ducts to be extended outside the plotline towards provider Network	2x (4") inch pipes/ducts towards the building and four x (4") inch pipes/ducts towards the provider Network
Apartment Indoor Distribution Cabinet std 19" Rack	12U (H) x 600 mm (W) X 515 mm (D) flush mounted on wall	24U (H) x 800 mm (W) X 800 mm (D) Stand alone type 19" equipment Cabinet
Floor Distribution Box	Size: One 30x30 x15 cm box recessed inside the wall for each floor. Location: Convenient location with 1 meter free wall space around and at a height between 40-120 cm above finished floor level.	Size: One 30x30x15 cm boxes flush to wall Location: To be provided in each floor Telecom Closet
Main Telecom Room	No requirements	Size: 2x3x3 (LxWxH) meters Location: In the ground floor common area.
Floor Telecom Room	No requirements	Size: 1x2x3 (LxWxH) meters Location: In common area
Floor Telecom Closet	No requirements	Size: Closet (LxWxD) 100x60x40 cm Location: In common area
Riser Cable Trays	No requirements	20x5 cm cable trays

Table No. 1

Distribution from indoor equipment cabinet

Flat distribution

- A secured indoor equipment cabinet should be of minimum size 12 U and width 600 mm and depth 515 mm to house the Optical Network Termination (ONT), power sockets and patch panel/IDC modules. The cabinet should be flush mounted on wall. The cabinet

should be dedicated to each residential flat and to be sited in a secured place. The location shall be suitable for technician's access, when required.

- The location of the indoor equipment cabinet should be at a common point, where all the internal conduits meet and the Structured Cabling System on a star topology can be installed. However, the farthest socket must not exceed 90 m from the cabinet.
- Two power sockets are required, inside the indoor equipment cabinet, for powering the optical network unit and battery rectifier.
- The cabinet distribution box location should not be adjacent to any electrical distribution or bus bars.
- The cabinet distribution box should be installed at a height of 120 cm above the finished floor level
- All internal conduits should be of a diameter not less than 25 mm (1 inch) to extend the structured cables from ONT to socket locations at each room.

Villa distribution

- A secured indoor equipment cabinet, should be of minimum size 12 U and width 600 mm and depth 515 mm to house the Optical Network Termination (ONT), power sockets and patch panel/IDC modules. The cabinet should be flush mounted on wall. The cabinet should be dedicated on each villa and to be sited in a secured place. The location must be suitable for technician's access, when required
- A secured distribution box of size 30 (L)x30 (H)x15 (W) cm flush mounted on wall is required in every floor of the villa, for distributing Cabling System, from the indoor cabinet
- The floor distribution box should be kept at a convenient and easily accessible location where the floor distribution conduits are terminated. It should be installed at a height between 40 cm and 120 cm above the finished floor level
- The distribution boxes on different floors of a villa should be connected through a PVC conduit, of a 50 mm diameter
- The distribution box should have one 50 mm (2 inch) conduit to the rooftop of the villa, from the cabinet or from the telephone entry duct location, in order to provide access to cables from the antenna

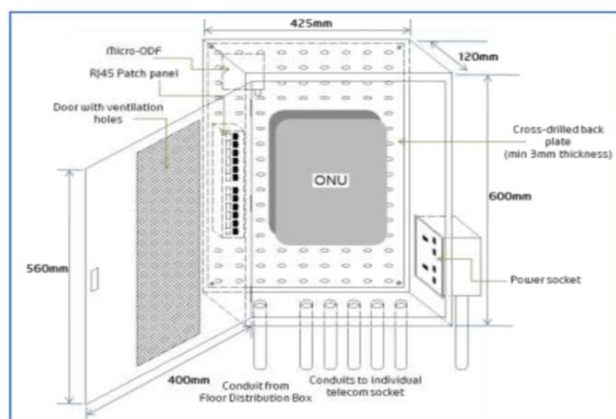


FIGURE 1 ONT CABINET FOR RESIDENTIAL BUILDING/VILLA

Installation of in-building fiber drop cables

High-rise buildings

- The building owner should install a minimum of 2 core fiber drop cables, from the main telecom room ODF location to the indoor cabinet location of each flat/premises. Installer to leave an extra length of 3 m of cable on either end for terminations. The cables must be suitably labeled

Single villas

- In the case of single villas, building owner will extend and terminate the fiber drop cable, directly in the ONT.

Cabling & termination

Telecommunication cabling

- The cables used for these wiring must comply with minimum CAT 6 standards
- The planned Cabling System should meet the designed service requirements within the particular flat level and should have built-in flexibility, to meet growing needs of the residents
- All cables are to be properly labeled and terminated, in the RJ45 sockets and in-patch panel or in CAT 6 compliant IDC modules by the owners
- The physical topology of the horizontal cabling should be configured as a star with each outlet connected directly to a flat/apartment distribution box inside the flat or apartment. No looping of cables from outlet to outlet is permitted
- The length of cable between the farthest telecommunications outlet and the distribution box should not exceed 90 m
- All conductors in each cable should be connected to a single RJ45 socket at the work area outlets and patch panel. Each cable should be terminated to maintain the twists in each pair within 5 mm of the termination. Proper strain relief should be provided for the cable at the outlets and patch panel, avoiding strain on the conductors.
- The minimum size of a conduit pipe used as a horizontal pathway from the distribution box to the telecommunications outlet should be 25 mm
- For the conduits, the inside bending radius should always be at least 10 times the internal diameter
- Minimum of one nylon draw wire must be installed in a conduit
- Maximum number of UTP cables inside a conduit, recommended for the installation of a Structured Cabling System is 7 cables.
- Building/Flat owner is responsible for replacement of in- building cables and other fixtures, if these become faulty
- The supply and termination of UTP cables on patch panel or IDC modules and sockets locations should be the responsibility of the installers/owners

Telecommunication socket

- All outlets should be Category 6 performance, outlets mounted in shutters, typically in dual, triple or quad formation in a single or double gang white faceplate.
- All RJ45 outlets should be fitted with spring loaded sliding shutters to prevent the ingress of dirt and dust.
- Provision for at least one dual socket for telecommunication services should be made in every room including kitchen. Conduit with not less than 25 mm should be connected between the socket locations
- Every socket must be connected with a minimum of four pair SCS Cat 6 cable, following star topology.
- Telecommunication sockets, cables and associated facilities within the various rooms and premises are to be provided by the building owner
- The choice of outlets distribution, location and type, either it is single, dual, or quad, the optimum requirements in each area, ultimate number of outlets in every locations, flexibility and maximum usage, should be the responsibility of consultants.

Patching

- All horizontal UTP cabling should be terminated in a 12 or 24 port patch panel, placed inside the wall or floor cabinet. Alternatively, Cat 6 compliant IDC modules can also be used.
- Voice services can be fed from the services patch panel directly to the user outlet using standard 1 pair patch cords.

Labeling

- All floor outlets, patch frames and horizontal cables should be labeled. A typewritten standard labeling system is recommended. The labeling scheme shall be agreed on with the clients' telecom team.

Protection from electromagnetic interference

To avoid EMI, the telecommunications pathways, spaces and metallic cables should be installed with the following clearances:

- 1.2 m from large motors or transformers
- 0.3 m from conduit and cables used for electrical power distribution
- 12 cm from fluorescent lighting

Annex No.(1)

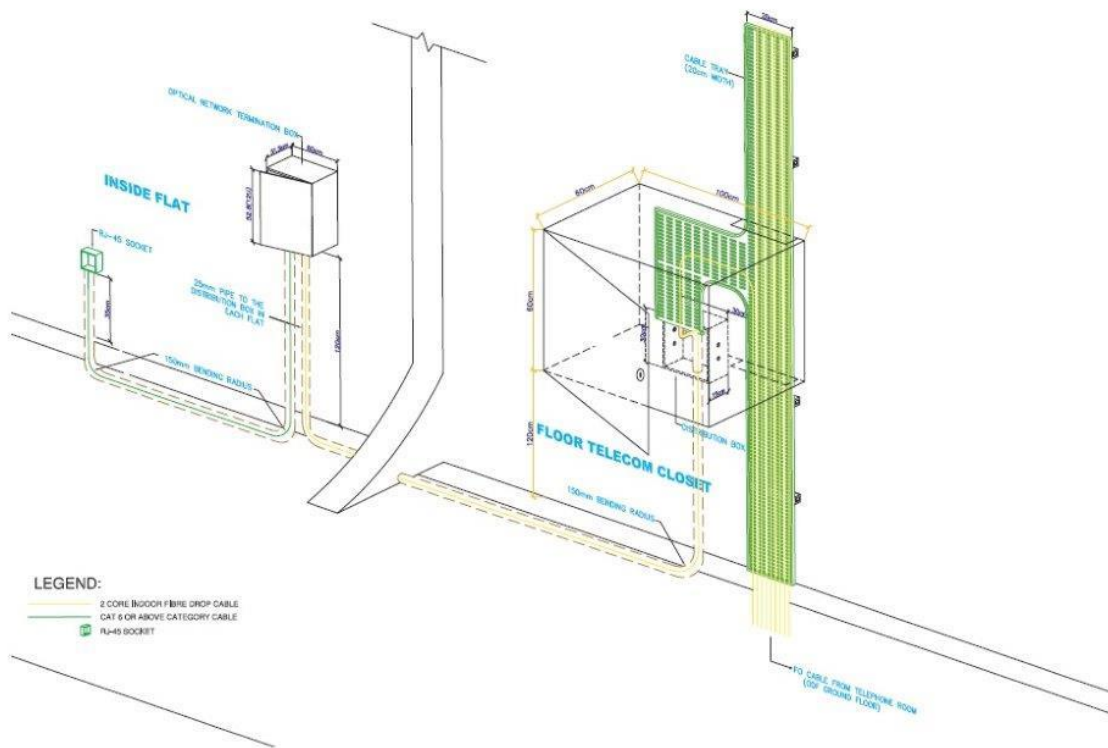


FIGURE 2 TYPICAL TELECOM REQUIREMENT IN MULTI-STOREY BUILDING

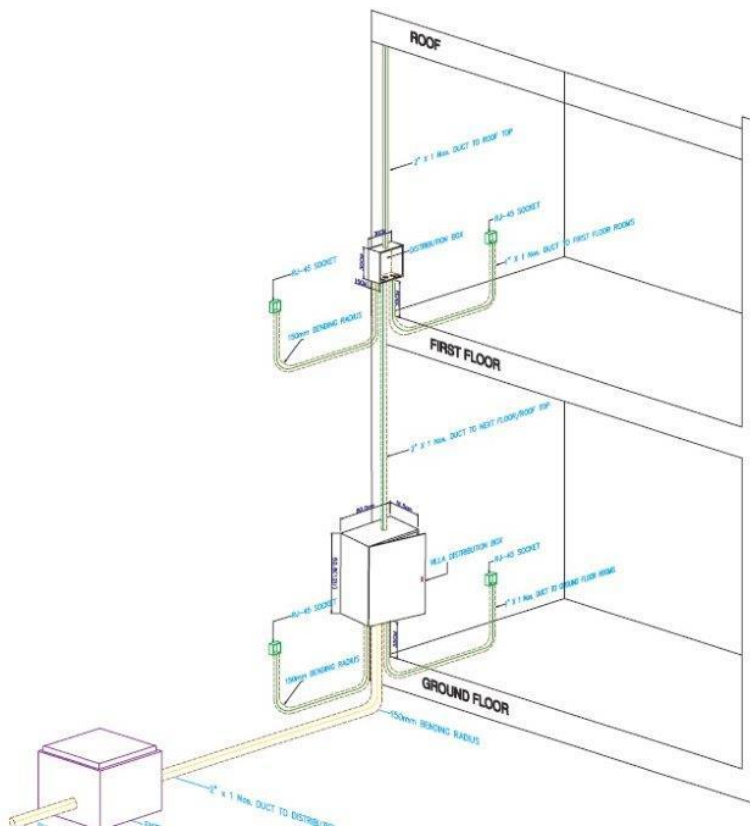


FIGURE 3 TYPICAL TELECOM REQUIREMENT IN SINGLE VILLAS