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GTC Technical Guidelines – Fibre to the Home

GTC Technical Guidelines and Safety information
for House builders and Developers



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1. INTRODUCTION

This document details the requirements to provide voice data services to both single and multi-dwelling premises. The document is designed to enable you to undertake the works to provide the minimum requirement necessary to enable service, but does not preclude you from adding supplementary requirements to meet local or customer specific needs.

The installed Customer Premises Equipment (CPE) is capable of providing up to two telephone lines and 4 independent data feeds irrespective of the number of telephone and data sockets installed throughout the premises.

Where a Fibre Integrated Reception System (FIRS) is specified it will give the ability to distribute a full range of digital television signals (satellite and terrestrial) and DAB radio from a central location to individual premises on the site. If your development has a FIRS solution, please consult our FIRS Technical Standards (GF-CIC-ES-0059) which needs to be followed in conjunction with this document.

2. SAFETY

Safe Place of Work

GTC requires a safe place of work to be provided for all its staff and contractors. Initial enquiries shall be made seeking confirmation that the construction site is a safe place to work.

Upon arrival to site, staff and contractors shall report to the site manager/representative to discuss intended works. Prior to undertaking this work, a site specific risk assessment will be undertaken. If, following this assessment, the works cannot be undertaken in a safe manner, the site manager/representative will be informed. Until a safe working environment is achieved, no activities shall be undertaken.

Site Traffic Rules

All site traffic information should be made available to the team/operative when arriving on site, via a site induction or/and during the booking in on-site stage.

Equipment and Materials

All materials shall be handled, transported, stored and fixed in accordance with the manufacturer's requirements. Any dispute between such requirements, this documentation and the British Standards Institution, shall be referred to GTC in writing for a decision.

The Site Manager/Representative shall ensure their equipment and materials are operated and stored in such a manner that they do not become a hazard within the working area of the team/operative.

Scaffold

Ensure all scaffolding where the team/operatives are to work is removed prior to their arrival on site.



Welfare Facilities

In the majority of cases, welfare facilities are to be made available on site from the Principle Contractor.

Competence

Any staff and/or appointed contractor working on behalf of GTC who attend site shall have the appropriate training, technical knowledge and experience to discharge the intended works in a safe manner.

3. PROJECT LIFE CYCLE

3.1 Prestart Meeting

Prior to the beginning of Works on site, a pre-start meeting will be arranged by GTC with all parties that are expected to direct installation of IFNL materials. A pre-start checklist and where applicable, a schedule of additional information requirements form, will be completed. An example copy of each document is attached (please see Appendix C).

Where it is indicated on either the pre-start checklist or the additional information requirements form as your responsibility, you agree to provide any additional information so requested or provide clarification as soon as possible.

We will not be responsible for any delay to the Programme of Works caused in whole or in part by a failure to provide any applicable pre-start checklist clarification or additional information requirements in good time.

At the pre-start meeting we also require confirmation of the status of your relevant planning permission and where applicable, you may be required to enter into a way leave agreement with us so that we have the necessary rights to access, lay, use, inspect, maintain, repair, replace, remove and renew the Equipment and/or Installation Materials provided.

3.2 Programme of Works

You should give GTC as much notice as possible of any changes or anticipated changes to the Programme of Works in order that this change can be managed.

It should be understood that any delay to the Programme of Works could have a like for like delay in the ability of GTC to complete our works and we will not be liable for this delay. Where a variation to the site or building layout is deemed to be minor in nature, it may be incorporated into the 'as fitted' or 'as laid' drawings.

We do however reserve the right to charge you for any costs incurred directly or indirectly as a consequence of a change to the site or building layout which is deemed to be major in nature. In either case whether a change is deemed to be minor or major in nature will be at our sole discretion acting reasonably.



The Fibre Network will be installed and made live within a minimum of 20 weeks from acceptance of the GTC offer and receipt of all required minimum information needed to complete fibre design and plan all required works, this information includes:

1. CAD designs of the development (in .dwg format) with plot numbers, details of the site boundary with any planned S278 works clearly marked.
2. Details of any pre-planned service strips.
3. A clear indication of where the Fibre Network entry point will be for each home.
4. If the development is a Multi Dwelling Unit (MDU) details should be provided on the location of the internal Communications room that can be used to house telecommunications apparatus with details of all tray work leading to the riser locations.
5. Floor plans will also need to be provided with plot numbers and details of the riser locations. Details should also be provided in each apartment detailing where the Fibre should terminate and where the Home Hub box can be located.

Once we have received your acceptance of the GTC offer with the minimum required information we will require the following minimum notice periods for completion of our Works:

- 4 weeks to complete the Fibre network design
- Once you have completed all required OSCP construction activates we will require a further 10 weeks to complete all required connectivity installation works and commission and test our telecommunications equipment. No customer connections can be made until these activates are completed.
- 8 weeks for Equipment and/or Installation Materials ordering and delivery to Site. It should be noted that this includes the equipment located within premises later referred to as CPE.
- 2 weeks for commissioning of an installed system within an individual premise from date of call off by you (further information on this can be found in section 9 of this document).

The contract between us assumes that we will be asked to connect not less than three individual premises per visit to the Project where we are required to perform the Works.

3.3 Supply and Storage of Equipment and/or Installation Materials

Equipment and/or Installation Materials will be made available to you in accordance with the Programme of Works.

You are required to provide a secure storage area for any Equipment and/or Installation Materials required to complete the Works.

Any Equipment and/or Installation Materials provided to you for the Works will incur a charge for replacement in the event they are lost, damaged or stolen.

Excessive or unreasonable use of Equipment and/or Installation Materials will also incur a charge.



3.4 Client Works

Client Works must be completed to the standard of a Reasonable and Prudent Operator. Client Works are further detailed in the remainder of this Technical Standard document.

3.5 Quality of Works

At periodic intervals during the Programme of Works we will carry out routine quality checks.

Any identified Works not completed in accordance with the contract between us will be reported to you. You will be required to make good any identified deficiencies in the Works at your own expense. We will not be responsible for any delay to the Programme that these re-works may cause.

Duct and associated infrastructure must comply with the recommendations specified in c entitled: "Guidelines on the positioning and colour coding of underground utilities' apparatus, including New Development sites".

Further details of the Works you are required to perform are set out through the remainder of this Technical Standard document, and the requirements detailed take precedence over the NJUG document.

4. ON SITE CONVERGENCE POINT (OSCP)

4.1 OSCP Definition

The 'On Site Convergence Point' ('OSCP') is the name assigned to the building, street side cabinet or room, together with the collection of equipment placed within it, which is required to enable provision of fibre services to your site.

GTC will let you know the option that is most appropriate for your project and agree the location of the building, street side cabinet or room as required, at the pre-start meeting.

4.2 Physical Requirements for OSCP Building/Room

Exact requirements will be agreed at the pre-start meeting. However you will be required to construct and for our permanent use and ownership an OSCP building or room which meets the minimum specification requirements of the IFNL standard design, and is compliant with all appropriate requirements of the Building Regulations Parts A to P (including amendments to the Approved Documents).

This minimum specification for the IFNL standard design, capable of servicing up to 6000 plots, is shown in Table 1 below. If your development has over 6000 plots GTC will consider a bespoke OSCP design to cater for your specific needs.

This is to be read in conjunction with the IFNL standard layout drawings for an OSCP. These can be obtained from your GTC Account Manager or Fibre Project Manager.

Should you be unable to fulfil any of the listed requirements you must notify us at the earliest opportunity, but in any event prior to the pre-start meeting.



Table 1 – OSCP Build Requirements Matrix (standard design up to 6000 plots)

Item	Requirements
Min Internal Dimensions (LxWxH to ceiling soffit)	2400x1600x2800mm
Access	Vehicular access is required within 5m of door with a level access route.
Doors / Locks	OSCP heavy double doors shall be minimum 1500mm wide and 1800mm in height. All doors shall open outwards. The doors shall comprise double skinned GRP or Steel leaves, pre-hung in a suitable robust frame. The doors must be weather tight and with provision for a padlockable handle. Use of the Sunray heavy door (without louvers) is recommended installed with the Sunray 3 point lock system and padlockable handle.
OSCP "meet me" Ducts and Chambers	1 x JC3 chamber in standard positions outside the OSCP. The JC3 shall have 6 x 90mm I/D ducts into the OSCP. Site specific details to be provided in the IFNL fibre design.
Duct / Chambers for Offsite Connection route	1x JC2 chamber at edge of site connected to the JC3 at the OSCP via 1nr 90mm I/D duct. Site specific details to be provided in your fibre design.
Room Internal Finishes	Floors: Chemical Resistant Anti Slip Floor Paint, Light Grey. Walls and Ceiling: Vinyl Matt Emulsion, Off White. Woodwork: Gloss or Satin, Brilliant White
Mains Power Connection	230v 100A single phase metered supply
Distribution Board	Distribution board to be capable of 3 phase use, but fitted for single phase, 100A Mains Switch, 63A RCD
Socket Outlets	One 63A Commando wall mounted socket fitted adjacent to Rack 1. GTC project manager can provide guidance on location discussed at your pre-start meeting. Minimum of 4x twin 13A surface mounted switched outlets. All wiring will be contained in 20mm high impact PVC conduit all switches and wiring accessories will be high impact, non-metallic and fully insulated and sourced from a quality manufacturer



Item	Requirements
Lighting	Minimum of 2x 4' twin anti-corrosive polycarbonate switch start units with 2x36W lamps
Heating	1x 3kW wall mounted Dimplex WFC3NS fan convector heater with inbuilt thermostat and frost protection setting
Equipment Earthing	6 way earth bar, with single disconnecting link, connected to independent earth rod or integrated to building earthing system as appropriate. There are specific earthing requirements for OSCP cabinets located next to substations and combined OSCP and substation buildings. For combined substation buildings the LV supply is to be provided using a Series 6 cut-out providing a separate Neutral & Earth. The earth will be provided as a separate connection from the substation earth. Please consult the relevant drawing for more information.
Equipment Environmental Conditioning	This may be required in some specific circumstances; a precise specification will be agreed with you at design stage if this is necessary.
Building Alarms	IFNL install alarm and monitoring equipment. Where appropriate though, integration to building Smoke and Fire Systems will be agreed with you at design stage.

4.3 Duct Entry in to the OSCP building

All OSCP's shall have a minimum of six 90mm I/D ducts installed to provide distribution and back-haul cabling requirements. Duct segregation is needed between the incoming back-haul cables and the outgoing distribution cables at all times.

4.4 OSCP building Multi-services Chamber

The OSCP multi-services chamber is a large JC-3 chamber located directly outside the OSCP or on the footway closest to the OSCP location. This chamber is used to merge all incoming and outgoing cables from the OSCP into the six 90mm I/D ducts that directly enter the OSCP from this chamber.

4.5 OSCP Street Side Cabinet – For Development up to 840 plots

A street side cabinet deployment can be used to support developments of up to 840 plots. The cabinet is delivered prewired ready with all active and passive equipment to support voice and data services and will be installed by GTC. You will be responsible for building the appropriate plinth and ensuring a suitable single phase LV feed is provided to the cabinet once in place.

If FIRS is a requirement on the site then GTC will need to deploy an additional expansion bay onto the standard cabinet. This configuration has a separate plinth requirement.



The street side cabinet has a series of duct entry points for power, earth and fibre cable routes into the onsite network. The expansion bay has a duct entry point for satellite and terrestrial TV signal cables.

4.5.1 Positioning of the Fibre Cabinet

Cabinet positioning is determined by the fibre design.

When planning the installation of a Fibre Cabinet the site position needs to be checked for the following considerations:

There is 90mm I/D clearance between the rear of the cabinet shell (50mm from standard base) and any fixed structure to allow cabinet shell maintenance.

There is sufficient clearance around and above the completed base to allow the cabinet shell to be lowered in to position using a mechanical hoist.

Once the cabinet shell is in place all the doors must be able to open a minimum of 90o.

There is a minimum width of 1.2m footway available from the front of the cabinet shell to the road side edge of the kerb to allow pedestrian access around the fibre cabinet.

Where possible the cabinet is not sited where it would be vulnerable to damage e.g. close to the kerb edge rather than at the rear of the footpath.

4.5.2 Plinth Designs

Where it has been agreed that a Street Side Cabinet can be deployed you will be required to build the required plinth to support the cabinet installation.

There are two plinth designs, the first supports the standard voice and data cabinet where no FIRS is required and the second supports a voice and data cabinet with the required expansion bay needed to support the additional FIRS equipment. Specific details on Plinth dimensions can be found in Appendix E.

4.5.3 Street Side Cabinet Electricity Supply

You will be responsible for delivering a single phase LV supply to the cabinet that is capable of supporting a load of 1KWatt. If the cabinet is located next to a substation then the LV supply is to be provided using a Series 6 cut-out providing a separate Neutral & Earth. The earth will be provided as a separate connection from the substation earth. The cabinet will be bonded to the substation earth mat. Please refer to the GTC project manager and consult relevant electrical design drawings for more information.

Deployment of a cabinet within a 10 metre radius of a substation should be referred back to the GTC project manager so the specific earthing requirements can be defined.

All electrical works are to be carried out in accordance with BS7671.

All cable ties to be cut level leaving no sharp edges.

All metal work and racks within the cabinet are to be earthed. Where the fibre cabinet is located next to an Electricity substation the cabinet should be deployed within the boundaries of the substation's earth mat and must be connected to the substation earth.



4.5.4 Cabinet Earth Rod Installation

A hole is to be excavated to accommodate the earth rod in the appropriate template position to a depth of 1.5m, ensuring that no services are visible within the located area.

The Rod is to be installed in the hole, which is then backfilled and compacted.

The use of conductive concrete maybe used in place of an earth rod arrangement.

Earth readings at plinth build stage

The earth testing must be carried out to appropriate standards and the results must be recorded within the job pack and verified correct by the signature of the person who has the overall responsibility for ensuring the testing has been accurately carried out.

Earth readings for conducrete are not taken at the plinth build stage.

Earth readings on earth rods at plinth build stage must be between zero (0) and one hundred and thirty (130) ohms with the following stipulations in place:

If the initial earth reading is 0 to 130 ohms with 1 rod provided in plinth that is acceptable

If the initial earth reading is above 130 ohms then the following additional secondary earth systems should be gradually provided until 0 to 130 ohms is obtained : 2 external rods, 15m of earth tape and up to 3 earth mats (with programme manager approval)

If 0 to 130 ohms cannot be obtained using the combination of the secondary earth options the job should be referred to the region for a decision on cabinet positioning and provision

The above criteria apply at the Civils earth electrode test stage.

5. DUCT AND CHAMBER REQUIREMENTS

GTC will provide a Duct and Chamber design with 4 weeks of receiving acceptance of the GTC Fibre offer and all the required minimum information. The Duct and Chamber design will include:

- All onsite chamber location and types (e.g. JC1, JC2, JC3) on site
- Ducts from OSCP to associated chambers
- Location of an edge of site chamber for external services
- Duct requirement from edge of site chamber to defined OSCP Chamber
- Swept tee positions and orientation

You will be required to build this Duct and Chamber network as per the provided design. Where it is not possible to do so you should request a design change request to the GTC Fibre Designer or GTC Fibre Project Manager.



5.1 Chamber Construction

All chambers, irrespective of chosen construction materials, shall be constructed / positioned on top of a concrete base 150mm thick, with a clean and level surface. A sump of 100mm diameter, and 100mm deep is to be provided in each concrete base to enable chambers to be pumped dry.

Ducts shall not enter chambers closer than 75mm to any corner, at a minimum of 350mm depth (measured from cover level), and with an invert level of not less than 100mm above the chamber base slab. Duct entries are to be cut flush with the chamber walls, and rasped to remove rough edges.

The following table illustrates the types of chambers and the required standard depths.

Table 2 – Required minimum chamber depths:

Type of Chamber	Surface Type	Depth*	
		Standard (mm)	In close proximity of Carriageway with Road crossing (mm)
JC1/FW4 (915mm x 455mm)	Verge / Footway	600	600
JC2/FW6 (1310mm x 610mm)	Verge / Footway	600	600
JC3/FW10 (2315mm x 737mm)	Verge / Footway	600	750
CW12 (1220mm x 685mm)	Carriageway	1050	1050

* Standard depth of chamber from the base to the underside of the cover

All Footway chambers are to be of modular construction where possible. A minimum chamber depth of 600mm above the concrete base is to be maintained at all locations to enable the installation of fibre equipment and service loops.

Specifications for chamber materials and construction are described here, with standard construction details provided in Appendix D of this Document.

5.1.1 Prefabricated Chambers

The GTC's preferred method for chamber construction is to use pre-formed modular chambers constructed in ring sections that are stacked on top of each other.

This deployment methodology provides a deskilled, fast-track method of construction which does away with the need for specialist box building teams and concrete backfill. Complete chambers can be constructed from excavation to reinstatement in little more than an hour.

Prefabricated chambers such as the "Quadbox"™ system (or similar and approved) may be utilised. A minimum of four full sections are to be installed on top of the concrete base to maintain the required 600mm depth.



5.1.2 Brick Chambers

Brick built chambers may be utilised. The bricks used shall be grade 'B' Engineering bricks to BS EN 771-1:2003, made by a plastic process, dense, hard, well burned, of regular shape and free from all visible particles of lime and from serious cracks. They shall not absorb more than 7% of their dry weight when immersed in water for twenty-four hours.

Where authorised, bricks used for Chambers, shall be load bearing Class 3 or better, either wire-cut or plastic pressed. They shall be of good shape, free from visible particles of lime and from serious cracks.

Calcium Silicate Engineering Bricks: Load bearing bricks Class 3 or better may be used for footway Chambers.

5.1.3 Duct entries

All ducts shall enter the chamber at 90 degrees to the chamber wall.

All ducts shall be finished flush with the inside face of the chamber wall.

The ducts shall be positioned a minimum of 50mm above the finished floor level of the chamber and a minimum of 50mm from any corner of a wall with spacing as dimensioned on the drawings. All entries will have any burrs removed on completion of the chamber.

5.1.4 Frames and covers

Frames and covers shall be located in position with the cover in place solidly bedding over the whole seating area to obtain an even bearing and shall not protrude above the surrounding surface level.

Footway and verge frames and covers shall be bedded on a 3:1 sand and cement mortar mix; there is no requirement for a fillet surround for frames and covers constructed in verges.

Carriageway frames and covers shall be bedded on an approved material and shall have the following properties:-

- shall be low shrinkage;
- shall have a minimum working life of 15 minutes;
- shall have a compressive strength in excess of 30/Nmm² in 3 hours; and
- shall have a tensile strength in excess of 5/Nmm² in 3 hours.

The re-instatement surround to frames and covers situated in paved footway areas shall be carried out using a Rapid Setting Mortar from an approved supplier detailed. Standard mortar mix is prohibited in paved footway areas. Existing slabs shall be cut to ensure that the footway frame and cover is situated so as to leave a minimum gap with due regard to the seating of the slab surround and in no circumstances shall exceed 100mm.

5.1.5 Cleaning

All Chambers shall be thoroughly cleaned and all debris removed on completion of construction.



5.2 Duct Network Construction

Duct shall be manufactured from purple un-plasticised polyvinylchloride (uPVC) in accordance with BS 3506:1969, and tested in accordance with BS.EN 50086-2-4 (450n compressive strength) and obtained from a technically approved supplier.

Table 3 – Duct dimensions:

Duct type Nominal I/D (mm)	Effective duct length (m)	Wall thickness (mm)	Socket length (mm)	Spigot ring length (mm)
90	6.0 & 1.5 (-0+10mm)	>3.05	100(+5-0)	100(0-5)
50	6.0 & 1.5 (-0+10mm)	>2.5	70(+3-0)	70(0-3)

5.2.1 Distribution Network Duct

This duct is standard 90mm I/D uPVC solid duct that is used as the primary duct network in all developments unless otherwise stated and agreed upon. The distribution duct will carry all distribution cabling from the OSCP out to all main distribution points in the network i.e. CLJ's, Main Distribution Joints, Multi-Dwelling Unit's.

5.2.2 Drop Network Duct

This duct is standard 50mm I/D uPVC solid duct that is used as the primary duct network in all developments unless otherwise stated and agreed upon. This is lead-in duct connecting the customer premises to the distribution ducting network via 90 Swept-Ts attached to the 100mm distribution duct.

5.2.3 Duct bedding and surround

Shall be loose earth, stone dust, quarry waste or sand which shall pass a 10mm sieve and shall be reasonably well graded with the particle sizes showing a uniform distribution throughout the mass. Sand shall be of the course angular variety and be used at the optimum moisture content as defined in the 'Specification for the Reinstatement of Openings in Highways'. Unacceptable materials as per clause S5.1(5) of HAUC Specification for Reinstatement shall not be used. All classes of materials shall be capable of being compacted around and between ducts of all types and shall not be capable of causing damage to the ducts or of leaving voids to form a watercourse. The material may be derived from on-site excavated materials but the Supplier shall also be responsible for the provision of imported material to make up any short fall.



5.2.4 Duct depth and Clearance

Duct will be installed at the following standard minimum coverage depths:

Table 4 – Duct depth:

Type of Duct Diameter	Depth of Cover		
	Agricultural(mm)	Verge & Footway(mm)	Carriageway(mm)
50mm/90mm Duct	1000	350	600

All types of ducts shall be kept well clear of gas or water mains, service pipes, sewers, subways, manholes, joint boxes or other plant belonging to other undertakers. The minimum clearance between the duct and other utilities shall be in accordance with the following table:

Table 5 – Service Separation:

Utility	Separation	Solution where not achievable
Low Voltage Cables (<100Volts)	150mm	Where not achievable a pre-cast slab, or layer of concrete C10 not less than 50mm thick, shall be placed between the 2 sets of plant to provide a minimum separation of 75mm
High Voltage Cables (Multi Core) (>100Volts)	300mm	Where not achievable a pre-cast slab, or layer of concrete C10 not less than 50mm thick, shall be placed between the 2 sets of plant to provide a minimum separation of 200mm
Gas Pipes	300mm	Where not achievable a pre-cast slab, or layer of concrete C10 not less than 50mm thick, shall be placed between the 2 sets of plant to provide a minimum separation path of 75mm
Water Pipes	300mm	Where not achievable a pre-cast slab, or layer of concrete C10 not less than 50mm thick, shall be placed between the 2 sets of plant to provide a minimum separation path of 75mm
Other Telecom Ducts	150mm	Where not achievable a pre-cast slab, or layer of concrete C10 not less than 50mm thick, shall be placed between the 2 sets of plant to provide a minimum separation path of 75mm



5.3 Duct inspection, handling and storage

Each duct shall be carefully examined immediately prior to laying and any damaged or defective ducts shall be marked in a conspicuous manner and removed from Site.

When handling ducting the following best practise should be followed:

- A. Loading and unloading: Care shall be taken when unloading ducts.
- B. Stacking: Ducts are supplied in timber framed block packs which may be stacked two high on a flat even surface.
- C. Removal of ducts from block packs: Care shall be taken when removing ducts from the block packs when the tension is released.
- D. Storage of loose ducts: Loose ducts shall be stored on a smooth flat horizontal surface, supported by side supports throughout their entire length, in accordance with the manufacturer's recommendations.
- E. Socketed duct storage: Socketed ducts shall be stacked in layers in accordance with manufacturer's recommendations and with the sockets at alternate ends of each layer. The socket on one layer should project beyond the duct spigots on the layer below.

5.4 Duct Laying

(a) Duct bed and surround

(i) Generally

The duct bed shall consist of a minimum depth of suitable fine fill (derived from site excavated or imported material) material and be flat and level. The bed shall be well compacted.

(ii) Rocky ground

In rocky ground, the duct bed shall comprise an extra 40mm depth of fine fill material to give a total depth of 65mm after compaction.

(iii) Support of adjacent structures

Where duct routes are located within the loading zone of influence of existing structures the trench will be infilled with concrete of minimum strength 10 N/mm² in order to ensure the structural integrity of the adjacent structure, as may be directed by GTC or Highway Authority and as shown on Standard Detail drawings.

(b) Duct alignment

Irrespective of the route taken the duct alignment shall be as straight as possible in the horizontal and vertical directions, with the overall requirement of the duct runs being fit for purpose.

(c) Duct arrangements

The duct shall be laid as a single duct or in multiple arrangements as shown on the Duct and Chamber design.



(d) Duct Laying

The duct shall be placed in the trench with its socket held by the duct layer. The first duct shall have its spigot end against a board acting as a buffer against which subsequent ducts can be driven home.

(e) Duct jointing

The spigot end of the duct shall be offered to the socket initially pushed in by hand and then to achieve proper engagement a suitable wooden batten is placed across the remote socket and tapped with a mallet. Full engagement is when the indicator on the duct seats properly. Joints shall be made in such a manner as to avoid any sharp internal edges that may interfere with cabling operations.

(f) Duct entering Chambers

The duct shall pass through the wall at right angles to the chamber wall. Ducts shall always enter with the spigot end, and be flush with the inside of the chamber. Ducting shall never enter chambers in the centre of a wall or at a joint of any two walls.

(g) By-pass ducts

Ducts shall not pass through a chamber unless instructed by GTC

(h) Preformed 90 degree bends

The only occasion where preformed ninety degree bends may be used is for customer connection duct into a building.

(i) Swept-t

Swept-t shall only be used on new or existing ducts for customer connection installations. On existing ducts, Swept-t may only be used on ducts containing customer connection cables. The use of Swept-t shall be limited to five numbers per chamber section length and shall all be installed in the same direction.

(j) Sweeps in duct routes

All sweeps shall be as gradual as possible and jointed above ground prior to installation. At the discretion of GTC preformed bends with a minimum radius of 5 metres may be used, but must be recorded by a named supervisor.

(k) Duct marker tape

A marker tape shall be placed over all ducts. Where duct configurations have caused a widened trench, more than one length of tape may be necessary to accommodate the extra width of trench. Marker tape shall be placed at a depth of 80mm from the uppermost duct or duct configuration. Depth of the marker tape from the surface shall be such that it shall be unaffected by hot lay materials.

(l) Duct couplings

No more than one short length (a maximum 1.0 metre long) of duct shall be used between chambers or swept tee positions.



5.5 Cleaning, testing and draw line installation

Cleaning, testing and draw rope installation to all ducts, customer connections and accesses shall be carried out prior to any subsequent operations commencing.

Ducts integrity shall be tested using an appropriate mandrel of rigid construction in accordance with the table below.

Table 6 –Mandrel construction:

Duct Size (internal diameter)	Mandrel Length	Mandrel Diameter
50mm	200 mm	43 mm
90mm	240 mm	83 mm

Draw ropes shall be installed with slack and secured in the underground chamber. Draw ropes shall not be secured to step irons.

5.6 Duct plugs or caps

After fitting ropes, a plastic purpose-made plug or cap shall be placed in all open ends of ducts in the chambers to prevent ingress of water and/or foreign matter.

6. BUILDING ENTRY METHODS

6.1 Overview

There are two methods of entry to both individual residential premises known as Single Dwelling Unit (SDU) and one method for Multi Dwelling Units (MDU). Should these methods be impractical, we will advise you and agree on suitable alternatives to utilise for the Project at the pre-start meeting. Additional costs for such alternates will be met by you as a Project Variation.

You must install a draw rope (which will be supplied by you) in all ducts, and all ducts are to be cleaned, by you, prior to quality checking and handover to us.

All open duct ends must be protected by a temporary seal to maintain the duct clear of blockages during construction work. Where required, we will provide a permanent seal once our Works are complete.

6.2 Single Dwelling Unit (SDU) Entry

Recommended. Option 1 – External Wall Entry

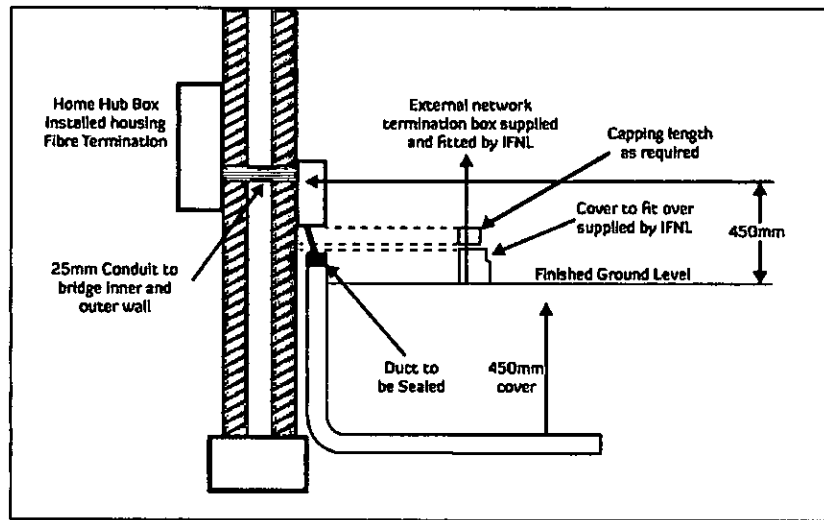
You will install the service duct from the swept T or directly installed from the chamber at a depth of 350mm-450mm below finished ground level. The duct will be brought to a vertical termination by means of a pre-formed 90 degree bend on the external wall. The services duct must be cut level two bricks below the damp proof course.

You will supply and install a standard 25mm conduit through the cavity wall at the point that is vertically above the end of the service duct. External Capping 25A and Connector Bend 4 should be fitted as required.



The Home Hub will be mounted on the internal wall adjacent to the external wall entry:

Figure 1 - SDU entry external wall



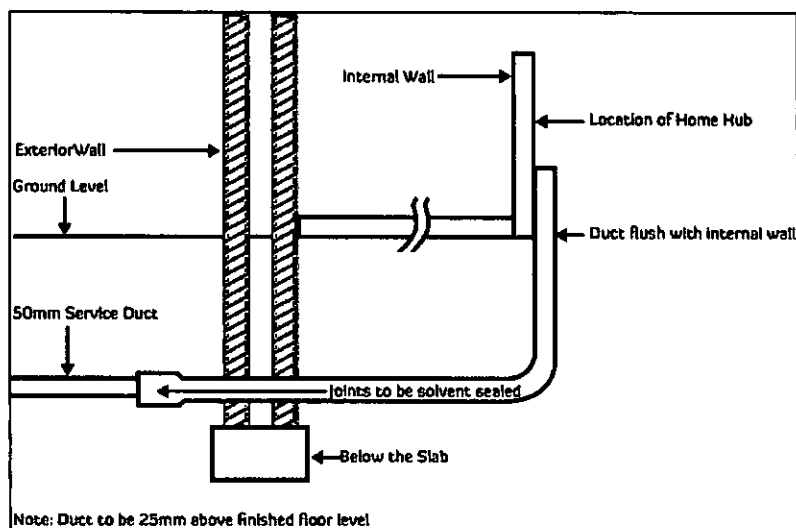
Where it is not possible to install the Home Hub on an internal wall adjacent to the external wall entry you may deploy the Home Hub in a more convenient location within the property. GTC will free issue a Micro Duct that you will need to install from the external entry point to a point up to 15 metres away at more convenient Home Hub location. Where deployed the 15 metres of Micro Duct must be installed in one contiguous fault-free length.

Option 2 – Below Slab Entry

You will install the service duct from the swept T or chamber. This is to be installed horizontally below the slab, and be brought to a vertical termination by means of a pre-formed 90 degree bend. The termination point will be against the outside face of the wall onto which the Home Hub and CPE will be mounted, and cut flush with the finished floor level, as illustrated in

Figure 2.



Figure 2 - SDU entry below the slab

6.3 Multi Dwelling Unit (MDU) Entry

The method of entry for individual MDU properties will be in the same manner as that shown in Figure 3, other than that a 90mm I/D diameter duct shall be used, terminating in the equipment room or riser space.

7. IN PREMISES INSTALLATION

7.1 SDU

We will connect fibre optic cable directly to the Customer premises Equipment (CPE), and protect this by means of surface mounted conduit between the point the cable exits the service duct and where it enters the CPE enclosure described in Section 8. It should be noted that, to enable this capability, the service duct (previously installed by you) from the external swept tee or chamber, is to rise directly below the position of the internal wall onto which the CPE enclosure will be installed.

Please note that the requirements described in Section 8 for electrical and data / telephony sockets at both the CPE location as well as those served by distribution cabling around the premise must be considered as the minimum requirement for an effective home network. Further cabling and sockets may be added at your discretion.

7.2 MDU

All MDU's in a development shall have a minimum single 90mm I/D duct entering the building for the cables to be installed through. Some buildings may have multiple entry points into the building along with multiple segregated riser shafts to serve premises on certain floors. All floor plans and riser shaft plans should be supplied to GTC at the fibre design stage to ensure an appropriate fibre design can be produced.



You will be required to provide the appropriate riser tray work and install an internal micro duct system (which we will supply) from the riser to the apartment that we will use to facilitate the delivery of fibre to each apartment.

8. APARTMENT AND MDU NETWORK DESIGNS

8.1 Small MDU – up to 25 Apartments

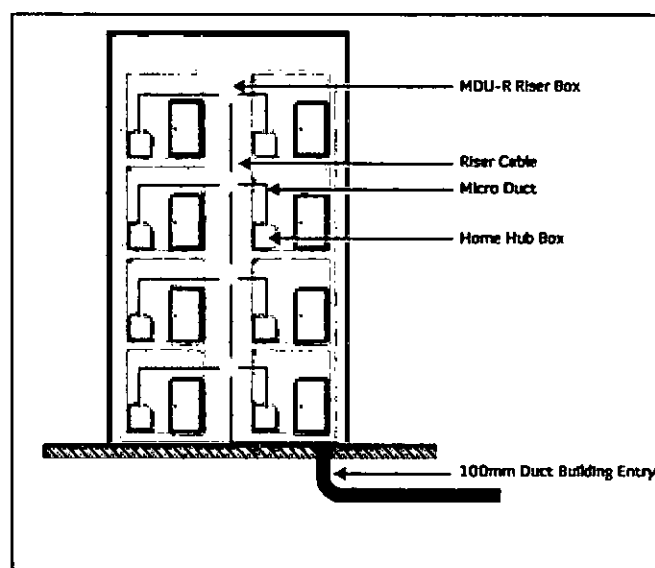
From the 90mm I/D diameter duct entry position you will need to provide and install appropriate tray work from the entry position to and then up the building risers. We will use this tray work to install our fibre cable and MDU riser boxes that are used to provide a service to each apartment.

You will also be required to install a free issued micro duct from each apartment to the riser where the allocated MDU-Riser box will be installed; this location will be clearly marked on the fibre design. Two metres of micro duct is required at each end of the installation which should be left coiled.

All micro duct runs must be kink and blockage free, with all open ends temporarily sealed to prevent ingress of moisture or extraneous material. If subsequently a fibre tail cannot be pushed through, we will require the remedial work to be carried out at your expense.

At a suitable and agreed programme window we will install the MDU riser enclosures within the riser as per the fibre design and run the required fibre cables up the riser. Following this we will install and commission Customer Premise Equipment (CPE), prior to occupation by residents.

Figure 3 – Small MDU Layout



8.2 Network Layout (Large MDU)

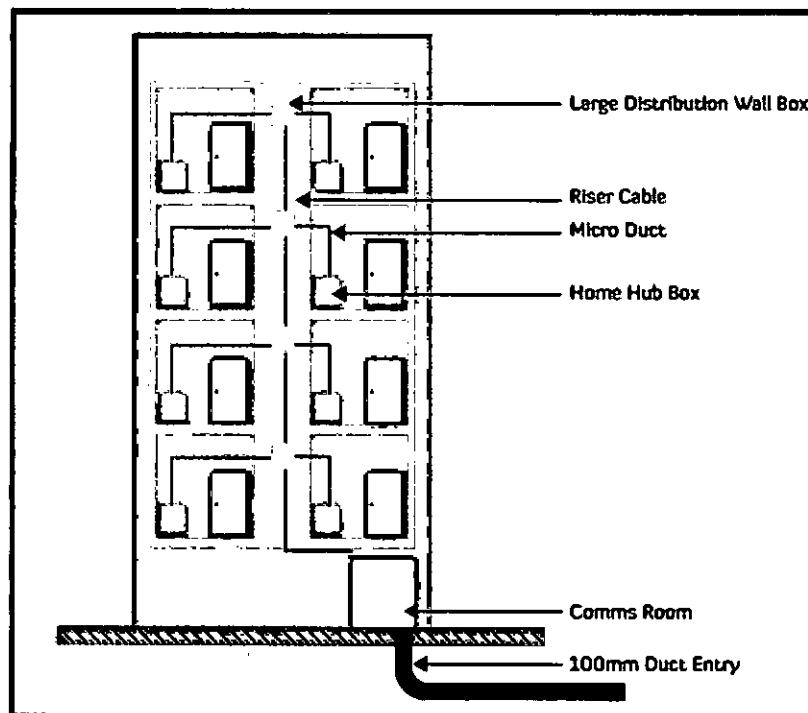
Larger MDU's tend to differ in layout and dimensions, so a tailored solution will be designed. Principally this solution will consist of a basement or podium level plant Comms room, giving access to one or more risers through the building core(s); where other buildings are to be served these will need to be connected by means of a private duct network which you will install to our design. We will access and own the secured OSCP room, and it will perform the function of the OSCP, in which we will install various cabinets to house our equipment including and Large Distribution Wall Boxes (LDWB) that are used to provide a service to each apartment.

From the Comms room you will need to provide and install appropriate tray work from the entry position to and then up the building risers. We will use this tray work to install our fibre cable. You will also be required to install a free issued micro duct from each apartment to the riser where the allocated LDWB will be installed, this location will be clearly marked on the fibre design. Two metres of micro duct is required at each end of the installation which should be left coiled.

All micro duct runs must be kink and blockage free, with all open ends temporarily sealed to prevent ingress of moisture or extraneous material. If subsequently a fibre tail cannot be pushed through, we will require the remedial work to be carried out at your expense.

At a suitable and agreed programme window we will install the LDWB enclosures within the riser as per the fibre design, run the required fibre up the risers and where necessary install an Optical Distribution Frame (ODF) where all fibre will terminate and any other active or passive equipment within the Comms room located at the basement or podium level. Following this we will install and commission Customer Premise Equipment (CPE), prior to occupation by residents.



Figure 4 - Large MDU Layout

9. WORKS AT CPE LOCATION AND FOR IN PREMISES DISTRIBUTION CABLING

Once a customer requests service we will install Customer Premise Equipment (CPE) capable of supporting a maximum of two independent telephone services and four Data services.

To facilitate this you will be required, during construction, to install an enclosure to house the CPE in a suitable location; this enclosure is known as the "Home Hub" and will be provided to you on a free issue basis. An example of the Home Hub unit, containing our equipment, is shown in

Figure 5.

You will also be required to supply and install all necessary, power, telephone and data cabling.

The preferred location for the Home Hub is within a utility, storage or under stairs cupboard (in houses this should always be on the ground floor), where it will not be subject to potential extremes of temperature or high levels of moisture. The location of the CPE must also give due regard to access for customers with disabilities or mobility problems and to repair or replace faulty or damaged equipment. The service duct which will carry the incoming fibre cable must also terminate flush with the floor and face of the wall in this agreed location.



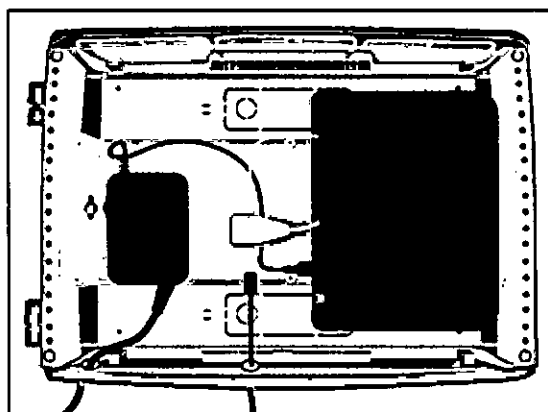
9.1 Developers Obligations

In order to enable us to complete our Works, we will require you to:

- Install the Home Hub box in suitable location with the door hinge on the LEFT hand side of the box. This location must always be directly above where the duct containing the fibre optic cable entering the property terminates.
- Supply and install two switched twin socket outlet units adjacent to and directly below the Home Hub location.
- Supply and install all distribution cabling. Wall sockets for voice, data and FIRS services around the property, and terminate the cabling into sockets below the Home Hub box.

All obligations for both you and us are summarised in the Responsibility Matrix in Appendix A.

Figure 5 - Home Hub



9.2 Home Hub Installation

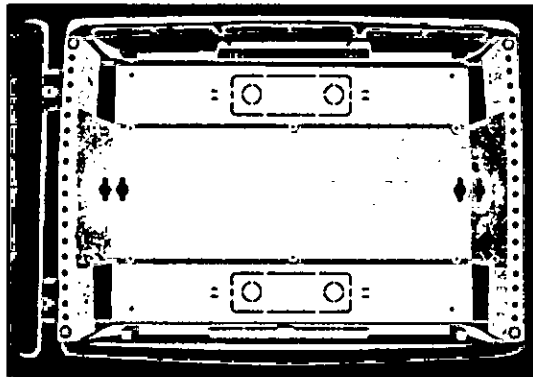
The Home Hub consists of a lidded lockable plastic box, formed in fire resistant ABS (UL94-VO rated). It is finished in self coloured white, RAL 9016, and a push fit lock, similar to that found on meter enclosures.

The Home Hub has removable top and bottom plates, which contain ventilation louvers and pre-formed "knock-outs" to facilitate the entry of cables etc. There are similar pre-formed "knock-outs" in the rear (wall mounting) face of the main unit, again to facilitate entry or exit of cables. These will be referred to later in the sections dealing with the entry of the fibre optic cable, and the management of home network cabling.

The external dimensions of the Home Hub are (w) 400 x (h) 307 x (d) 131mm.

The Home Hub unit has a net weight of 2.3kg and can be attached to a solid wall or stud partition. Where it is fixed to a partition we recommend that the fixings are secured to an additional timber batten or lath behind the plasterboard to account for the total weight of the enclosure and equipment that will be installed within it, the complete CPEs could be up to 8.5kg in total.



Figure 6 - Home Hub Box Internal View

When fixing the unit you should note that in order to allow us to install our equipment in the correct configuration, it must be done so the door is hinged on the LEFT hand side of the box. If this does not happen we will not be able to install our equipment correctly, and we will require you to refit the box correctly, at your own cost.

The Home Hub must be fixed to the wall above the duct bringing the fibre optic cable into the property, the centreline of the box coinciding with that of the duct, and with a minimum clear height to the bottom of the box of 700mm above Finished Floor Level (850mm to centreline of mounting holes on wall).

Where an above ground external wall entry is chosen as the method to enter the property you will need to ensure the GTC free issued Micro Duct is install from the external entry point to the Home Hub Box where it will terminate inside the box. The Micro Duct should be installed in to the Home Hub Box through one of the circular knock out ports on the rear panel of the box. The Micro Duct must be installed in one continuous fault-free length.

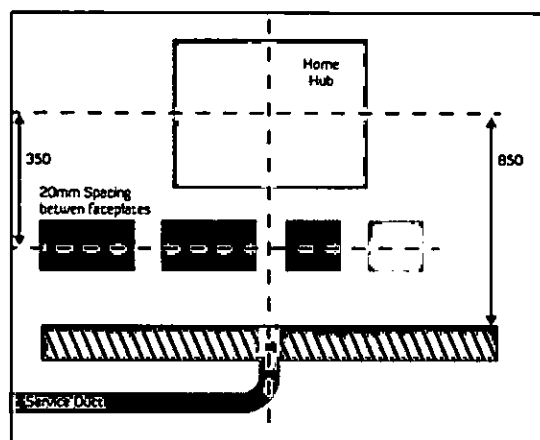
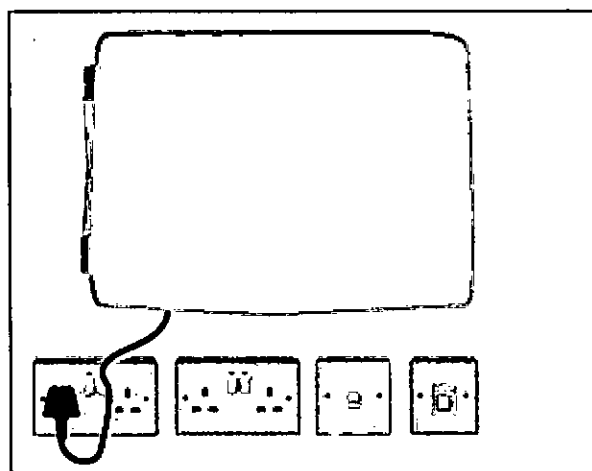
Figure 7 - Home Hub Layout – Diagram

Figure 8 - Home Hub Layout

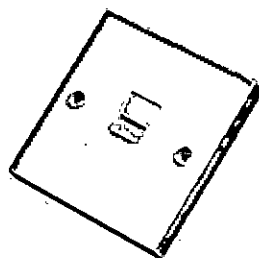
9.3 Home Wiring and Cable Termination

To give your homeowners maximum benefit of Fibre to the Home technology and the best possible experience, you need to make sure your wiring meets the demands of modern living.

Telephone and Data distribution cabling and sockets must be provided around the home consolidating back at the Home Hub unit.

9.3.1 Telephone Wiring Specification

A single 631A secondary telephone socket should be located below the Home Hub. CW1308 4 pair cable should be run from this socket in a series or "daisy-chain" arrangement to further 631A secondary telephone sockets located around the premise.

Figure 9 - 631A Secondary Telephone Socket**Table 2 - Telephone Wiring**

631a Telephone Socket	Cable Colours
5	White/blue stripe
3	Orange/white stripe
2	Blue/white stripe

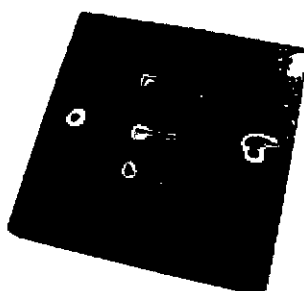


9.3.2 Broadband Wiring Specification

From a RJ45 faceplate located below the Home Hub run multiple solid core Cat5e cables to suitable locations within the property using a point-to-point data wiring configuration.

Each Cat5e cable should be terminated with a RJ45 faceplate in rooms where broadband services are required and should be located within one metre of a mains power socket.

Figure 12 – 1 Port RJ45 Face Plate



All cabling for faceplates must be of the solid core variety (as opposed to stranded) in all circumstances. An IDC termination tool should be used to install the solid core Cat5e data cable to the RJ45 socket.

Sockets should be sourced that have TIA/EIA-568B colour coding as per figure 13.

Figure 13 – TIA/EIA-568B Colour Coding

Pin	T568B Colour
1	 White/Orange Stripe
2	 Orange Solid
3	 White/Green Stripe
4	 Blue Solid
5	 White/Blue Stripe
6	 Green Solid
7	 White/Brown Stripe
8	 Brown Solid

9.3.3 GTC Home Wiring Requirement

Telephone Wiring

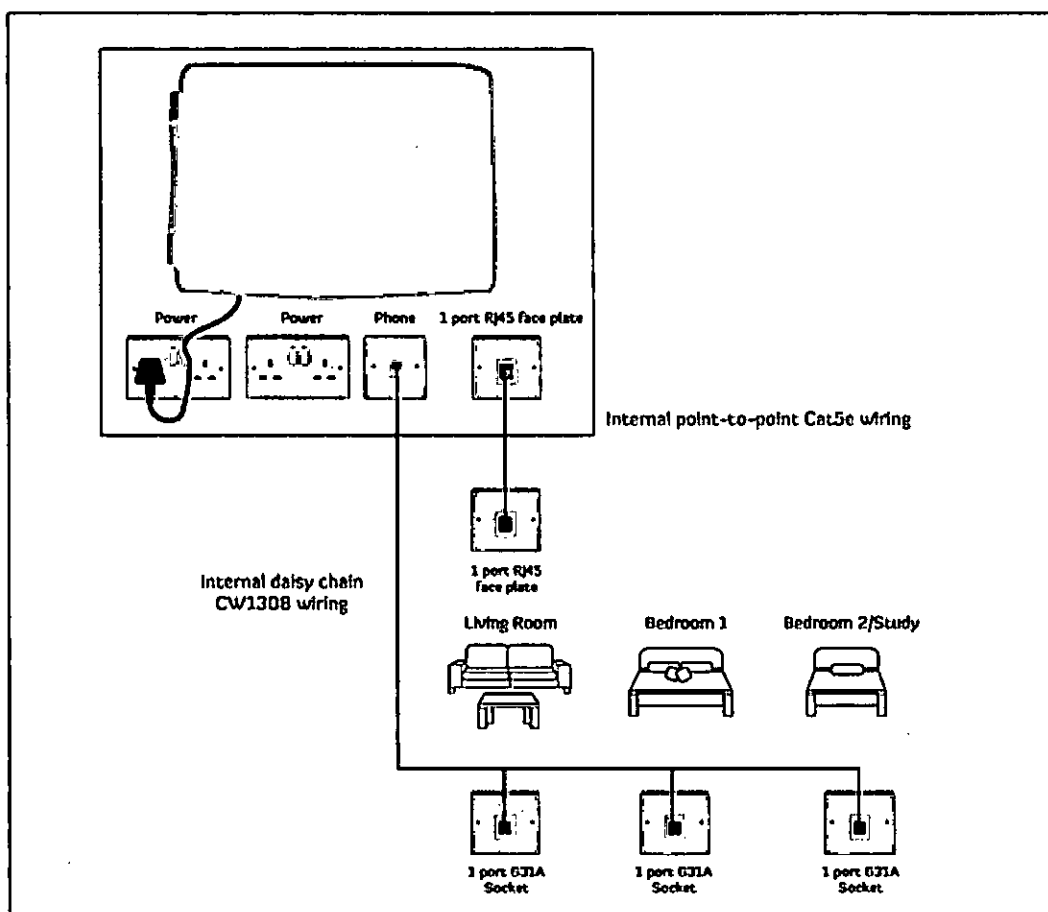
GTC recommend that a single port 631A secondary telephone socket is installed below the Home Hub which is connected in a "daisy-chain" arrangement using CW1308 4 pair cable to single port 631A secondary telephone sockets located in the Living Room, Bedroom 1, Bedroom 2 or a Study.



Minimum Broadband Wiring

GTC have a mandatory minimum broadband wiring requirements that must be followed to ensure compliance with this technical specification. The minimum broadband wiring specification of a 1 port RJ45 Cat5e faceplate below the Home Hub which connects to a 1 port RJ45 Cat5e faceplate in the Living Room located within one metre of a power socket and adjacent to the main TV point.

Figure 14 – Minimum Home Wiring Requirement



If you wish for your customers to experience an excellent service around their new home then GTC recommend installing a further 4 port RJ45 Cat5e faceplate next to the 1 port RJ45 Cat5e faceplate located in the Living Room and install further Cat5e connections from this 4 port RJ45 Cat5e faceplate to further 1 port RJ45 Cat5e faceplates installed to either Bedroom 1, Bedroom 2, Study, etc. once again of a power sockets should be located within one metre of the broadband port.



9.4 Summary/ Key Points of Home Hub Installation

- The box must be mounted so that its centreline is the same as that of the incoming service duct through which the fibre optic cable will be run.
- Two twin switched power socket outlets to be provided below and adjacent to the box.
- The completed assembly of box, plates and equipment may weigh up to 8.5kg. You will need to ensure adequate fixings are used; we recommend an additional timber stud is used on partition walls to help support this.
- The box must be fixed so that the door hinges are on the LEFT side.
- 631A secondary sockets for telephone terminations
- Telephone cabling is daisy chained from multiple connection points using CW1308 back to a single connection below the Home Hub.
- RJ45 sockets for data terminations
- Data cabling is point to point using Cat5e
- Remember to label all cables and connections correctly
- Failure to follow these deployment rules will mean you incur extra time and cost in remedial works.

10. TESTING

10.1 Testing of Installed Cable Networks

You are responsible to ensure that the installed cable networks are tested and that you are satisfied that they are fit for purpose.

10.2 Testing of Installed CPE

Once the CPE has been installed we will perform tests to confirm that the service to the premise is fully operational. Capability will be enabled once the customer is contracted. Should this testing reveal any faults with works you have carried out, we will require the appropriate remedial or re-provisioning work to be undertaken before a customer can have services enabled.

11. LABELLING

11.1 Labelling of Installed Data and Telephone Sockets

You are to ensure that each socket for each service located below the Home Hub is labelled with the destination point i.e. "Living Room", "Study", "Bedroom 1" and "Bedroom 2", to enable correct service distribution to specific rooms.



12. APPENDICES

Appendix A - Summary of Responsibilities

Description	Material Provide r	Installe r	Applicable to			
			SDU (IRS)	SDU (NO IRS)	MDU (IRS)	MDU (No IRS)
On Site Connection Point						
OSCP Construction / M&E Fit out (As per Table 1: OSCP Matrix)	Dev	Dev	✓	✓	✓	✓
Network Equipment in OSCP	GTC	GTC	✓	✓	✓	✓
External Fibre						
90mm I/D diameter external main duct	GTC	Dev	✓	✓	✓	✓
External Chambers	Dev	Dev	✓	✓	✓	✓
External Chamber covers and frames to BS EN 125	GTC	Dev	✓	✓	✓	✓
100 mm diameter building entry ducts.	GTC	Dev	x	x	✓	✓
50 mm diameter service duct / tees	GTC	Dev	✓	✓	x	x
Internal Fibre						
Blown fibre tubes / microduct ("drop tubes")	GTC	Dev	x	x	✓	✓
Home Hub / CPE						
Home Hub Box	GTC	Dev	✓	✓	✓	✓
2x twin switched socket outlets at CPE location	Dev	Dev	✓	✓	✓	✓
CPE installed within Home Hub (ind IRS where contracted)	GTC	GTC	✓	✓	✓	✓
Telephone sockets below Home Hub wired to room sockets	Dev	Dev	✓	✓	✓	✓
Data sockets below Home Hub wired to room sockets.	Dev	Dev	✓	✓	✓	✓
In Premise Wiring						
Coaxial cable and socket outlets for IRS distribution.	Dev	Dev	✓	x	✓	x
Coaxial cable and socket outlets for non IRS distribution.	Dev	Dev	✓	x	✓	x
Cat5e (solid core) cable for data and telephony wiring	Dev	Dev	✓	✓	✓	✓
CW1308 cable for telephony wiring (If Cat5e not used)	Dev	Dev	✓	✓	✓	✓
Data sockets (RJ45) at agreed outlet locations	Dev	Dev	✓	✓	✓	✓
Telephony sockets (631a) at agreed outlet locations	Dev	Dev	✓	✓	✓	✓



Appendix B - Quality

We will undertake quality checks of the Works you undertake for us. Sample Quality Check forms for this are set out below.

Quality checks on the internal wiring specified under Part 3 of this document are at your own discretion as responsibility for this part of the network remains with you.

However, it is nevertheless recommended that quality of internal wiring components you provide are quality checked by suitably qualified personnel for electrical integrity and layout to ensure they are fit for purpose. We reserve the right to refuse connection of any equipment to internal wiring we believe to be unfit for purpose. In the event that any part of the Works provided or undertaken by you fails to reach an adequate standard and needs replacing, that replacement will be at your cost.

Quality Check Form sample: Duct and Chamber Construction

Name of Client:

Address:

Post Code:

Project Number:

Sub Project Number:

	Y	N	n/a	Comments
Ducts laid in accordance with relevant requirements, or expectations agreed and documented				
Separation distances maintained, or expectations agreed and documented				
Ducts correctly bedded and sides compacted (lead-in-duct requires gas break N. Ireland only)				
Ducts properly trimmed and keyed when set in walls				
Chambers constructed in accordance with relevant requirements, or expectations agreed and documented				
Swept tees fitted as per design in drawings				
Frames and covers bedded correctly and fitted level				
Chamber furniture fitted as specified				

THIS CLIENT QUALITY CHECK SHEET CERTIFIES THAT ALL WORK HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE CONTRACT SPECIFICATION OR AGREED ALTERNATIVES.

Site Managers Name (Print):

Sign:

Date:



Quality Check Form sample: Microduct and CPE Location

Name of Client:

Address:

Post Code:

Project Number:

Sub Project Number:

	Y	N	n/a	Comments
Microduct provision is free from obstruction and kinks				
Position of microduct is 450mm above finished ground level				
Position of power feeds and outlets as per specification				
Recessed wall box (where applicable) in appropriate position, firmly fixed, with microduct fed into block				
Service Duct Terminated flush to wall below CPE equipment (Type 1 Building Entry)				
Service Duct Terminated directly below 25mm through fabric conduit (Type 2 Building Entry)				
Does overall space available at CPE comply with requirement of Technical Standards Part A?				
Have data sockets been labelled as per requirements?				

THIS CLIENT QUALITY CHECK SHEET CERTIFIES THAT ALL WORK HAS BEEN CARRIED OUT IN ACCORDANCE WITH THE CONTRACT SPECIFICATION OR AGREED ALTERNATIVES

Site Managers Name (Print):

Sign:

Date:



Appendix C - Example Pre-Start Checklist**IFNL Pre-Start Meeting – Checklist and Agreement**

To be completed in conjunction with contract agreement. Once completed a copy should be saved under the relevant project name on the Telecoms drive

Section 1 Confirm Site Address Details

Project Number		Contract Number	
Site Name			
Address			
Post Code			
If any site access issues please record			

Section 2 Confirm Site Manager Details

Name		Landline	
Mobile		Email	

Section 3 Confirm Project Details

Utility to be installed	Fibre Duct infrastructure and premises wiring		
Is a drawing layout showing at Fibre Duct on-site proposals confirmed?	☐ Yes ☐ No		
Drawing number and revision			
Does this drawing match the present site layout?	☐ Yes	☐ No	No of plots
Have all Wayleaves, easements and permissions been obtained by the Developer?	☐ Yes ☐ No		
Can the network be built as per the Fibre Duct design i.e. are there any variations? (If Yes, follow Deviations and Variations procedure)	☐ Yes ☐ No		
Are there any specific risks on the site?	☐ Yes ☐ No		
Have there been any changes to the Health and Safety Plan Summary Form?	☐ Yes ☐ No		

Section 4 Confirm Work Planning Details

What is the SITE construction start date?	
When is Telecommunications service required?	
When is the first handover?	
Has a build program been made available? Details	
Have site storage facilities been made available? Details	
Date and nature of first materials deliveries:	
Anticipated rate of materials consumption (separate list if necessary)	
Contact details been made available? (separate list if necessary)	
Formal progress review meetings dates agreed? (show first date)	
Change of design agreed? (Ref Details)	
Site Induction requirement established?	



Section 5 On site and Off site Infrastructure

Are there off site duct and joint boxes to be installed?	☐ Yes ☐ No
Are there On site duct, joint boxes, premises lead ins, and internal tubing, recessed termination boxes to be installed?	☐ Yes ☐ No
Is there an OSCP Room to be made available?	☐ Yes ☐ No
Is there an OSCP Street Cabinet to be installed?	☐ Yes ☐ No

Section 6 In Premises Services

Are the Termination Equipment (TE) service options available and agreed?	☐ Yes ☐ No
Are all the telecom services and termination methods agreed?	☐ Yes ☐ No
Have premises lead in methods been agreed?	☐ Yes ☐ No
Have premises internal wiring requirements been agreed	☐ Yes ☐ No
Have all functionality and Quality standards been made available?	☐ Yes ☐ No

Section 7 Flats, Business, or Multi Occupancy Premises

Are there any flats, businesses or multi occupancy buildings on the development?	☐ Yes ☐ No
Are any of the telecoms services to be supplied by a riser or manifold?	☐ Yes ☐ No
Are duct lead ins provided to the Termination Equipment point?	☐ Yes ☐ No
Are there any properties over two stores	☐ Yes ☐ No

Section 8 Paperwork

Health and Safety Pack	☐ Yes ☐ No	Fibre Duct Construction Requirements	☐ Yes ☐ No
Tech. Standards Part A for Fibre duct and internal wiring requirements and Quality		☐ Yes ☐ No	
Issue IFNL Technical Standards document which must be signed by the site manager and returned with the Pre-Start Meeting Proforma		☐ Yes ☐ No	

Section 9 Health and safety Summary

Is there a Health and Safety Summary Form available?	☐ Yes ☐ No
Do the details on the H&S Summary Form match the conditions on site?	☐ Yes ☐ No
Have the necessary remedial actions been made?	☐ Yes ☐ No
Are there any additional hazards onsite (if Yes, please give details below)	☐ Yes ☐ No

Section 10 Programme Details

Construction Programme		
Fibre Service Connection Programme		
IFNL Site Co-ordinator		
NAME:	Signature:	Date:
Developer's Site Manager		
NAME:	Signature:	Date:

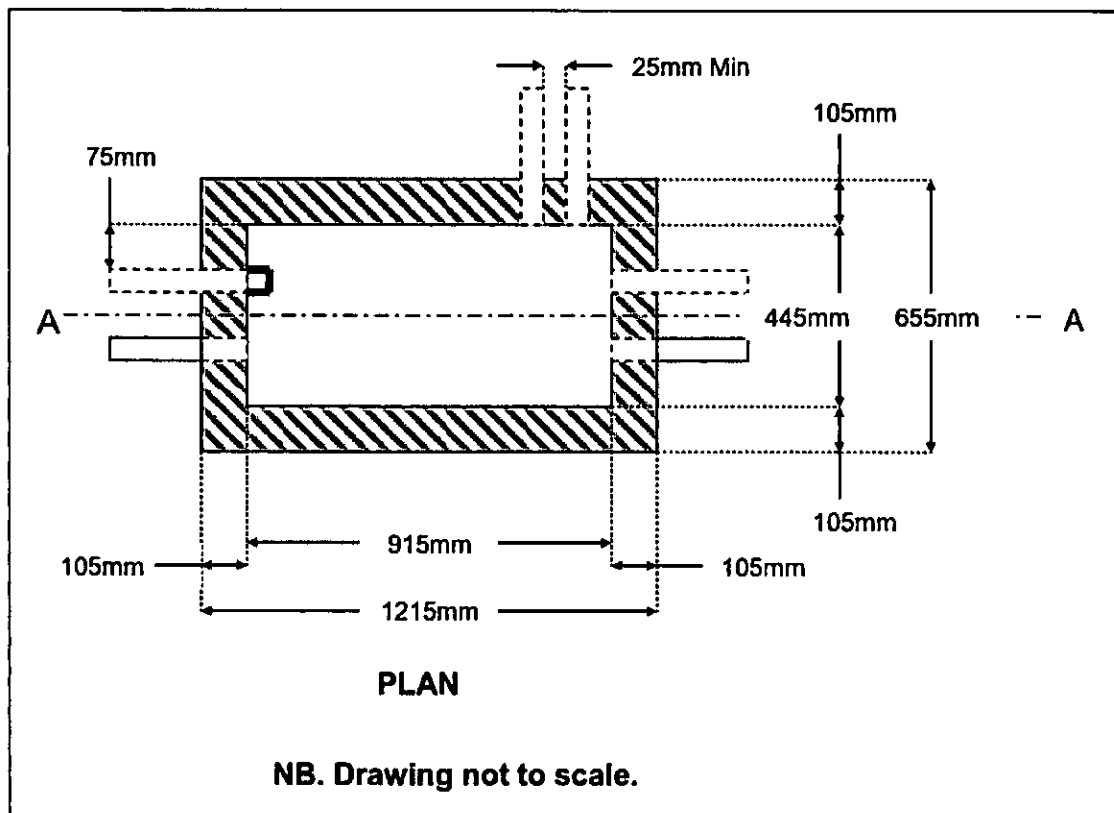


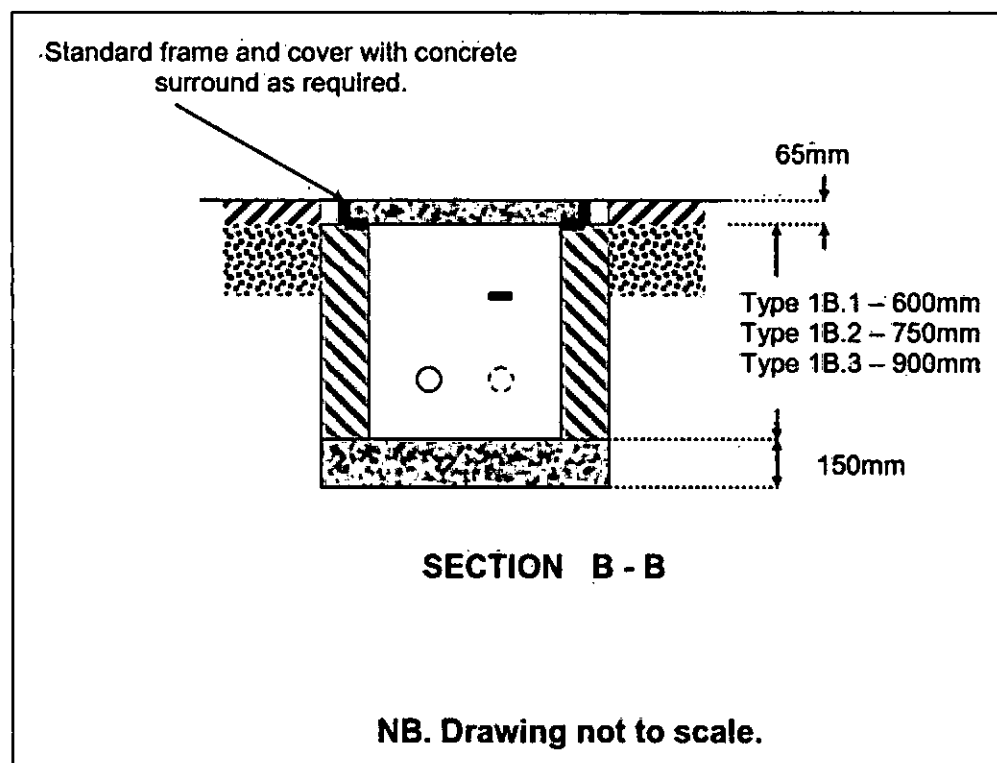
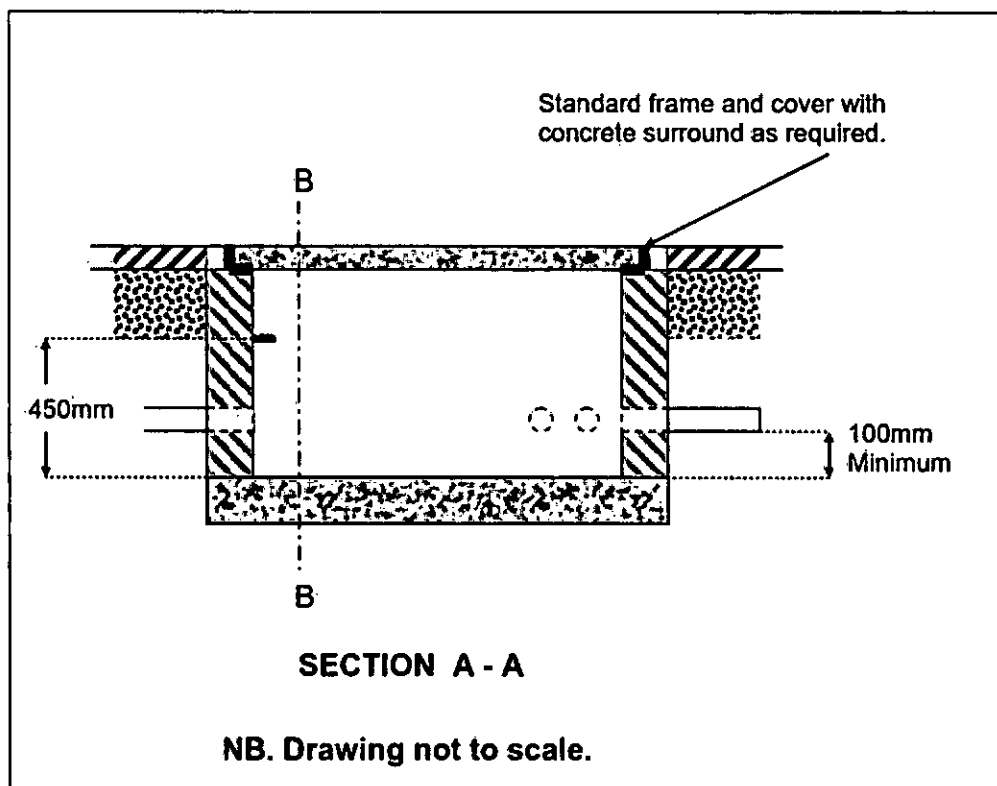
Appendix D – Examples: Chamber Construction

D.1 Inspection Chamber Footway/Carriageway Type 'JC1'

1 Inspection Chamber Footway Type 1B.1 – 1B.3

1. Chamber base to be constructed of concrete, walls to be of brick construction.
2. Where bricks are used, these shall be Class B Engineering brick, complying with BS3921 / EN 771-1, and 3:1 sand / cement mortar complying with BS12. Concrete should be Grade 35.
3. Ducts must not enter through corners and should be no less than 75mm from the side wall. Ducts must enter the wall at least 350mm minimum depth from the top of the frame for a Footway chamber and 600mm minimum depth from the top of the frame for a Carriageway chamber.
4. All brickwork to be keyed in at corners and pointed. For Footway deployment brickwork shall be constructed using Stretcher Bond.
5. Where the JC-1 is to be deployed in the Carriageway brickwork shall be constructed with a 10mm joint thickness of cement mortar and shall be of English Bond.
6. Ducts intended for future use can be provided as short lengths.
7. A step should be provided in an end wall in all chambers deeper than 700mm.
8. Standard Type A frame and cover provided by IFNL with embossed cover.
9. Type 1B.3 chambers should be used when used to support a road crossing

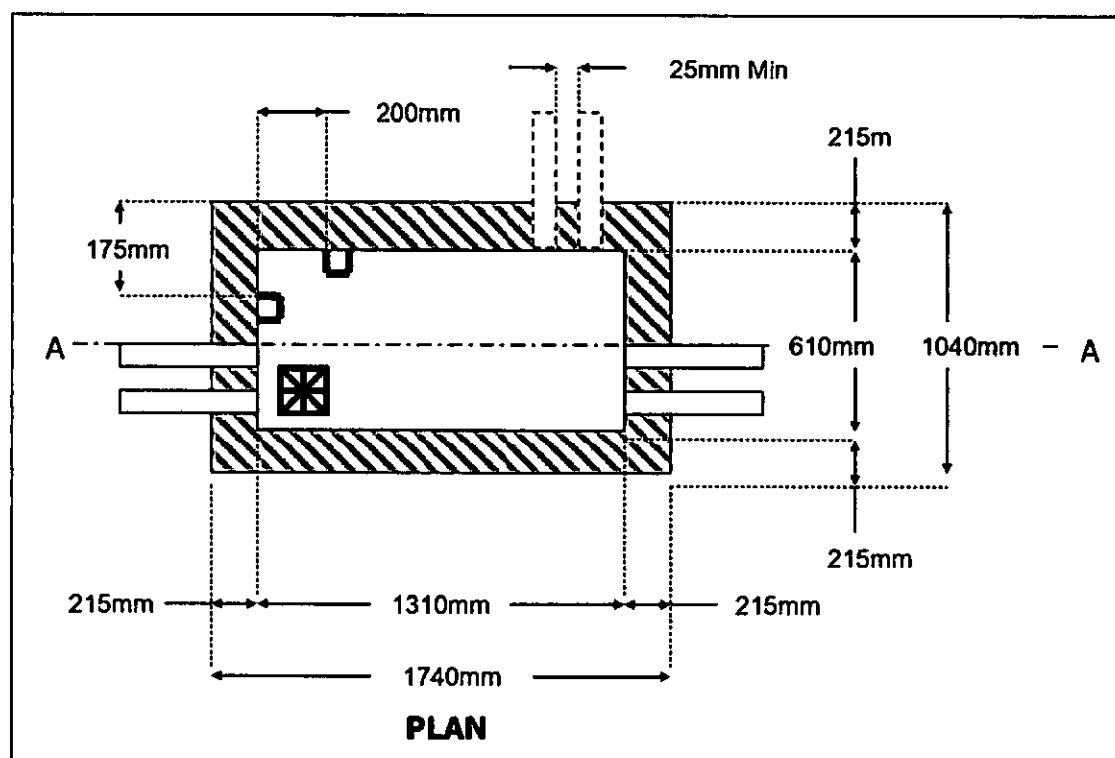


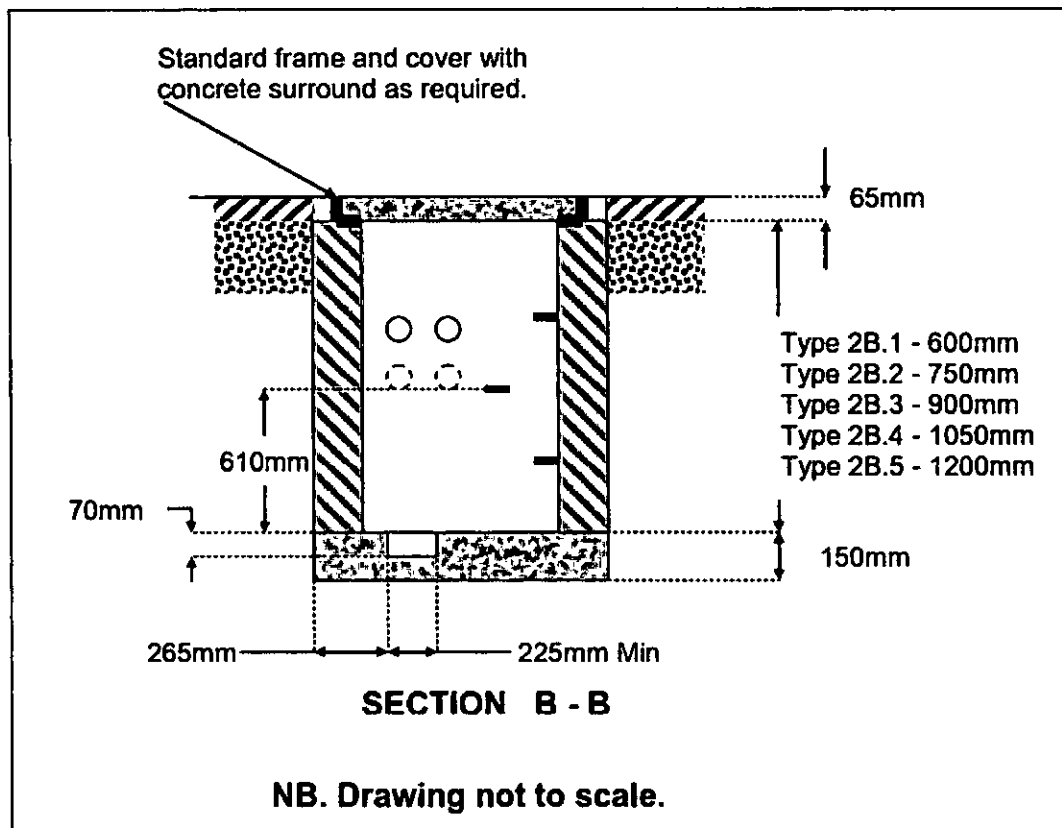
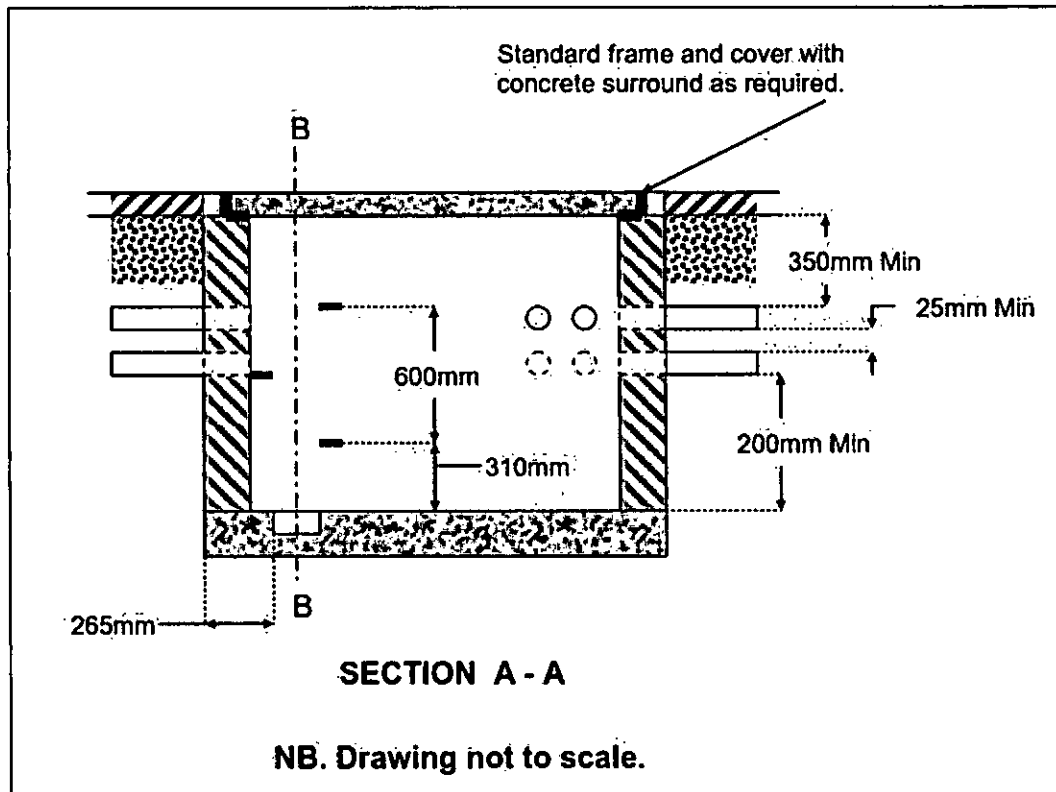


D.2 Inspection Chamber Footway/Carriageway Type 'JC2'

JC-2 Inspection Chamber Type 2B.1 – 2B.5

1. Chamber base to be constructed of concrete, walls to be of brick construction.
2. Where bricks are used, these shall be Class B Engineering brick, complying with BS3921 / EN 771-1, and 3:1 sand / cement mortar complying with BS12. Concrete should be Grade 35.
3. Ducts must not enter through corners and should be no less than 75mm from the side wall. Ducts must enter the wall at least 350mm minimum depth from the top of the frame for a Footway chamber and 600mm minimum depth from the top of the frame for a Carriageway chamber.
4. All brickwork to be keyed in at corners and pointed. Brickwork shall be constructed with a 10mm joint thickness of cement mortar and shall be of English Bond
5. Standard two way duct shown as solid line, maximum additional ducts shown as dashed line.
6. Ducts intended for future use can be provided as short lengths.
7. Steps should be provided in an end wall removed from side entry ducts in chambers Type 2B.2 – 2B.5.
8. Type B frame and cover to be provided with the letters IFNL embossed on the cover.
9. The sump can be formed in the base by placing a pipe of 225mm minimum diameter in position in a corner opposite to the location of the steps.

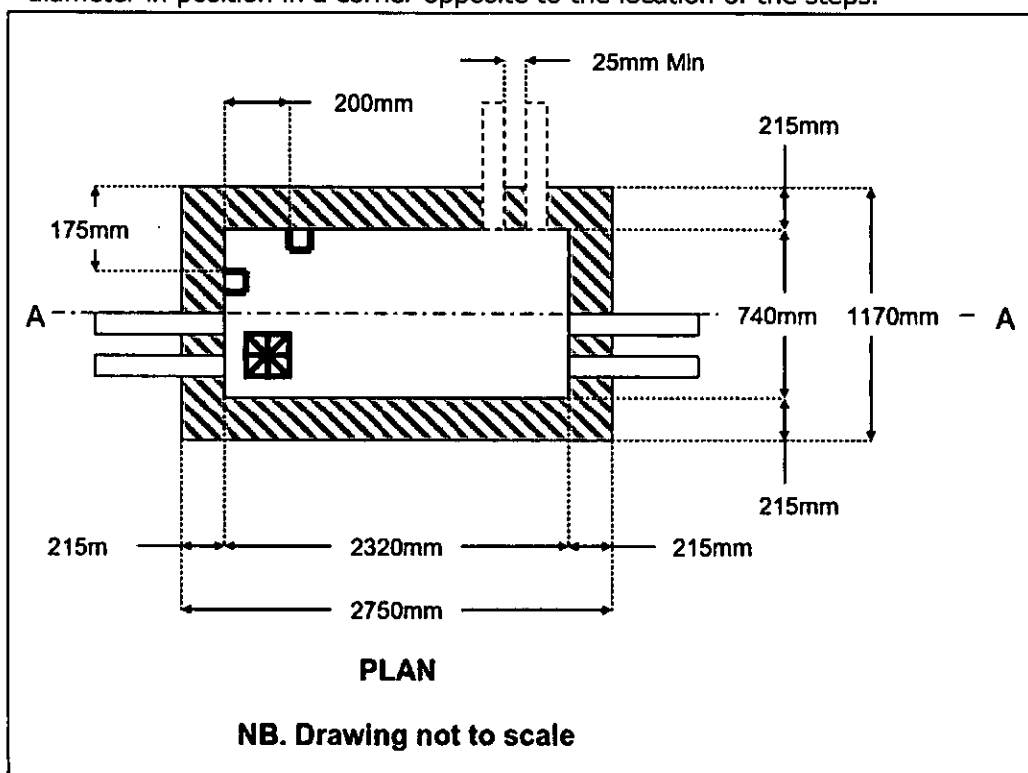


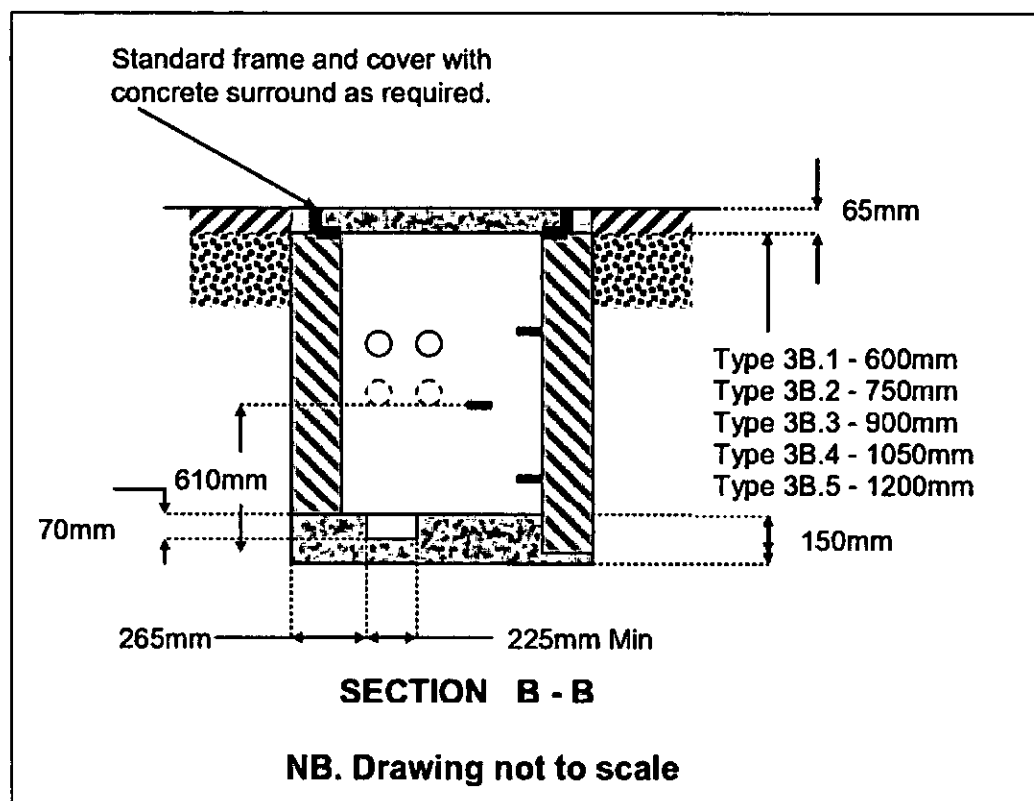
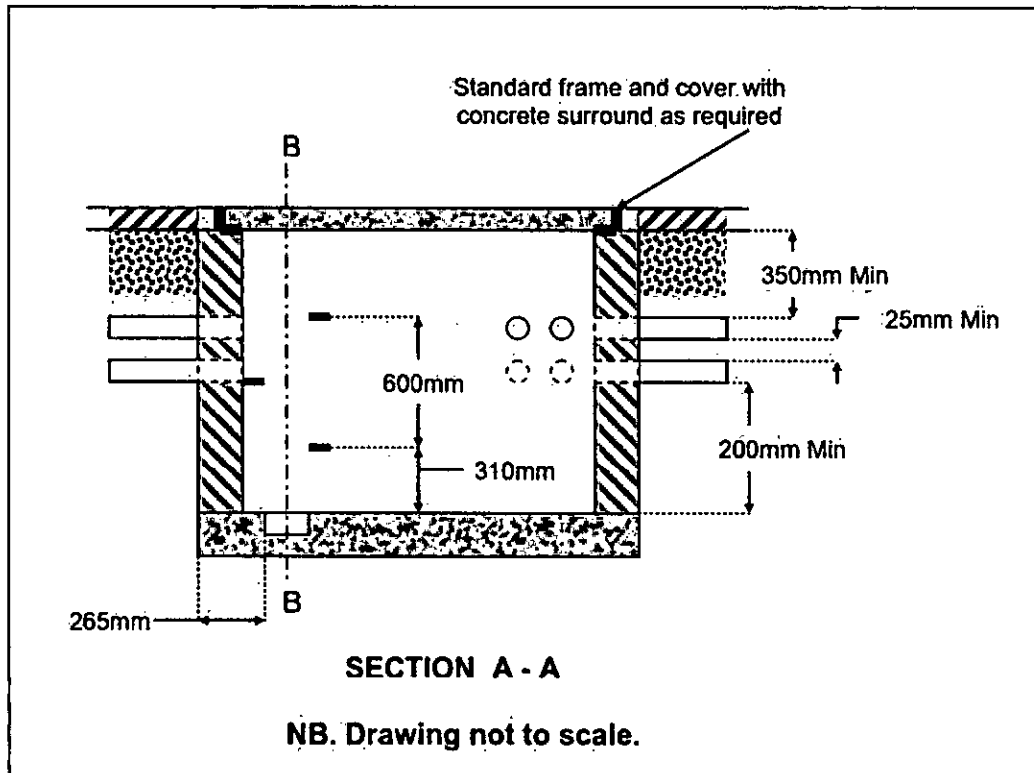


D.3 Inspection Chamber Footway Type 'JC3'

JC-3 Inspection Chamber Type 3B.1 – 3B.5

1. Chamber base to be constructed of concrete, walls to be of brick construction.
2. Where bricks are used, these shall be Class B Engineering brick, complying with BS3921 / EN 771-1, and 3:1 sand / cement mortar complying with BS12. Concrete should be Grade 35.
3. Ducts must not enter through corners and should be no less than 75mm from the side wall. Ducts must enter the wall at least 350mm minimum depth from the top of the frame for a Footway chamber and 600mm minimum depth from the top of the frame for a Carriageway chamber.
4. All brickwork to be keyed in at corners and pointed. Brickwork shall be constructed with a 10mm joint thickness of cement mortar and shall be of English Bond
5. Standard two way duct shown as solid line, maximum additional ducts shown as dashed line.
6. Ducts intended for future use can be provided as short lengths.
7. Steps should be provided in an end wall removed from side entry ducts in chambers Type 2B.2 – 2B.5.
8. Type B frame and cover to be provided with the letters IFNL embossed on the cover.
9. Ducts can be 2-way in chambers Type 2B.1 and 2B.2 and up to 4-way in chambers Type 2B.3 – 2B.5
10. The sump can be formed in the base by placing a pipe of 225mm minimum diameter in position in a corner opposite to the location of the steps.



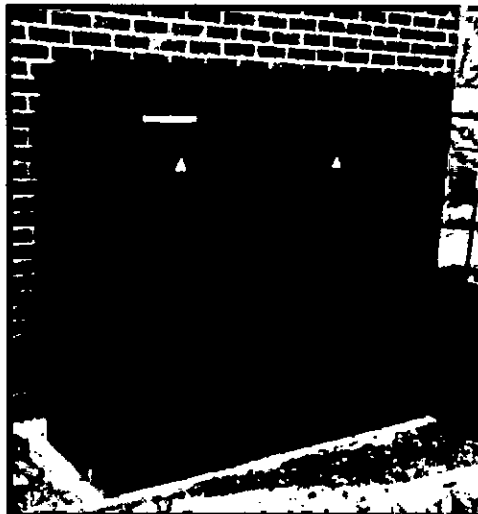


Appendix F – Examples of OSCP building and Cabinets

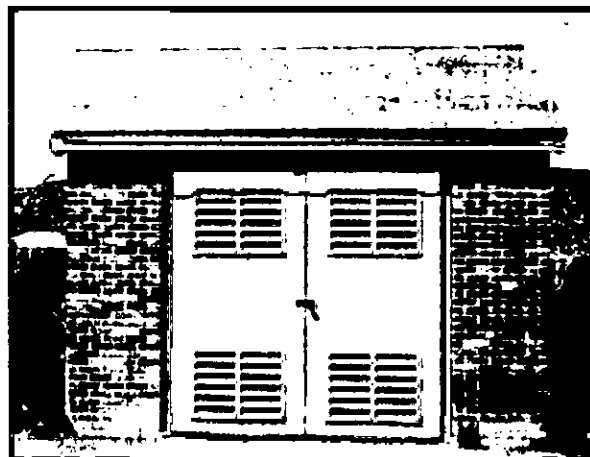
F.1 Voice and Data (Non FIRS) Cabinet



F.2 Voice and Data with FIRS Cabinet



F.3 OSCP Building



F.4 Satellite Dish, DVB-T and DAB Antenna installation on OSCP/Substation building

