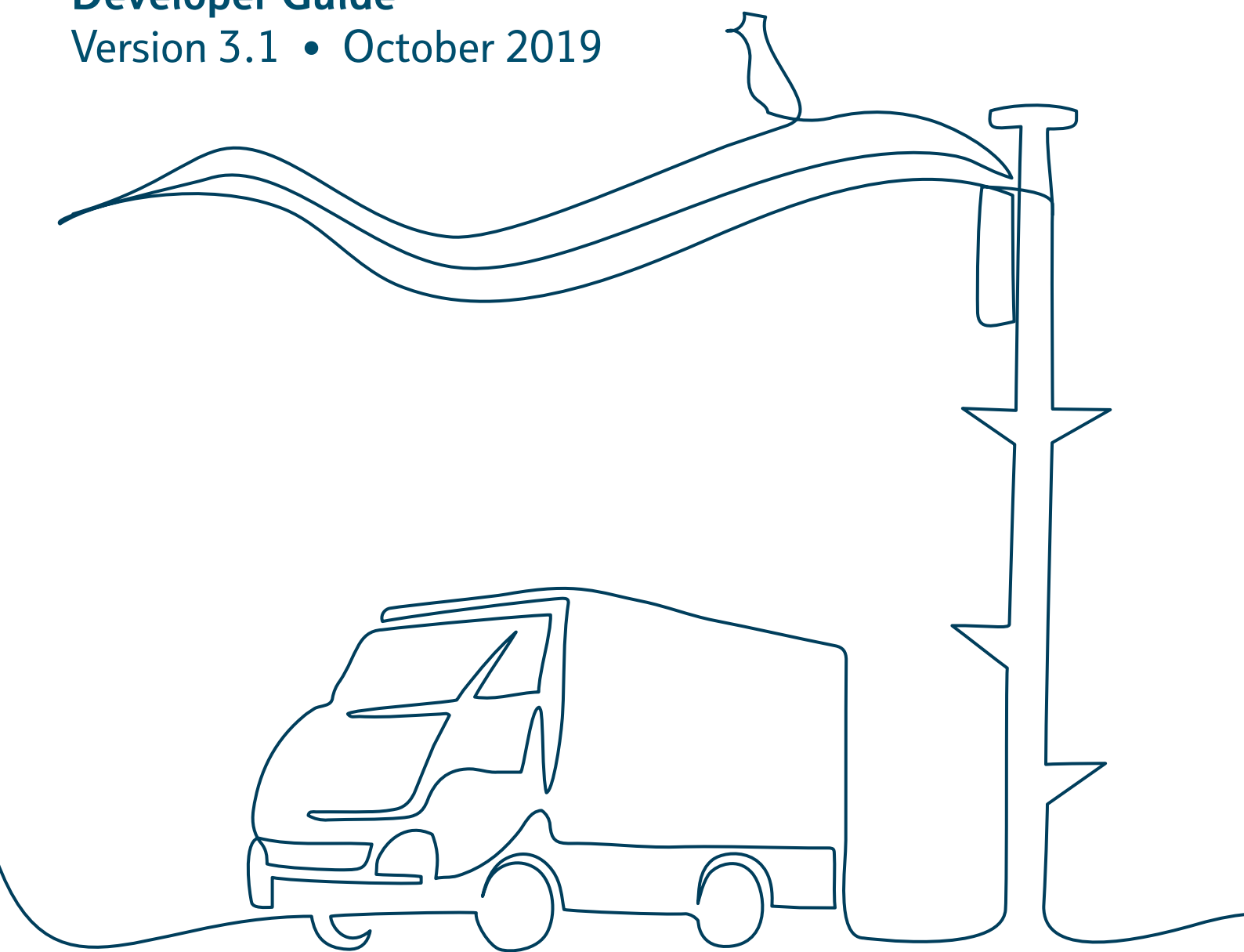


How to build a copper network

Developer Guide

Version 3.1 • October 2019



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1 Home wiring

Home buyers expect access to connectivity immediately. The wiring you install will be pivotal to their experience. The following information is a guide for connecting the Openreach network to your home wiring.

For Governmental guidance, check out PAS: 2016 Next Generation Access for new Build Homes Guide.

Installing additional telephone sockets as part of the overall building programme avoids the problem of exposed wiring and will enhance the appearance of your development.

Wireless offers great connectivity for smart portable devices. But when it comes to streaming high bandwidth in a highly reliable manner, the user experience can only be maintained through physical connection. That's why we recommend that you add extensive data cabling throughout the home to make it a 'connected home'.

Doing this will mean your customers will have the potential to connect their TV to get the new generation of ultra-high definition TV and 4K television and beyond, or if they are keen online gamers, they'll need to plug their equipment into a physical connection. Similarly those working from their home office will want a physical connection for rock solid voice and video over internet protocol.

As a minimum, we'd recommend data cabling rooms likely to benefit most from a physical connection, like the room with the main TV and the home office.

Basic materials

Openreach will fit the master socket (Network Terminating Equipment (NTE), which will remain the property of Openreach. You will supply a flush mounted back box at the entry position of the service access hole adjacent to the external duct location.

To install telephone extension points you will need:

- A back box for extension sockets, flush mounted extension socket points, internal cable, an Insulation Displacement Connector tool, (IDC) BS6312 431A Plug with crimping tool or the interconnection voice lead.
- It's recommended that either Cat 5e or Cat 6 cable is used for the provision of data sockets fitted to the relevant Cat type outlet mounted to flush fitting back boxes.

Installation

- Voice extension cabling should run from the NTE face plate with connections made using an IDC tool.
- Extension sockets should be located close to power sockets for easy equipment connection. A minimum of 50mm between telephone cables and power cables should be left throughout. Where this isn't practical, telephone and power cables must be separated by an acceptable divider (i.e. of rigid, non conducting material).



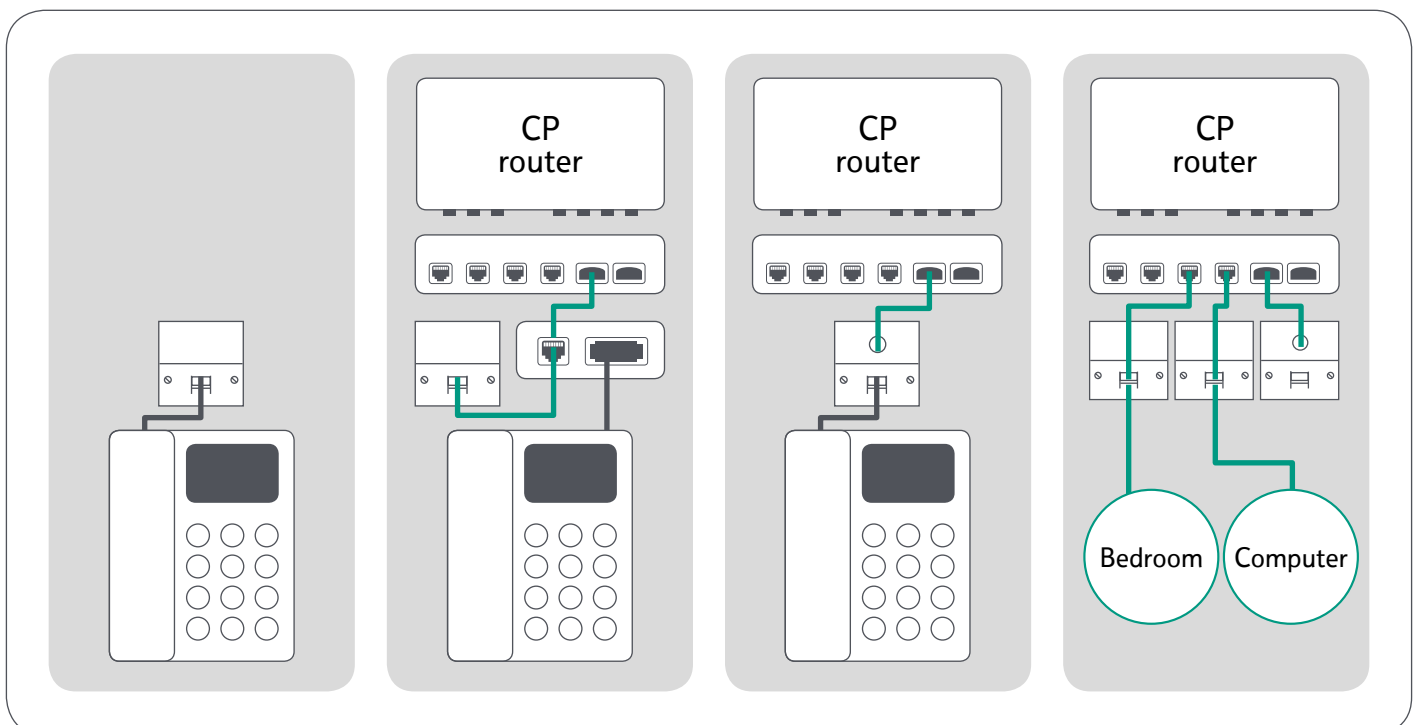
- Extension wiring must be telephone/data grade and shall have plain annealed solid copper conductors of a diameter between 0.5mm and 0.63mm. The conductors shall be in twisted pair format. The conductor resistance shall be of a maximum of 96 ohms/km. The cable sheath shall be PVC.

Home wiring

- Detailed information on internal cable installation and separation is given in the British Standard Code of Practice 6701, Part 1 (particularly clause 6) and the relevant sections of the latest Institution of Engineering and Technology (IET) regulations for electrical installation (Regulation 525 is of particular importance).
- The wiring pattern of the extension socket is critical i.e. non-star wired and in accordance with the diagram on page 6.
- Extension sockets should be located close to power sockets for easy equipment connection. A minimum of 50mm between telephone cables and power cables should be left throughout. Where this isn't practical, telephone and power cables must be separated by an acceptable divider (i.e. of rigid, non-conducting material).
- Extension wiring must be telephone/data grade and have plain annealed solid copper conductors of a diameter between 0.5mm and 0.63mm. The conductors shall be in twisted pair format. The conductor resistance shall be of a maximum of 96 ohms/km. The cable sheath shall be PVC.
- As a rule of thumb internal communication cables should not exceed the bend radius of a 2p coin. Detailed information on cable installation and separation is given in the British Standards Code of Practice 6701, Part 1 (particularly clause 6) and the relevant sections of the latest IET Regulations for electrical Installation (Regulation 525 is of particular importance).
- The wiring pattern for cabling must be either in series or spur. For data it must be point to point as speeds will be impacted after the first point of a daisy chain.

Please note

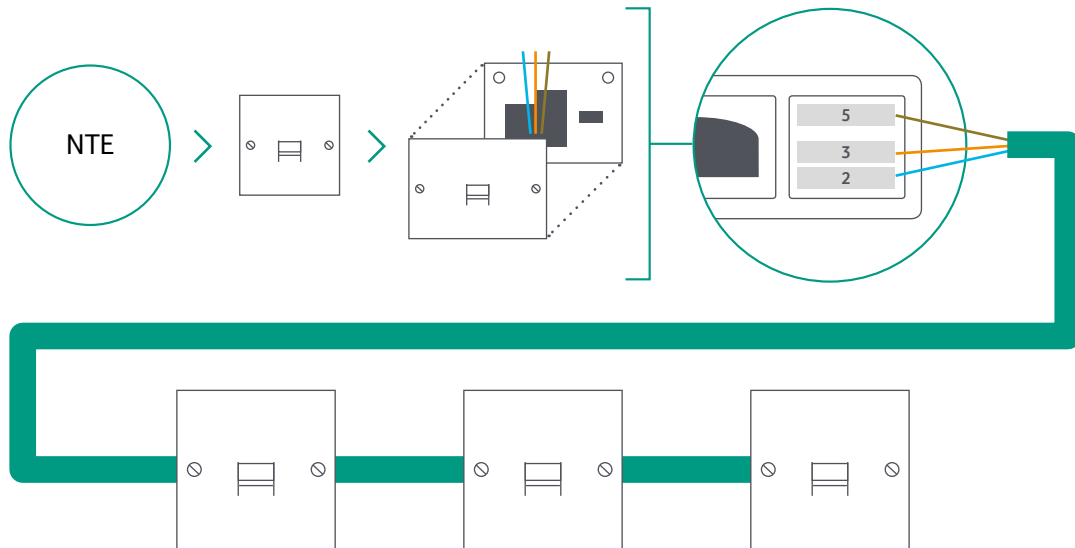
While the provision of internal wiring beyond the Openreach master socket will normally be the responsibility of the customer/developer, you can contract an Openreach engineer to do this work for you. If interested, please contact your local Customer network solutions team. Terms and Conditions for the provision of internal wiring will apply.



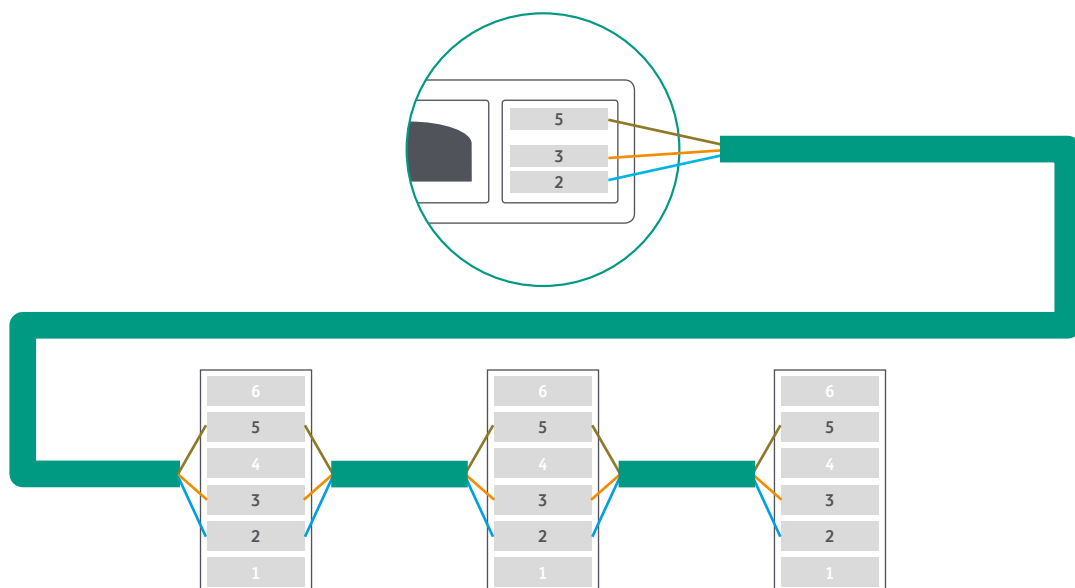
Home wiring

Extension wiring from the Openreach master socket (NTE)

Customer connection point at the back of the removable front plate of the master NTE5.



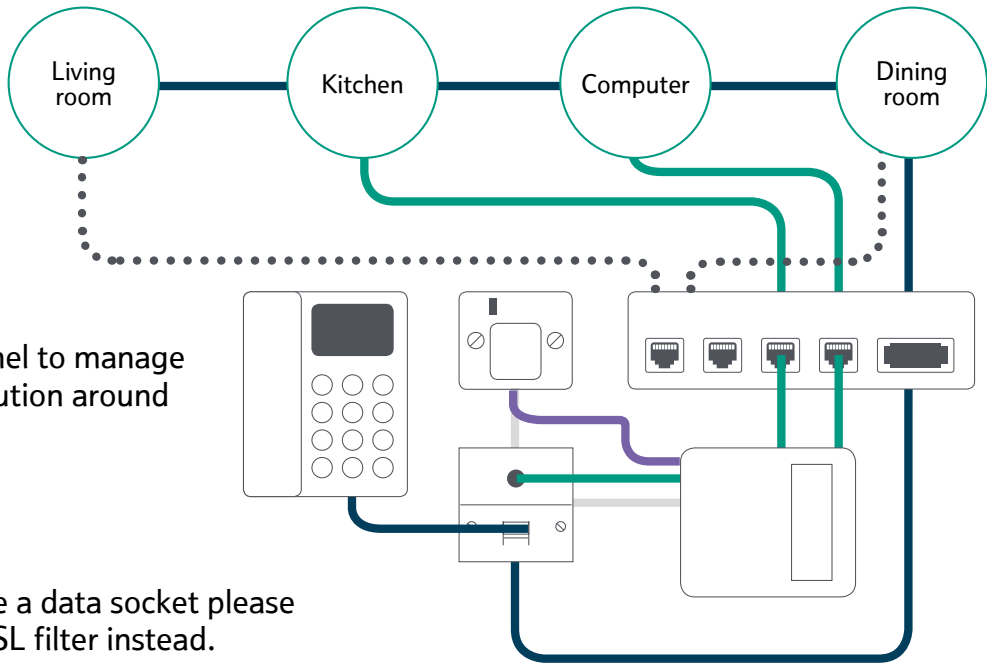
Customer connection point at the back of the removable front plate of the master NTE5



Home wiring

The Connected home

Customer connection point at the back of the removable front plate of the master NTE5.

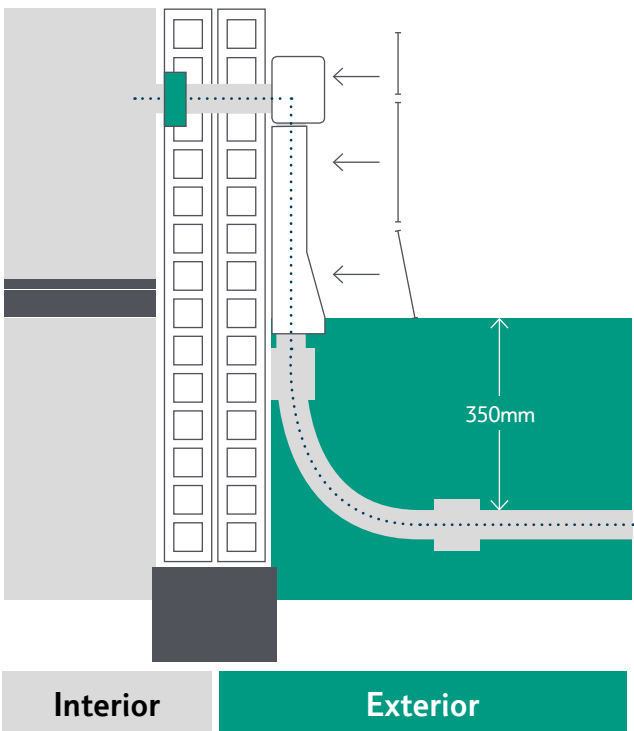


Utilising a patch panel to manage data & voice distribution around the home.

- Voice Cable
- Data Cable

If NTE does not have a data socket please use appropriate ADSL filter instead.

Cable entry from exterior to interior



Issues with Home wiring

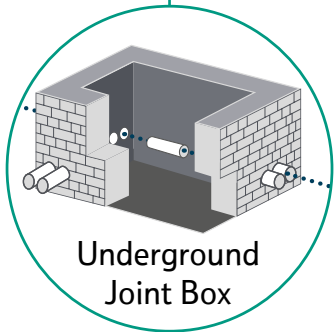
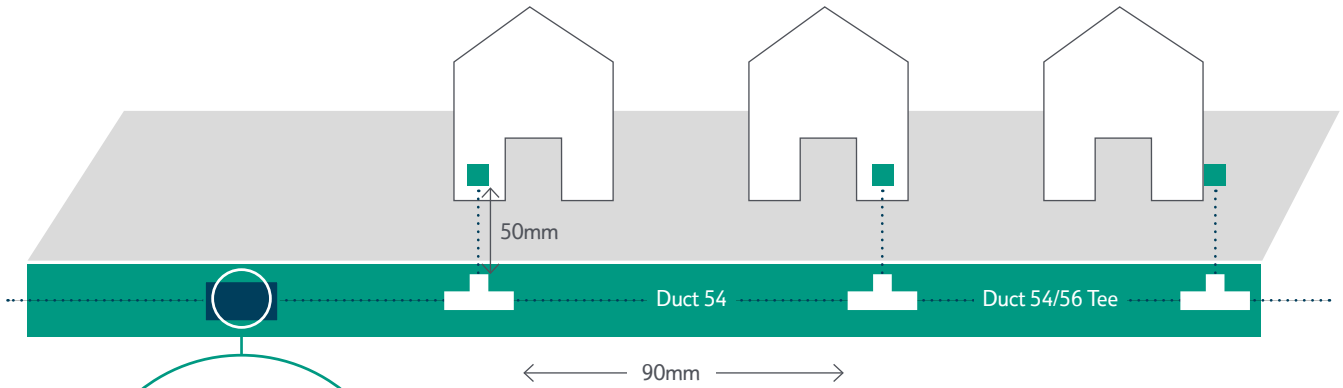
- Cable short, cut or damaged
- Defective or damaged home wiring creating a fault on the line
- Extension sockets not connected to Openreach NTE
- Incorrect cable type or wiring configuration

Impact on delivery

- Inability for Openreach to provide service and developer requirement to re-provide cable
- Poor user experience for home purchaser
- Slower data download speeds experienced

2 Duct presentation – houses

Installation for houses



Underground Joint Box

Agree the intended location for the duct with your FBC before installation.

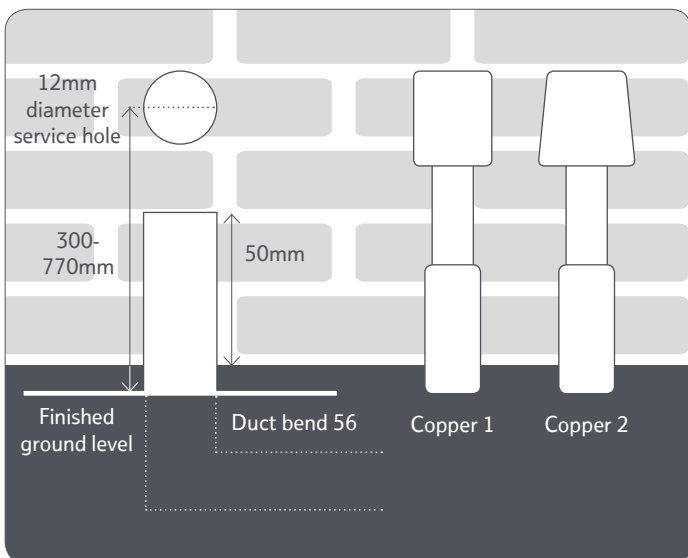
Lay Openreach Duct 54 from the footway joint box, with the socket end presented to the joint box. Fit the Duct 54/56 Swept Tee. Connect the Duct 56 to the property and terminate with a 90° preformed Duct Bend 56 on the outside of the property wall. Cut 50mm above ground level. When laying duct, you'll need to protect the ends from damage or the ingress of dirt.

External Capping 25 and Connector Bend 4 should be fitted as required.

Cover 101 is normally fitted at the top of the capping but this may be changed to a BT66 by Openreach during commissioning.

Copper 1 – Cover 101
Copper 2 – BT66

To keep things tidy, make sure that the service access hole is drilled in line with the duct and in keeping with the above dimensions.

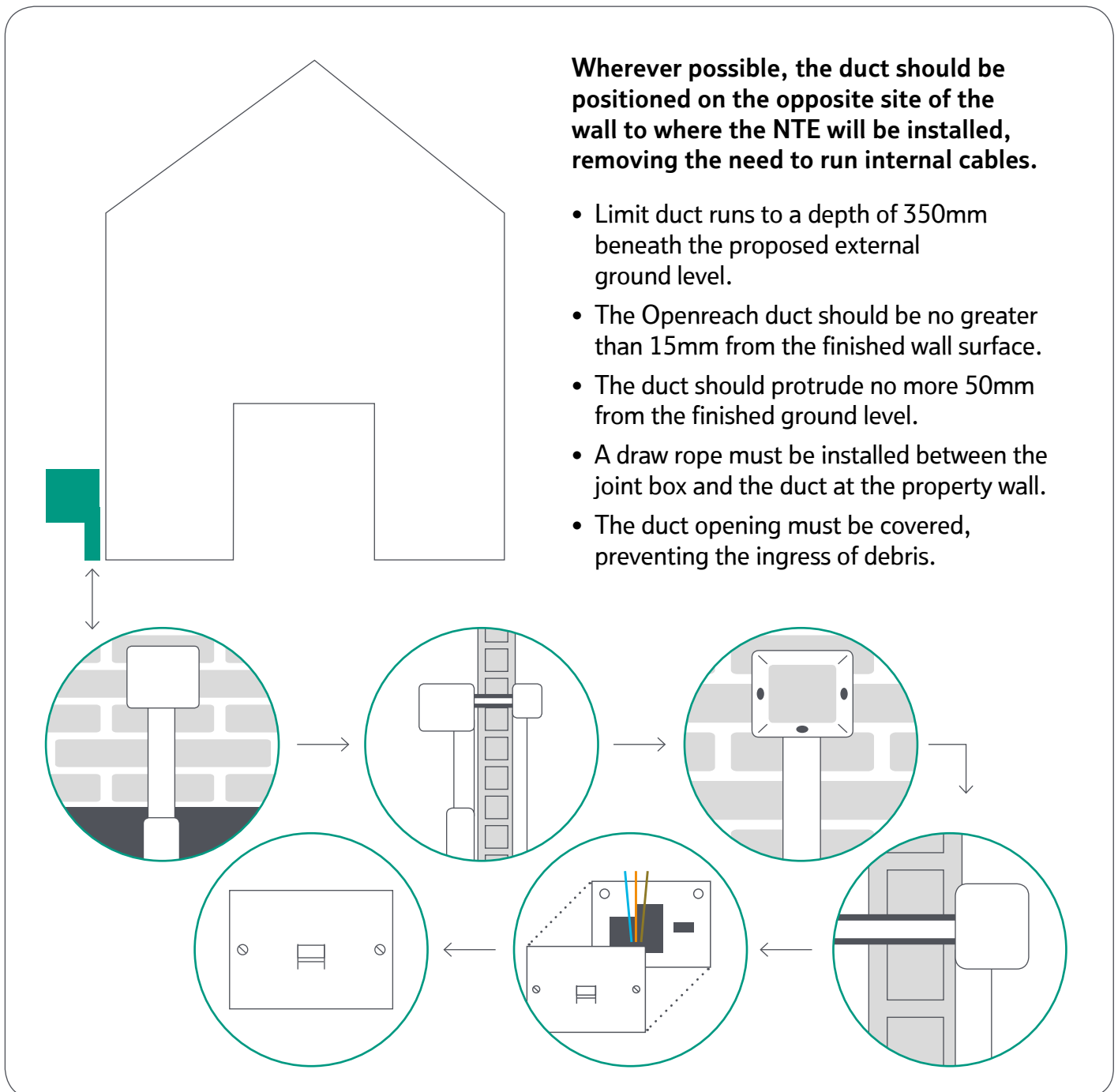


Please note

All internal wires and sockets beyond the Openreach Network Terminating Equipment (NTE) (master socket) are the responsibility of the developer/future home owner. Any faults or defects resulting in an Openreach visit will incur a charge.

Where the Network Terminating Equipment (NTE) is not directly behind the entry hole, and it will not be possible to provide a continuous external lead in to the NTE, a BT66 will be fitted by Openreach in lieu of cover 101.

Duct presentation – houses



Typical issues with duct presentation

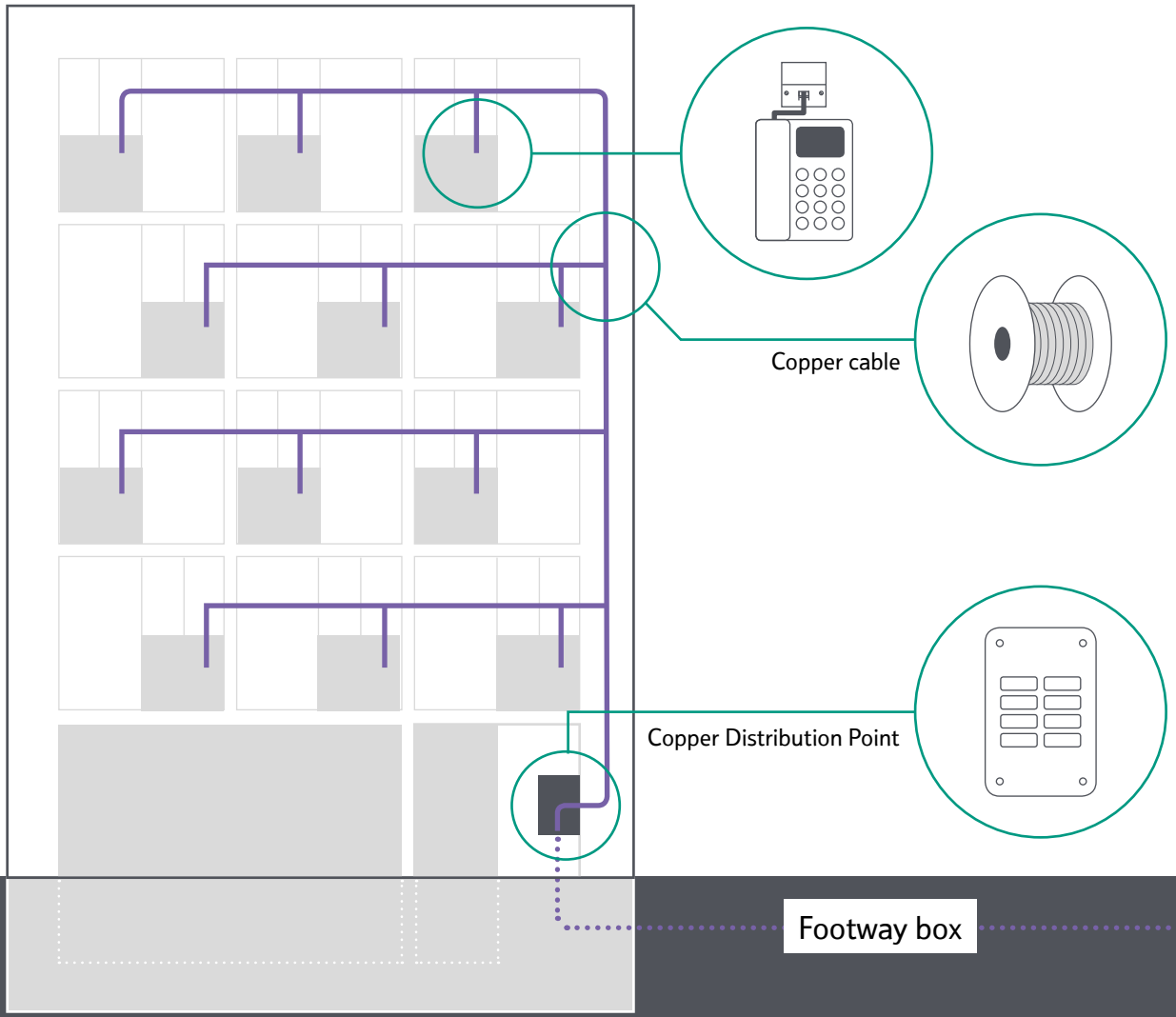
- Service hole is incorrectly offset from duct centre.
- Duct not cut to the appropriate height from the finished ground level.
- Duct installed too shallow.
- Duct protruding too far from the finished wall surface.

Impact on delivery of issues

- Delay in completion – Openreach may refuse to cable if we can't guarantee adequate protection.
- The capping and covers would look unsightly.
- Failure to provide conduit can prevent a cable from being installed.
- Customers may not be able to place orders and remedial work may incur additional costs.

3 Multi Dwelling Units (MDUs)

Small MDU



Your New Site Designer (NSD) will create a copper layout based on your Mechanical & Electrical (M&E) drawings of the MDU. The design will calculate the stores required to build the network. Your FBC is on hand to guide you through the ordering process to make sure the equipment is available when you need it.

The incoming copper will terminate in the communications intake room or riser cupboard.

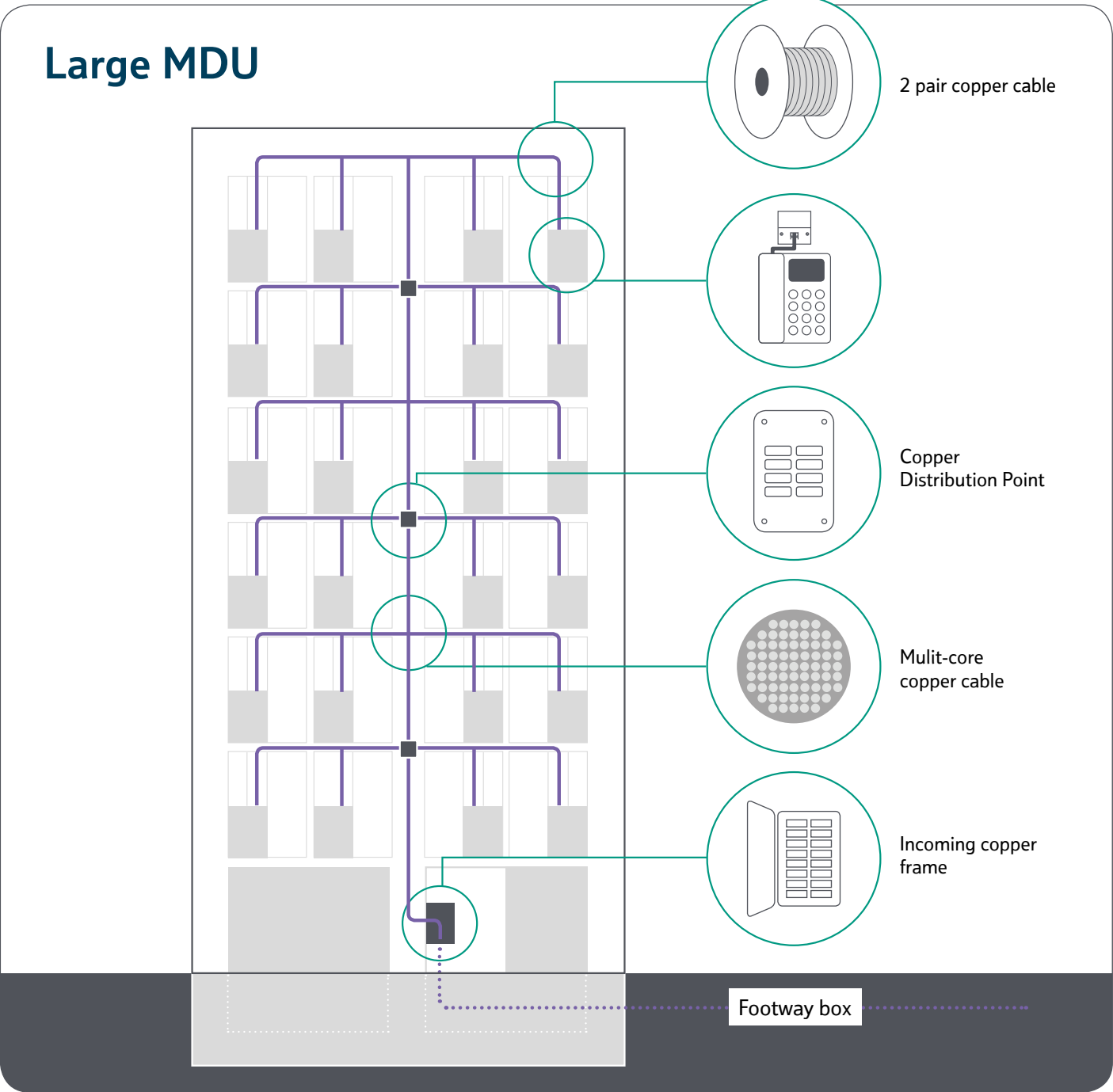
This needs to be a secure and safe location with access for installation and any future maintenance visits.

Our copper Distribution Point (DP) needs to be installed at a minimum height of 200mm and a maximum of 1500mm. Your FBC will agree the location with you. A wayleave may be required from the building owner prior to installing apparatus in common areas.

Please note

You may need to order copper lines for example: for telemetry, lift lines, CCTV or door entry.

Multi Dwelling Units (MDUs)



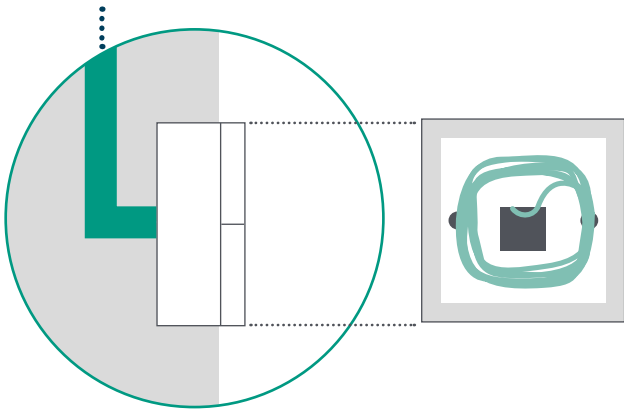
For larger MDUs there may be a requirement to install Multiple Distribution Points (DPs). These DPs will be connected with copper cables commonly housed within the riser space.

Each apartment will require a designated 4 wire copper cable run in a continuous fault free condition from the designated master socket location within the apartment to the designated DP within the riser.

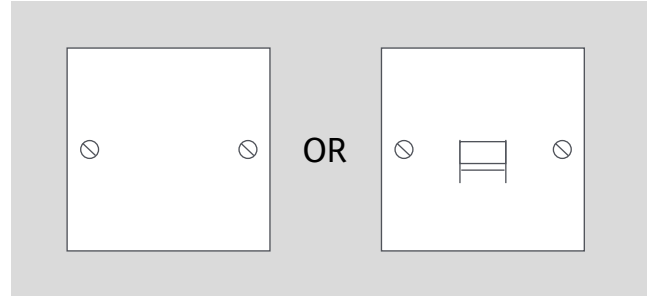
The cable should be clearly marked with the apartment number and left safely coiled within the riser.

300mm of spare cable is required within the apartments master socket back box and at least 1500mm of spare cable is required at the designated DP located within the riser

Multi Dwelling Units (MDUs)



- Install a single flush mounted back box at the desired master socket location
- Install the 4 wire cable from this point to the designated riser DP location
- Install blanking plate to protect cable or the master socket ready for Openreach provision



- Ensure there is 300mm of 4 wire cable should be left at the NTE position and at the DP position to allow for termination
- An IDC tool MUST be used to make all terminations onto the Openreach master socket

Your FBC will advise of all cable marking/labelling and will check for this when ‘calling off’ the work.

IET wiring regulations should be followed.

External type cables can run to a maximum of 2000mm from the internal building entry point.

From this point onwards all cables must either be of retarded, reduced or limited fire hazard properties. Alternative is to house in metallic trunking.

Care should be taken to avoid stretching cables through installation. If the cables are found to be deficient/defective they will require replacement by the developer.

Correct sized shouldered cleats are to be used for fixing copper cable to walls.

A minimum separation distance between power (supply or distribution) cables and copper communications cables must be maintained.

Separation distance is subject to the voltages and power levels involved. Consult your FBC if you are unsure of the minimum separation distances.

Under no circumstances should cable be secured or supported to the suspended ceiling hangers or under floor support legs.

It’s your responsibility to provide, fire stopping on completion of the cable installation.

Openreach networks must not interfere with or be interfered by other services within the riser or any other shared space. e.g.

- Un-insulated hot water pipes.
- Unscreened mains cables.
- Fluorescent lighting.
- Heavy duty switch gear.

A wayleave may be required from the building owner prior to installing apparatus in common areas.

Please note

You may need to order copper lines for example: for telemetry, lift lines, CCTV or door entry.

Multi Dwelling Units (MDUs)

Internal distribution point

Adequate space needs to be set aside for the internal distribution point in the building as outlined in the diagram below.

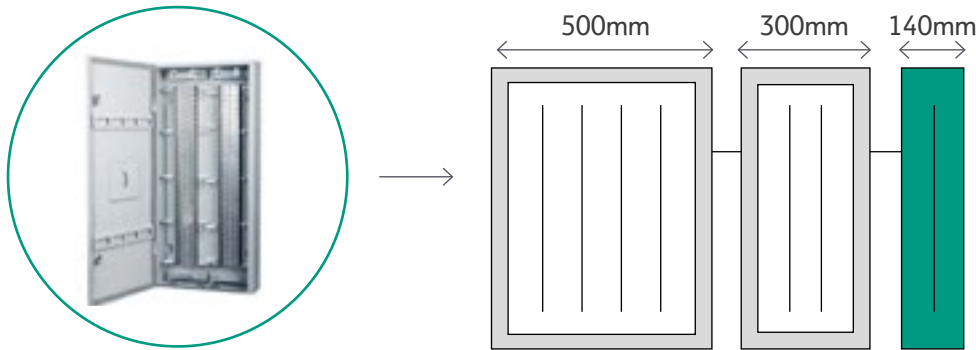
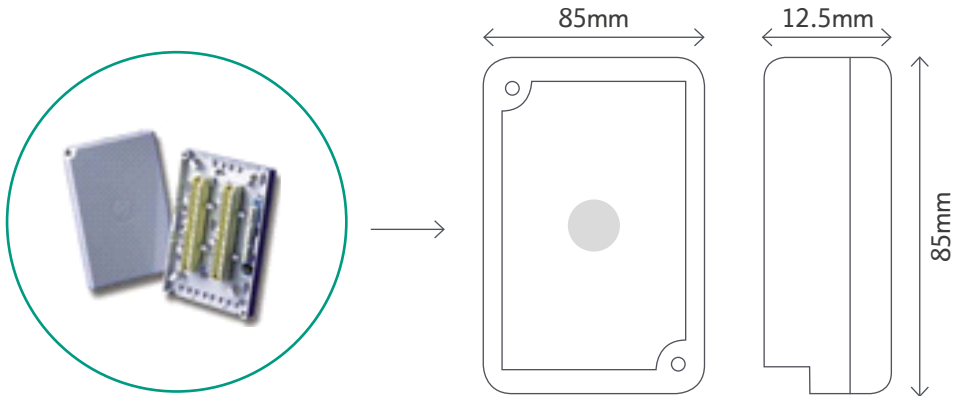


Diagram
Examples of an internal distribution point (top) and incoming copper frame (bottom).

Bending Radius for Copper Cables	
5 pair 8.5mm (x 12 = Bend Radii)	102mm
10 pair 12mm (x 12 = Bend Radii)	144mm
20 pair 15mm (x 12 = Bend Radii)	180mm
50 pair 19.5mm (x 12 = Bend Radii)	234mm
100 pair 25mm (x 12 = Bend Radii)	300mm

The developer is responsible for wiring beyond the termination point unless you request Openreach to provide additional cabling (at time related charge rates).

It is imperative that all internal cabling is run inside conduit or duct to a proper fire standard. All externally run cables must be of a type designed for external use, comply with the bending radius and appropriate cable separations to current IET Regulations and the appropriate British Standards. Consult your FBC if you or your contracted partner is unsure of the installation requirements.

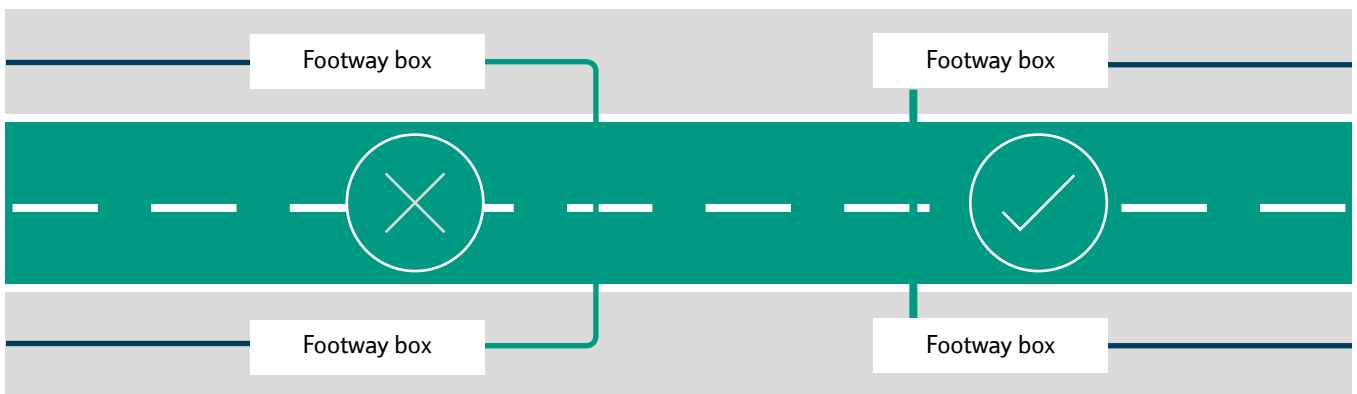
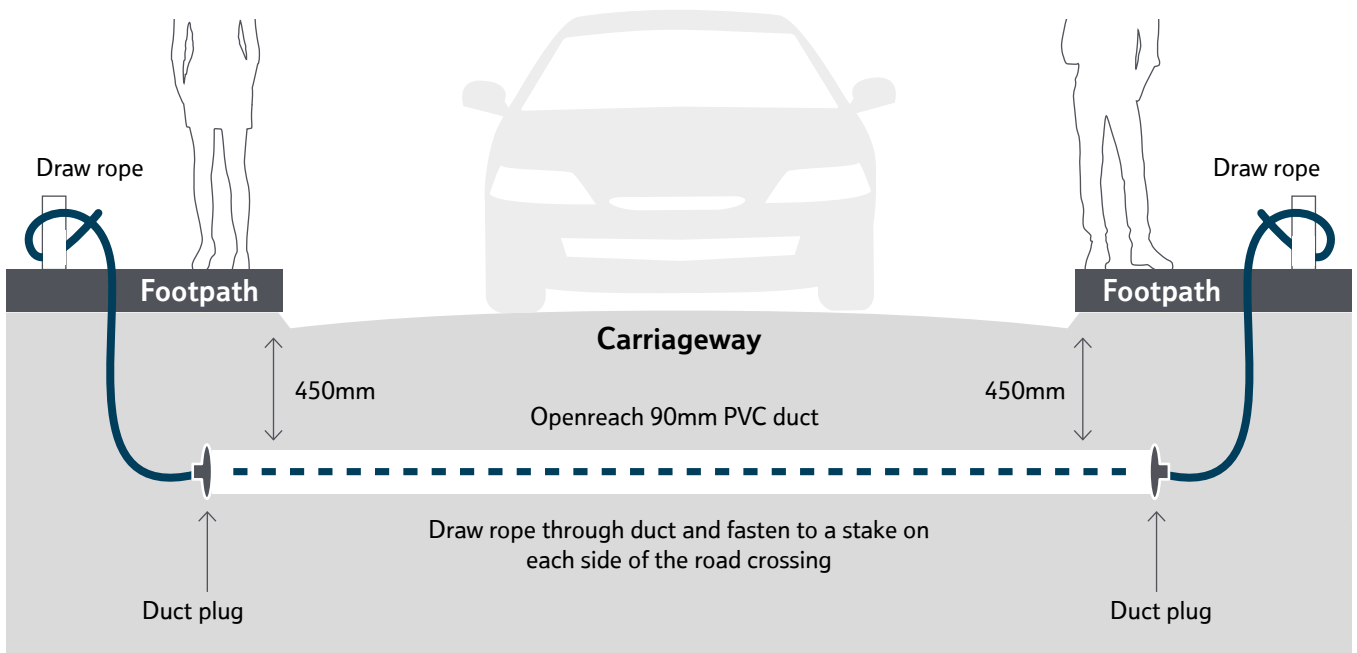
If your site is identified as being in an area of higher than normal risk from lightning we may ask you to provide additional protection. For example we may ask you to provide an earth wire to the Openreach main distribution point, or run copper tape in the ground for the jointing chambers.

4 Duct laying

Carriageway Road Crossings

Where our duct crosses a carriageway, adjoining kerbs must be temporarily marked to note positions. Openreach duct must be laid on an outer edge of the service trench to enable box building. A draw rope will be inserted through the duct and secured to the marker posts at both ends of the crossing. The appropriate Plug Duct 4B socket end and 4C Spigot is then fitted.

Duct laid beneath a carriageway crossing must be a minimum of 450mm depth from the cover of the final surface levels and, for engineering reasons (Streetworks UK), separated from other services laid in parallel by 600mm (to permit us to install underground joint boxes without the need for bends).



Duct laying

Ducting to the building

Duct to the premises/building must be laid at a minimum depth of 250mm and be as straight as possible.

Ducting general principles

- All runs shall be laid as straight as possible. If needed, you can carefully bend the ducts or use pre-formed bends supplied by Openreach.
- There shall be no more than one pre-formed 90° bend in any single run of duct.
- Pre-formed 90° bends shall not be installed in any duct linking two joint boxes.
- Footpath or service strip ducting must be laid at a minimum of 250mm depth of cover.
- All space alongside the duct must be backfilled with granular fill to a minimum thickness of 75mm.

For all Single Dwelling Units (SDU) duct must be terminated on the external surface of the property.

- The duct termination point must be in a location that will allow unrestricted access for any future maintenance activity.
- All ducts must be provided with a draw rope after installation, unless it's agreed locally to substitute the draw rope with a cable.
- Please notify your FBC when the duct has been laid and is ready for inspection.

Commercial unit ducting

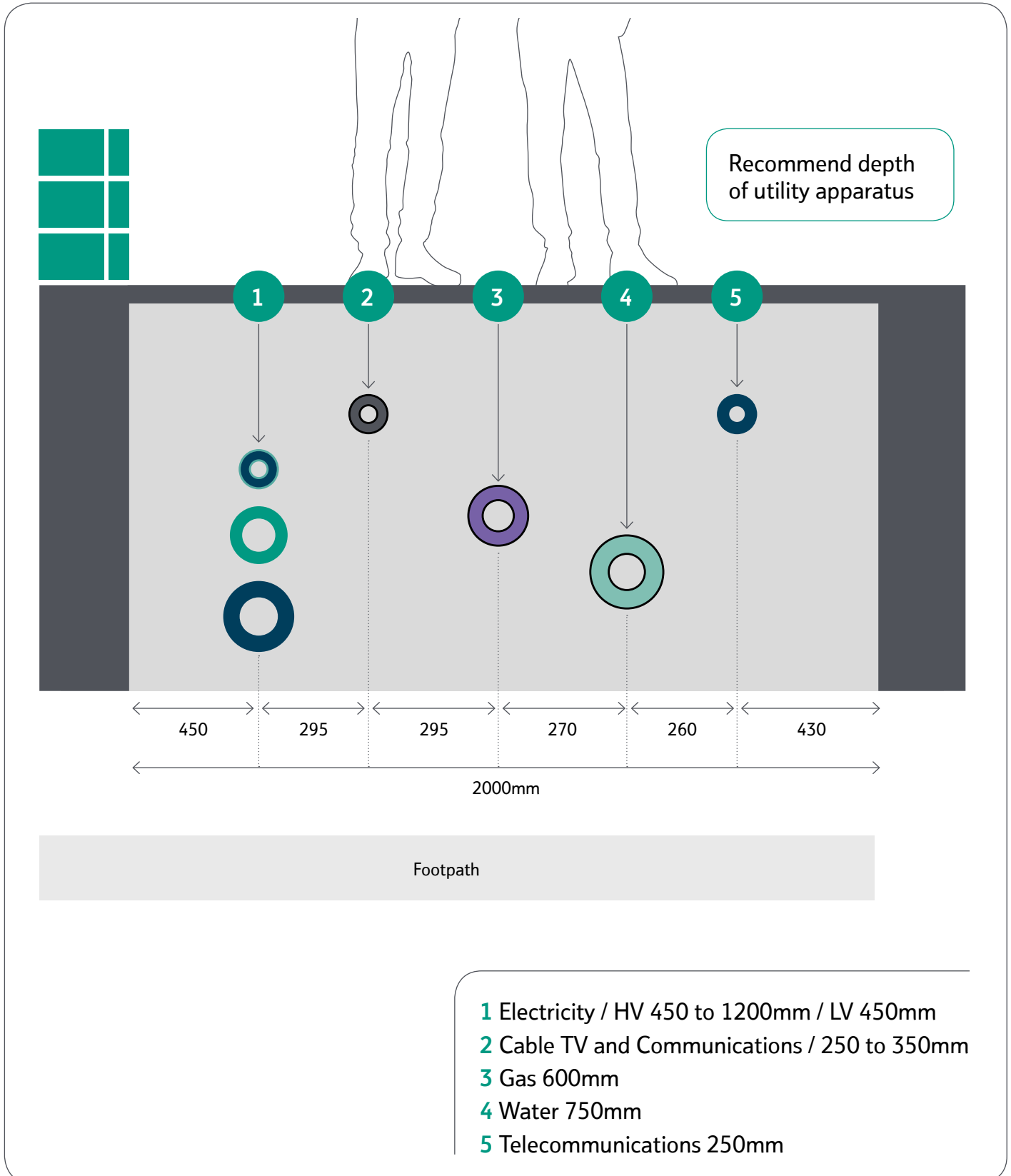
- 90mm duct can be laid either externally or internally to the building, with 45 degree angled bend.
- If internally then the duct should be sealed once cabling is complete – the FBC will provide this as a stores item.
- The termination point on a large commercial unit within a commercial only site should be located within 10m of the entry point.

Please note

The latest information on the positioning of utilities, mains and plant can be obtained from Streetworks UK: [streetworks.org.uk](https://www.streetworks.org.uk)

Duct laying

Arrangement of mains services



Duct laying

Avoiding damage to the Openreach underground network

Openreach has an extensive underground network that can be located inside/on the perimeter of a site.

This network is vulnerable to excavation related damage unless appropriate precautions are taken.

The precautions for avoiding damage to an underground utility plant are contained within the Health & Safety Guide no. 47: “Avoiding danger from underground services”.

This document stresses the need for the availability of utility plans on site and the use of safe digging practices.

Available here:

www.hse.gov.uk/pubns/books/hsg47.htm

Damage to the Openreach network by a third party can be expensive for that party to repair.

By working together, we want to make sure you avoid the repair and associated cost which can consist of one or more of the following:

- **Direct Cost** – the cost of repair.
- **Operational Cost** – delays associated with repair.
- **Social Cost** – loss of service to emergency services/centres or the vulnerable in society.

Typical issues with carriageway road crossings

- Insufficient depth.
- Proximity to other services.

Impact of issues

Developer will have to renew duct and this may delay any first occupation date or subsequent occupation dates.

Click Before You Dig

To obtain a more precise location of Openreach infrastructure (either within your site or the adjoining land) and avoid costly damage, contact:

email: cbyd@openreach.co.uk

Utilisation of the Openreach “Click Before You Dig” free service has a proven record of minimising the potential for damage and cost.

If you need to move or consult on existing Openreach equipment, contact us on **0800 783 2023** or complete the online webform at www.ournetwork.openreach.co.uk/help-and-support.aspx

5 Modular jointing chambers – Quadbox™

The optional approved pre-formed chamber system Quadbox™ can be used to speed up the installation process and bring significant productivity benefits as there is no need for specialist box building teams and concrete backfill to be used.

The Quadbox™ is not a free stores item from Openreach, but can be purchased directly from our approved supplier, Cubis Industries: www.stakkabox-quad.com

Joint box modular footways 104 and 106 are the Openreach approved versions (BT specification LN712).

Box furniture items slot into moulded pockets within the chamber, eliminating the need to cast-in fixings or drill on site. Duct entries are also easy to achieve, using a standard hole saw mounted on a cordless drill.

The lightweight high-strength system is supplied as 150mm deep twin wall high-density polyethylene (HDPE) rings to provide maximum flexibility and strength which are simply stacked on a prepared base and backfilled with suitable as-dug or Type 1 material.

See the suppliers Installation Guide Which comes with your box.

If purchasing a pre-formed chamber you are required to purchase the associated furniture.



Modular jointing chambers – Quadbox™

Furniture

Cable brackets and steps (where required) are supplied in a bagged kit and easily slot into purpose designed pockets in the chamber. The brackets and steps drop into preformed slots.



Available Size Range		
Product Code	Clear opening	Depth Per Section
JMF104	915X445mm	150mm
JMF106	1310X610mm	150mm

Duct entries

Duct entries can be cut as and where required using a hole saw mounted on a cordless drill.

The chambers incorporate guides which identify drilling points to ensure correct duct spacing.

A maximum of 4 duct entries can be made into a single wall of the Quadbox™.



Quadbox points of note

As with brick built chambers, care should be taken to make sure:

- The box is set at the correct depth and the base/ plinth is installed correctly.
- The side wall is not damaged/misshapen due to over compaction.
- The frame is level with the surface and a core drill is used for cutting duct entries.
- The developer is required to purchase the required wall bearers.

6 Joint boxes & footways

Footway (JBF104/106)

Joint box designs and specifications may vary depending on the duct layout and whether multi-way ducts or major road crossings need to be incorporated into the network design.

Full technical drawings and specifications are available at www.openreach.co.uk/propertydevelopments

Materials

- **Bricks:** BS EN771-1. Stretcher Bond.
- **Cement:** BS EN197-1:2000 ordinary mix. Three parts sand to one part cement.

Specifications

- **Base:** 150mm concrete, clean and level.
- **Brickwork:** Keyed in at the corners and pointed.
- **Frame and cover:** Set on a mortar bed and fitted squarely to the box structure. You can purchase lifting keys for the covers from TW Engineering Co Ltd at www.twtools.co.uk (tel: 0115 932 3223).
- **Duct entries:** Must not enter through corners and be no less than 75mm from the side wall. They shall enter wall at a minimum depth of 250mm from the top of the frame, cut flush and clear the base by a minimum of 100mm.
- **Bolts:** Must be fitted in each box to allow ironwork to be installed by the developer.
- **Step(s):** One step is required in all boxes deeper than 700mm.
- **JBF104(C):** 915mm(L) x 445mm(W) x 750mm(D).
- **JBF104(D):** 915mm(L) x 445mm(W) x 900mm(D) the minimum depth for boxes either side of road crossings.
- **JBF106(C):** 1310mm(L) x 610(W) x 750(D).
- **JBF106(D):** 1310mm(L) x 610(W) x 900(D) the minimum depth for boxes either side of road crossings.
- **All backfill material** to be class 6N type.
- **Workmanship, materials and method of construction** are to comply with all current relevant contract documents, British Standards and codes of practice for the construction industry.
- **Concrete** to be grade C32/40 with a water cement ratio 0.4 minimum. Cement content 380kg/m³. Aggregate maximum size 20mm. All in accordance with BS8500.
- **All ducts** shown are based on maximum recommended values for Duct Type 54D.
- **End ducts** to be inline.
- **Ducts** to be positioned not less than 75mm from a side wall.
- **Mesh** to be grade B500B or B500C conforming to BS4483.
- **Short lengths of Duct 54D 90mm** to be used on non-ducted routes. Appropriate duct to be used on ducted routes.
- Where instructed to do so drill one set of three holes using a 12mm **masonry drill** bit to a depth of 80mm for future fitting of equipment mounting bracket.
- For details and specs on using corbelling visit the **link** at the top of this page.

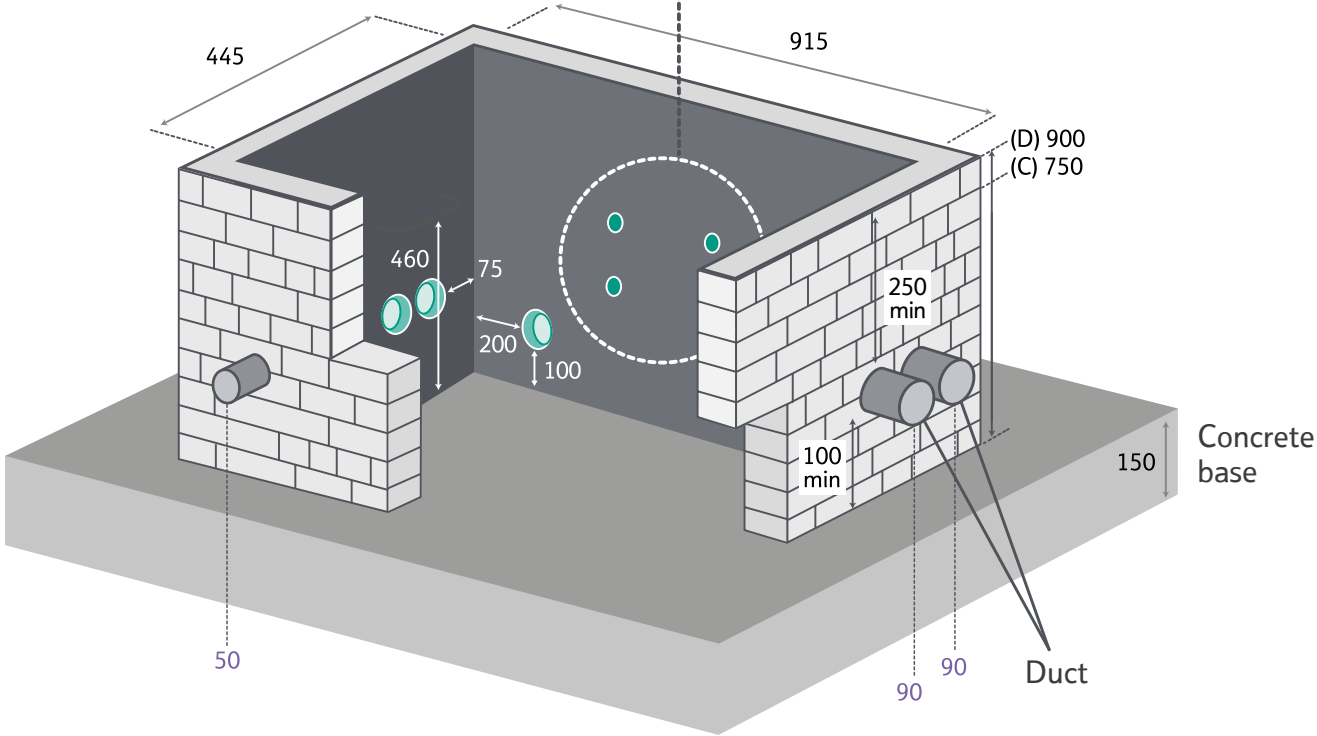
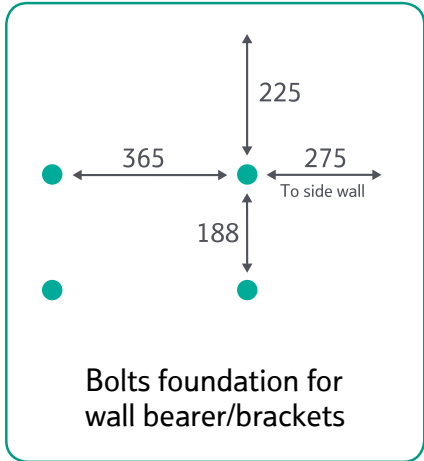
Please note

At no time must minimum box depth be compromised. Consult your FBC if the minimum depth cannot be achieved.

Joint boxes & footways

Joint box footway 104

Internal dimensions. Brickwork Stretcher Bond. Dimensions in mm (not to scale).

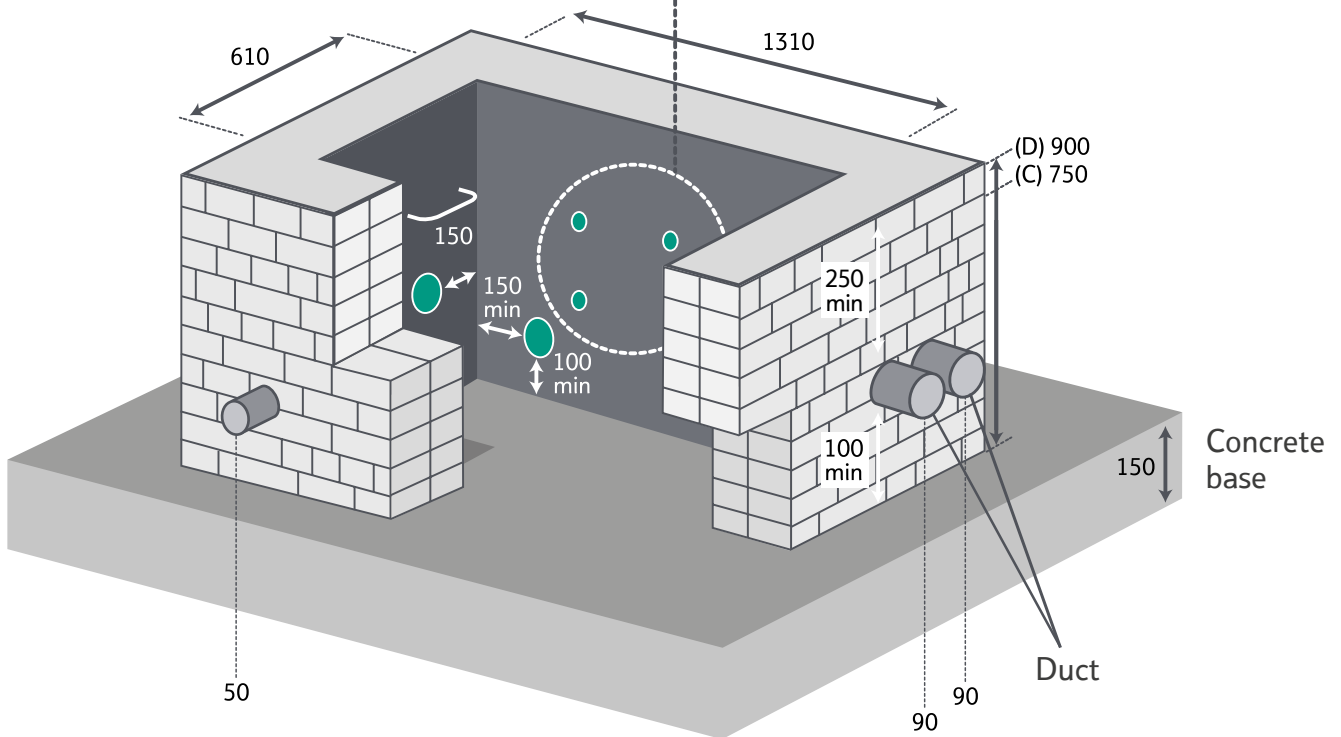
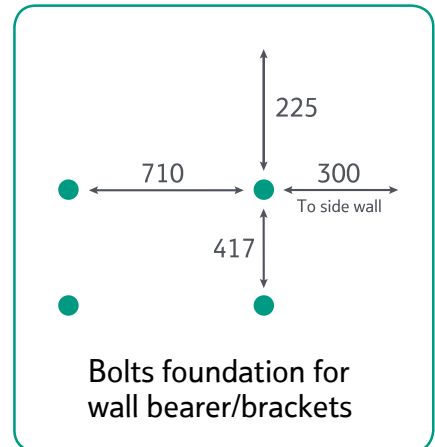


Joint boxes & footways

Joint box footway 106

Internal dimensions. Stretcher English Bond. Dimensions in mm (not to scale).

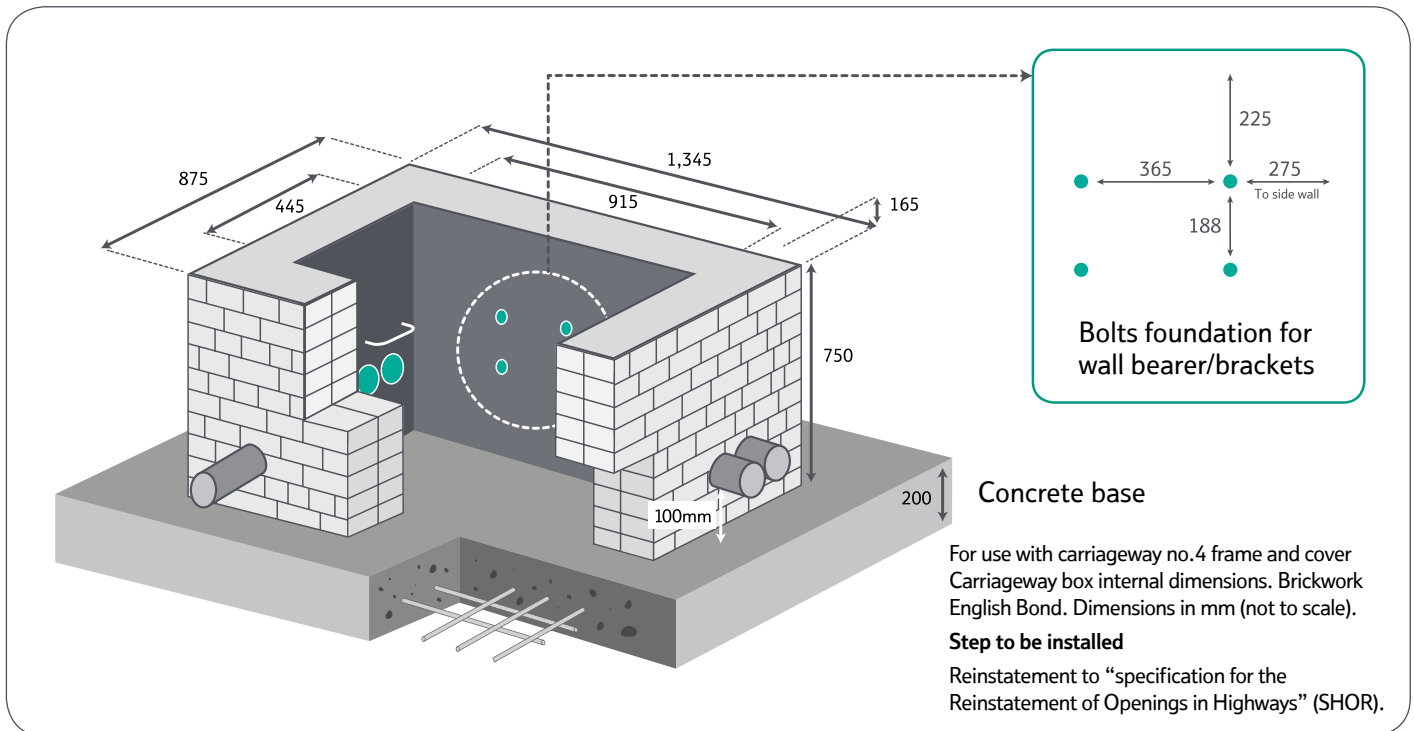
- Minimum depth for road crossing 900mm
- Sump to be fitted in boxes deeper than 700mm



Joint boxes & footways

Carriageway JBC4

Box design and specifications may vary. This will be determined by the duct lay-out and whether multi-way ducts or major road crossings need to be incorporated into the design.



Materials

- **Bricks:** BS EN771-1. English Bond.
- **Cement:** BS12 Portland Cement.
- **Concrete:** BS EN206 Grade 32/40 concrete.
- **Mortar:** BS5628, Part1 requirement for mortar Table 1, Type (i).

Base

- **Cement:** BS12 Portland Cement.
- **Concrete:** 200mm concrete Grade 32/40, reinforced with A393 grade mesh at 70mm cover.

Brickwork

- **Bricks:** BS EN771-1. English Bond.
- **All brickwork** to be keyed in at corners and pointed.
- **Brickwork** to be ‘English Bond’ constructed with a 10mm joint thickness of cement mortar.

Frame and cover

- **Frame and Cover Carriageway no.4** to be squarely set on a mortar bed Highway Agency standards HA104.

Lifting keys

- **Key Joint Box Lifter** should be used to lift the cover and can be purchased from TW Engineering Co Ltd at www.twtools.co.uk (tel: 0115 932 3223) or similar supplier of your choosing.

Duct entries

- Duct to be cut **flush** to the internal box wall.
- Duct **must not enter through corners** and be no less than 75mm from the side wall.
- Duct to enter wall no less than **450mm** from the top of the frame.
- Duct to be no less than **100mm** from the box base.

6 Frames & covers

Frames and Covers

Cubis Industries is the only supplier of these Openreach approved products.

Only approved frames and covers shall be fitted on your site. They are identifiable by the following markings; 'EN24 B125' the British Standards kitemark the Manufacturer Mark (SID), the year of manufacture and the BT identifier.

The 'standard frames and covers' are supplied by Openreach. They consist of a galvanised steel fabricated frame, fitted with unfilled galvanised steel fabricated cover trays and cross-beams.

All covers can be fitted to brick or concrete.

Please note

Where there's evidence or high risk of vehicles using the soft verge e.g. as an undertaking area opposite a T-Junction, a passing point on a narrow road or a parking area, it will be necessary to install a 'carriageway chamber, frame and cover'. **There is also an optional 'recessed frame and cover'.**

Recessed frames and covers

These can be purchased by the installer as an option to the 'standard frame and cover'.

Each cover tray has two key-hole fittings (in the centre of the short side) one of which carries a BT identity mark and the manufacturers' three letter identification 'SID'. The other key-hole fitting displays EN124 and B125 together with the BSI Kite mark certifying the covers to BS EN124: 1994. Recessed frames and covers will accommodate infill blocks to a maximum depth of 60mm. If you're planning to install frames and covers that aren't supplied by Openreach e.g. for block paving, or you have any doubts about what frames and covers to use, please speak to your FBC.



Frames & covers

Installation

All frames and covers should be levelled to the final running surface.

Where a box is located within a grass, soft or unmade surfaces, the frame should be surrounded with a 100mm wide strip of minimum grade C25/30 concrete, to the full depth of the frame, finished level with the top edge of the frame and the outside edge. It must be straight and parallel to the frame.

Unapproved frames and covers

Unapproved frames and covers must not be fitted. Openreach will take any necessary action against any developer who fits unapproved frames and covers within the network, including any potential claim for damages and costs, with possible delayed Service On Demand (SOD) payments. If you're unsure how to specify approved covers, please contact your FBC.



8 Quality control checklist

To help make sure your site network is built to a high quality standard, we've produced a checklist for each phase of the build.

Any subsequent changes to the site plan after a checklist has been completed must be communicated and agreed with your FBC as soon as possible.

Any re-work as a result of an out of date site plan could cause delivery delay and incur you costs in time related charges.

The Site Manager/ Developer Agent agrees to the quality standards and conditions.

Signature: _____

Date: _____

If you have any questions about your development, please visit www.openreach.co.uk/propertydevelopments or call us on **0800 783 2023**

The site	
Developer	
Site Name	
Site Address	
Post Code	
Site Manager/ Developer Agent Name	
Telephone	
Email	
Openreach New Site Identity Ref.	

Openreach Contact

New Sites Office	
FBC Name	
Telephone	
Email	
Off-site Connection Location	
First Occupation Date	
Site Start Date	

Quality control checklist

Item being audited	Category	Checked and Acceptable Standard?			Comments
		Yes	No	N/A	
Base has been cast correctly.	Joint Box				
Reinforced base cast correctly for Joint Box Carriageway JBC (N).	Joint Box				
Bearers and brackets fitted. Steps fitted where appropriate.	Joint Box				
Bolts fitted and positioned correctly during construction of boxes.	Joint Box				
Joint Box constructed to correct dimensions and installed at the correct depth. Any deviations to plan recorded and signed off.	Joint Box				
All concrete/brickwork carried out as per developer 'How to' guide specification.	Joint Box				
Cement and brick types used as specified or exceptions agreed and documented.	Joint Box				
Frames and covers bedded and correctly installed (if unmade surface, Joint Box frame secured).	Joint Box				
Joint Box constructed as planned, positioned correctly and conforms to drawings. Alternatives agreed and documented.	Joint Box				
Modular box installed and prepared as per instructions.	Joint Box				
Ducts properly trimmed and keyed when set in walls.	Joint Box				
External cable/Blown Fibre Tubing (BFT) protected and sealed in Joint Box.	Joint Box				

Quality control checklist

Item being audited	Category	Checked and Acceptable Standard?			Comments
		Yes	No	N/A	
Two pair cable, or draw rope provided in sound condition and correctly jointed where applicable.	Duct				
Cable left in planned location.	Duct				
Correct rope/cables/ installed as per Developer 'How to' guide.	Duct				
Correct type of duct provided and used.	Duct				
Duct laid in required position, at correct depth and installed in the correct position in the Joint Box.	Duct				
Duct properly trimmed and keyed when set in walls.	Duct				
Duct separation distance maintained, or exception agreement obtained and documented.	Duct				
Ducts laid at minimum depth (350mm), or exceptions agreed and documented. (To be viewed in footway where possible, if not check via Joint Box).	Duct				
Temporary duct seals fitted to agreed standard.	Duct				
Ducts positioned correctly on external walls and in line with the cable entry point.	Duct				

Quality control checklist

Item being audited	Category	Checked and Acceptable Standard?			Comments
		Yes	No	N/A	
Cable entry at properties installed and protected correctly (Capping 25, Cover 101A, Connector Bend).	Plot				
Ducts positioned in line with the cable entry point.	Plot				
Customer cable entries correctly positioned and provided.	Plot				
External cable protected and sealed	Plot				
Duct seal Plug 1A fitted.	Plot				
Back box installed at entry point at a usable depth	Plot				
The property has been designed to accommodate voice and data wiring in a convenient place for home owners to use.	Plot				
Voice and data cabling provided and terminated correctly for services.	Plot				

Quality control checklist

Item being audited	Category	Checked and Acceptable Standard?			Comments
		Yes	No	N/A	
Adequate space and access available and maintained for copper – (lift, alarm, telemetry lines, etc.) in a secure location.	MDU				
All cables presented as per schematic diagram and capped.	MDU				
Designated track ways/trays supports in good working order with separations maintained.	MDU				
Back box fitted in each unit at a usable depth.	MDU				
Location of unit entry suitable for Openreach equipment.	MDU				

Plot Numbers Inspected

9 List of abbreviations and acronyms

BSI	British Standards Institute
BT	British Telecommunications
CCJ	Cable Chamber Joint
CLI	Customer Lead In
CP	Communications Provider
DP	Distribution Point
FBC	Field Based Coordinator
HDPE	High-Density Polyethylene
IET	Institute of Engineering and Technology
JBC (N)	Joint Box Carriageway New Sites
JBF	Joint Box Footway
LSZH	Low Smoke Zero Halogen
MDU	Multiple Dwelling Unit
MJF	Product code designation for the Cubis Industries–StakkaBox/Quadbox
M&E	Mechanical & Electrical
NJUG	National Joint Utilities Group
NSD	New Site Designer
NSI	New Site Identity
NTE	Network Terminating Equipment
NTP	Network Terminating Point
PAS	Publically Available Specification
PE	Polyethylene
PVC	Polyvinyl Chloride
RFH	Reduced Fire Hazard
SCF	Straps Cable Fixing
SID	Manufacturers three letter identification
SDU	Single Dwelling Units
SHOR	Specification for the Reinstatement of Openings in Highways
SOD	Service on Demand
UG	Under Ground

10 Health and safety advice

This guidance is a practical aid for designers on what to eliminate, avoid and encourage

Red lists

Hazardous procedures, products and processes that should be eliminated from the project where possible

General issues

- Lack of adequate post-construction information (such as asbestos clearance, asbestos surveys, details of geology, obstructions, services, ground contamination and so on).
- Design of roof mounted services that require access (for maintenance and so on), without provision for safe access (such as barriers) in particular access for aerials / antennas systems.
- Design of environments involving adverse lighting, noise, vibration, temperature, wetness, humidity and draughts or chemical and/or biological conditions during use and maintenance operations.
- Design & layout of cabinets to reduce risks associated with road traffic and pedestrian movements when opened for maintenance works.

Distribution point (DP) location

- Placing DPs into voids or other enclosed spaces with inadequate ventilation.
- Placing DPs adjacent to, or above, any fragile surface.
- Placing DPs directly above, or adjacent to, water features/courses etc.

Cabling routes and lead-ins

- Routing of cables where the cables are above head height within false ceiling systems without a proper access system incorporated.
- Routing of cables external to building requiring specialist access methods (scaffold, mobile elevating work platform etc).
- Internal ducting is not permitted for Single Dwelling Units (SDUs).

Power systems

- Ensure all power installation meet relevant standards, and where DC supplies are planned seek further advice about requirements for earthing of racks, power supply ratings etc. to take account of future needs and growth.

Aerial and antenna transmission/ receiver systems

- Not mounted on building walls or other difficult to reach areas of a building.

Health and safety advice

Amber lists

Products, processes and procedures to be eliminated or reduced as far as possible and only specified or allowed if unavoidable. Including amber items would always lead to the provision of information to the principal contract or contractor where only one contractor has been appointed.

General issues

- Internal manholes and inspection chambers in pedestrian circulation areas.
- External manholes in heavily used vehicle access zones (creates need for roadworks guarding and traffic restrictions).
- Ensure correct installation of underground brick built boxes, and that frames & covers are correctly installed (line/level and ease of opening).
- Where required, correct installation of iron-work (especially any steps/ladders built into underground boxes).

Distribution point (DP) location

- Locating DP at greater than 1.5 meters above finished floor level (without fixed access system incorporated into design).
- DP's located into voids or enclosed spaces provided with ventilation systems built in.

Cabling routes and lead-ins

- Routing of cables where the cables are above head height within false ceiling systems.
- Routing of cables internally where access points require use of access equipment (ladders, step-ladders or platform steps) to allow for pulling in of cables.
- Alignment of external duct routes with capping at SDUs.

Aerial and antenna transmission/receiver systems

- EMF exclusion zones adequately managed with fixed barriers or partitioning systems.

Health and safety advice

Green lists

Products, processes and procedures to be positively encouraged.

- Adequate access for vehicles to minimise reversing requirements (one-way systems and turning radii) in particular if specialist vehicles will need access (pole erection units, MEWP vehicles etc.).
- Provision of adequate access and headroom for maintenance in communications rooms, and adequate provision for replacing heavy components.
- Thoughtful location of mechanical and electrical equipment, such as telecoms equipment, termination points, Wi-Fi transceivers etc. and so on to facilitate access, and placed away from crowded areas.
- Lighting within communications rooms adequate for fine tasks (fibre splicing, small diameter copper wire terminations etc).
- Provision of adequate air handling/conditioning and ventilation for the installed equipment base within the communications room (and people having to access and work within the area).
- Early installation of permanent means of access, and prefabricated access systems with hand rails.
- Provision of edge protection at permanent works where there is a foreseeable risk of falls after handover (consider radio antenna or aerials installations on roof spaces).
- Encourage the use of engineering controls to minimise the use of personal protective equipment.

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