

openreach

ISIS directive  
For Openreach and Partners

NWK/LNK/C566

Issue 13, 14-Feb-2022  
Use until 14-Feb-2024

Published by Openreach Chief Engineer

Privacy- None

# ***FTTP - Brownfield - DiG Solution for SDUs & MDUs - Policy***

*Network Policy*

## ***About this document ...***

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### **Content approval**

This is the Issue 13 of this document.

The information contained in this document was approved on 14-Feb-2022  
by Stan Edwards, Head of Network Policy, Quality & Accreditation

## Version History

Version No.	Date	Author	Comments
Issue 13	14-Feb-2022	Ada Hilton	X&Y Cable information added to section 4.2 – Jointing Brick/Bardic Box information added to section 5.6.
Issue 12	13-Jan-2022	Ada Hilton	Amendment to section 8.2 – clarification of wording.
Issue 11	31-Aug-2021	Ada Hilton	Comprehensive revision of entire document. Added: Duct 56 to Duct 56, and Duct 54 to Duct 56. Revised Micro Duct by separating into P&B and L2C
Issue 10	08-Feb-2021	Eddie Noonan	Section 10 Architecture 2 x diagrams to reflect new cable push distances
Issue 9	18-Dec-2020	Eddie Noonan	Section 6 paragraph 3 Information regarding the use of metal duct 100
Issue 8	18-May-2020	Eddie Noonan	Sections 10, 12,13.4, 13.5, 14. New maximum micro duct lengths for pushing cable- splitter to CBT = 85m. CBT to customer =75m unless for both cases an intermediate box is available for fleeting
Issue 7	20-Feb-2020	Eddie Noonan	Change of Author / Approver
Issue 6	31-Dec-2019	Ada Hilton	Section 12 Jointbox capacity link now updated to reference new ISIS: NWK/LNK/C573
Issue 5	20-Nov-2019	Ada Hilton	Document has received a complete review and update to all sections.
Issue 5	19-Nov-2019	Ada Hilton	Updated
Issue 4	02-Aug-2019	Paul Mott	Section 6.1, 6.2, 6.3-Toby Boxes, Section7.1 Issues during trial.Section 8.6 New SNN's. Section 9 Stores additions (tube seal's)
Issue 3	28-May-2019	Paul Mott	Toby Boxes Section 6 updated. Section 7 additional guidance added regarding passing through garden walls.
Issue 2	30-Apr-2019	Paul Mott	Section 5, Diagram updated. Section 6, New section on

			Toby boxes Section 9, Stores list updated.
Issue 1	28-Mar-2019	Paul Mott	New Document

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# 1 *Openreach Network Policy*

Openreach network policy defines a set of requirements to guide the decisions taken when planning and building a telecommunications network.

These requirements ensure we achieve the required outcomes in terms of meeting the strategic direction, architectural design, financial targets, and quality standards for the respective network.

This document forms a part of the authorised portfolio of Openreach network planning policy documentation. Adherence to these standards and policy is mandatory. Any deviation presents a risk to the required outcomes and will be subject to future compliance checking. Network deployments which do not meet network policy will fail any build audit and jeopardise our ability to supply services to our customers.

**Caution:** Policies are liable to change. Therefore, you must ensure that this copy/material is from a controlled source e.g. [The Bookstore Libraries](#), where you can register for email alerts about updates, from within the documents you reference.

## 2 *Introduction*

This document details the Openreach network policy for deployment of Direct in Ground (DiG) civils solutions for Brownfield FTTP (Fibre to the Premises) networks serving Single Dwelling Units (SDU) and Multiple Dwelling Units (MDU).

### 2.1 **Definitions**

The table below shows a list of definitions used in this document.

Definitions/Acronyms used in this document	
P&B	Plan and Build
L2C	Lead to Cash
Direct in Ground (DiG)	Locations where no duct infrastructure was installed. Normally armoured copper cable between distribution points, joint boxes, Jointing posts.
Partial DiG	Locations where a trunk duct infrastructure was provided with premises served by armoured copper cables
Trunk duct	Box to box duct forming part of the trunk route through an estate; also known as "spine duct".



Rider duct	Duct from a box to a stumped end with tees provided to customer curtilage.
Toby box	A box at the curtilage; it is the demarcation point between P&B and L2C in DiG estates
Surface Marker	Used to find where duct 56 is buried under the curtilage.
Lateral duct	Duct provided from the trunk or rider duct towards the customer curtilage or boundary
OLO	Other Licensed Operators - Companies other than BT which operate telecoms systems.
Jointing Brick/Bardic Box	Generally a steel box installed into the brickwork of a property.

Table 1 – Document definitions

### 3 **Scope**

This document details the 3 solutions that are utilised when building infrastructure into a full or partial Direct in Ground (DIG) locations.

It is not intended to provide instruction on 'how to' build a network, nor will it give in-depth details of products and components. Further details of the products and components can be found at: [EPT/ANS/A040](#) - One Fibre Network – Build Quality Manual for Engineers.

## 4 **L2C Considerations**

**Warning:** Before any plan and build work commences, all teams should ensure that they are fully aware of the L2C requirements to provide service from the CBT to a customer.

A summary of L2C considerations are shown in the following sections.

ISIS document [EPT/UGP/B101 - FTTP D.i.G Estates, Civils & Cabling](#) provides further guidance.

### 4.1 **Common considerations for all properties**

- Where is the service most likely to be taken? (For example, the living room because of the television). An existing route [Openreach's copper or another provider's] indicates a potential route for fibre.
- Is there a route that would avoid cabling through paving/metalled surfaces?
- Is there an existing duct into the premises that we can intercept?

- Have the driveways in this area been enlarged? Avoid placing a toby box in a location where it may become stranded in the future due to development

#### 4.1.1 Terraced properties

- For properties with no front garden, take into consideration the current underground [copper] feed route and place the lead-in to the property's living room
- For properties with small front gardens, is there a common boundary for routing the lead-in cable? Take into consideration the living spaces of the properties.

#### 4.1.2 Semi-Detached properties

- Is there a common wall/boundary/fence that can be used for the lead-in cable? Take into consideration the living spaces of the properties.

### 4.2 X and Y cables

The use of X and Y cables for the L2C task will allow for the provision of fibre to multiple properties from a single fibre cable and toby box/marker.

**Warning:** If we plan to serve multiple properties from a single toby box/marker via a single cable lead-in (X&Y cable), then wayleaves must be agreed and signed at the P&B stage with the premises /landowners.

Please see the following guidance:

[NWK/LNK/C591 - FTTP - X and Y Cable - Policy](#)

[Network Policy Briefing 808 - Benefits & Deployment of the X & Y Cable](#)

### 4.3 Survey Network Notes (SNN's)

It is essential that the correct SNN is applied to each address in the PON upon completion of the plan and build activity.

For current SNN list please visit:

[EPT/ANS/A068 - Survey Network Note's & Survey Markers](#)

## 5 DiG Policy

One of the major challenges in our FTTP build delivery plan is the DiG estate. Generally built in the 1970 and 80's these can be found nationwide in large numbers.

Our challenge is to deliver to these estates safely with a quality and cost effective build provided at speed. Our plan and build teams need to provide a useable route to the customer curtilage that will allow a simple and successful L2C provision.

We have 2 types of DiG estates:

1. Full DiG – see section 5.1
2. Partial DiG – see section 5.2

**Caution:** We are now aware of Jointing Brick/Bardic Box estates, and these are covered in section 5.6.

## 5.1 Full DiG

This is an estate where there is no existing trunk, distribution or lateral duct. The copper network was constructed with armoured cable and jointing chambers (boxes) or jointing posts etc. provided for distribution points (31A's, shrink downs etc). The lead-ins to properties will either be direct from the distribution point (DP) or via a buried "one pair cut- out" from a solid copper cable.

*Note:* Short sections of duct may exist that have been provided for copper length renewals required to cure faulty sections of the copper cable.

## 5.2 Partial DiG

Partial DiG estates are very similar to full DiG estates, but these estates have a trunk duct network running through the estate with generally a duct 54 box to box design. The copper lead-ins from the DP boxes will normally be armoured cable.

## 5.3 DiG Build – Policy Considerations

The build considerations below must always be followed when planning to build FTTP into these locations. These considerations must be read in conjunction with the full ISIS.

1. **Overhead** – We must always consider an Overhead (OH) solution before defaulting to and Underground solution. However, you must complete a consultation process with all key stakeholders including residents and the local authorities to gain agreement for an overhead solution.
2. **Do not overprovide** – Utilise all existing duct infrastructure and capacity where possible. For box capacity limits please refer to the guidance in [NWK/LNK/C573 - TM Node Jointbox Capacity](#).

3. **Metal duct 100** - When Metal Duct 100 is encountered in the network it should be treated as a Direct in Ground (DiG) cable. New duct should be installed to overlay the metal duct 100.
4. **Duct 56 solution** - Use the Duct 56 solution, this is now a standard and approved build. we can now provide duct 56 as a DiG estate solution and this can be deployed at speed.
5. **Micro-duct** - The use of Micro-duct is only to be used on exception and with pre-approval of the Network Policy team. Please contact the author of this document for further guidance.
6. **L2C Considerations** - Think about the L2C task, the position of the duct provided to the curtilage should always ensure a simple L2C solution i.e. do not leave a toby box in the middle of a drive where the L2C will be problematic.
7. **Jointing Brick/Bardic Box estates – See section 5.6**
8. **Build to the policy** - If you don't think you can follow the policy, you need to let us know why. Contact the policy team via the author of this document or by going to the [Network Policy website](#).

## 5.4 Engagement with Stakeholders

Consultation is key. You must engage with highway authorities, local authorities, community groups and residents etc. to ensure an efficient and effective network build. Representatives of these organisations can help by briefing other departments within their organisations to ensure the smooth running of projects.

## 5.5 Other Licensed Operators

Other Licensed Operators (OLOs) may have laid their own duct and constructed their own boxes within a DiG estate.

<b>Warning:</b> Openreach <b>do not</b> enter into agreements to use other Telecommunications operators' network in the public highway.
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This includes OLOs who have utilised out network by building their own duct network into our boxes under a Physical Infrastructure Access (PIA) agreement.



Diagram 1 - OLO duct installed into a BT joint box.

## 5.6 FTTP Provision via Jointing Bricks/Bardic Boxes

This section will outline what action the plan and build team should take when they encounter jointing bricks at the FTTP survey stage. They are also known as Bardic boxes in some locations.



Diagram 2 – Examples of Jointing Bricks/Bardic Boxes

Historically jointing bricks were used to host a copper DP or copper joint where the individual lead ins would then run to each property either in a small diameter duct e.g. duct 100 or loose under the floors of the row of houses. The jointing bricks were sometimes served with a duct but in the majority of cases they were served with an armoured cable direct in the ground (DiG)



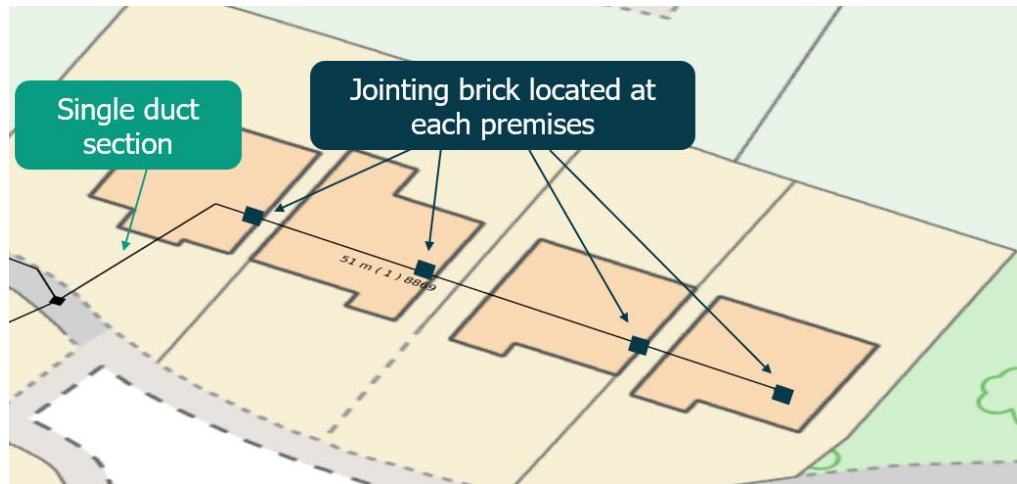


Diagram 3 - Single duct (section 8869) running under multiple properties

On PIPeR and ORION it may show that a duct exists between all the properties, however the access points to the duct will be under the floor or in some cases in the foundation of the property and will not be able to be accessed at the L2C stage.

### **FTTP Survey**

If joining bricks are identified or encountered at the FTTP survey stage the properties should be treated as DiG.

When planning the new duct the surveyor should follow the rules set out in this ISIS to provide network to the curtilage.

There are various different solutions of how these properties can be served as they could be either detached, semi-detached or terrace housing.

These are set out in the following list, please note this list is not exhaustive and some of these will require wayleaves to be obtained.

- Provide duct and a marker or a toby box to the curtilage of each property.
- Provide duct and a marker or a toby box to the curtilage boundary line of semi-detached properties with the use of the of the Y cable proposed at the L2C stage.
- Provide duct and a marker or a toby box to the curtilage boundary line of a row of 4 properties with the use of the of the X cable proposed at the L2C stage.

## **6 DiG Solutions**

Where no duct exists, check with the project manager to ensure the premises are to remain within the scheme. If they are to remain, overhead (OH) provision is preferable to underground (UG), but first ensure a consultation process is undertaken with all key stakeholders. If OH is rejected by the key stakeholders, then Openreach will need to provide a UG solution.

The solutions available are:

#### **Duct 56**

This can be used to provide a new trunk/rider duct and a lateral duct where the existing network is full DiG. See section 9.

#### **Existing duct 54 with new duct 56**

This solution can be used to provide new duct 56 laterals where the existing network has a duct 54 or equivalent trunk/rider duct network available for use. See section 10.

#### **New duct 54 with new duct 56**

Duct 54 can be used to provide a new trunk/rider duct which then connects to duct 56 lateral ducts. See section 10.

#### **Micro Duct**

The Micro duct solution is only to be used by the Chief Engineer's Civils Teams as part of the Chief Engineers trials. See section 11.

### **6.1.1 Dimensioning of New Chambers/Boxes**

ISIS document [NWK/LNK/C573 - TM Node Jointbox Capacity](#) specifies the dimensioning of new chambers/boxes.

- The minimum size box to host a single 4, 8 or 12 port CBT is a JF2 which is large enough to allow the installation of a MOBRA.
- A JB26 can only be used as an intermediate box for rodding purposes and no nodes should be positioned in a JB26 unless there is no alternative.
- A JB26 must never be placed within 600 mm of the road kerb or any position which will allow vehicles to drive over the box and potentially cause damage.
- A MOBRA cannot be used within the JB26 joint box type and therefore where utilised ensure that the components are secured adequately and account for correct minimum bend radii.
- All road crossing boxes must be a JBF4/JMF4 to obtain the correct depth for the carriageway duct.

## **7 *Utilising Existing Network***

It is important that we utilise any existing network that has been provided within a DiG estate. This section provides guidance on what and how existing network can be utilised to reduce build costs and speed up delivery.

- Where duct and boxes exist these must be utilised wherever possible, however the following policies should be adhered to.
- Metal duct 100 should be treated as DiG cable and not used.

- Where JB23s may have been installed in DiG estates for copper maintenance purposes. These are generally not suitable for hosting CBTs but can be used to link into an existing customer lead-in duct. (See section 7.2)
- Further guidance can be found in ["FTTP D.i.G Estates, Civils & Cabling" \(EPT/UGP/B101\)](#).
- Guidance on box capacities can be found in ["TM Node Jointbox Capacity" \(NWK/LNK/C573\)](#).

## 7.1 Connecting to existing customer lead-in's

Most DiG estates will have individual premises where a duct has been provided for the customer lead-in. This may be because of an historical faulty lead-in or because the property owner has pro-actively provided this as part of building works or a new driveway surface.

Where a lead-in duct exists, a solution must be incorporated into the scheme to ensure that the lead-in can be utilised by the FTTP L2C provision team.

The following sections provide guidance on this.

## 7.2 Existing JB23/26 with duct 56 lead-in

Where a Duct 56 has been provided between a JB23 and the premises on previous copper repair, a swept tee/duct 56 tee must be provided from the passing rider duct, with the tee facing toward the CBT location as shown in the diagram.

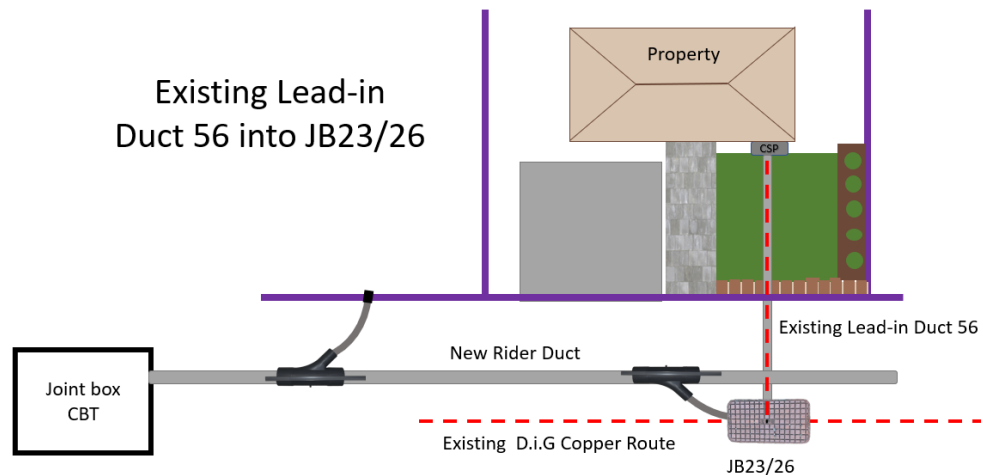


Diagram 4 - New duct connecting into existing lead-in



### 7.3 Buried joint to existing duct 56 lead-in

In the scenario shown below (diagram 5) a Duct 56 has been provided between a buried joint and the premises on previous copper repair.

We need to ensure we utilise the duct 56 lead-in to support a simple L2C provision.

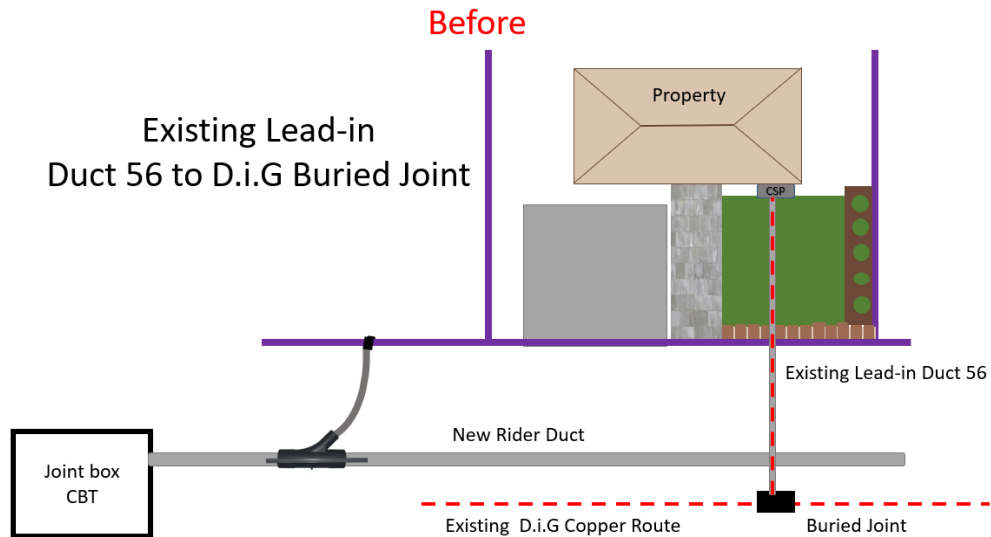


Diagram 5 - Existing duct 56 lead-in between a buried joint and the premises

To utilise the lead-in duct, a swept tee/duct 56 tee must be provided from the passing rider duct, with the tee facing toward the CBT location as shown in the diagram 6 below.

A connection must be made between the new lateral and the existing duct 56 lead-in.

Please refer to [EPT/UGP/B033 - Duct Description, Repair and Sealing](#)

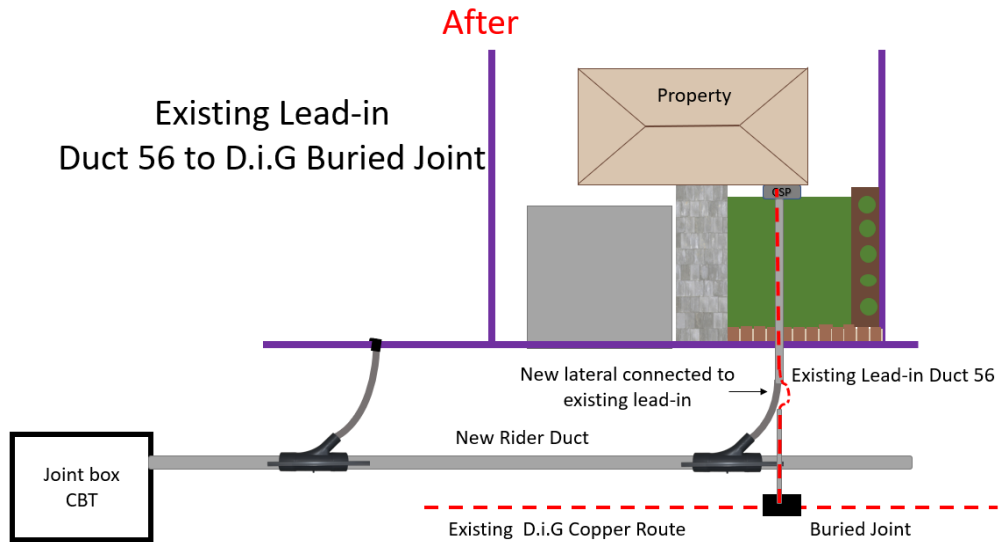


Diagram 6 - Connection made between the new lateral and existing duct 56

## 8 *Provision to the Curtilage*

The termination of the lateral duct at the customer curtilage must be completed with the correct method.

**Warning:** Please remember that “Pin Kerb” and “Kerb Stones” **Must Not be drilled or cut** in a way to provide service, this must be considered at the build survey stage.

Teams **must** follow the policy stated in ISIS document [EPT/UGP/B101 - FTTP D.i.G Estates, Civils & Cabling](#).

### 8.1 Toby box positioning

Where a boundary wall exists, small toby boxes should be placed as close to the wall as practicably possible at approximately 25mm-40mm from the boundary wall.

The picture below shows an example of how the toby box should be positioned.

The example below is compliant with policy.



Diagram 7 - A good example of toby box positioning

The picture below (diagram 8) shows an example of how the toby box **must not** be positioned.



Diagram 8 - A bad example of toby box positioning

**Warning:** The example above is **not compliant** with policy and will fail the quality audit.

### 8.1.1 Boundary wall foundations

Where the boundary wall has a foundation that will not allow the toby box to be positioned within 40mm of the wall then the provision of a medium toby box should be considered as shown below.

The 80mm “lip” shown in the diagram below should ensure that the position of the toby box meets the 40mm rule.

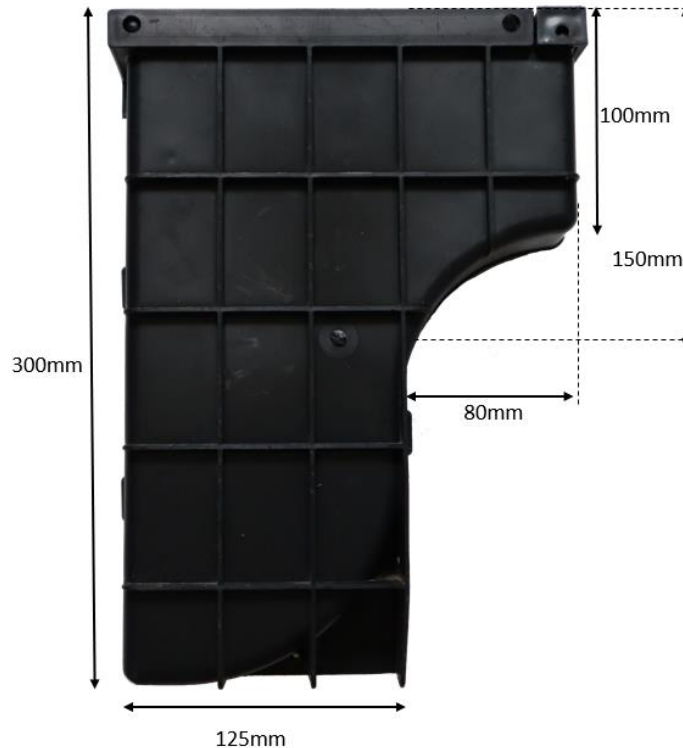


Diagram 9 - Medium toby box – side view with dimensions

Please see [EPT/UGP/B101 - FTTP D.i.G Estates, Civils & Cabling](#).

## 8.2 Small Toby box

Duct 56 can be laid and terminated in a small Toby Box, at the boundary wall, the duct must be cut flush and level with the flat base of the toby box.

Where a single lateral duct is used for provision to two properties at a shared boundary wall via a toby box, **a medium toby box must be installed**.

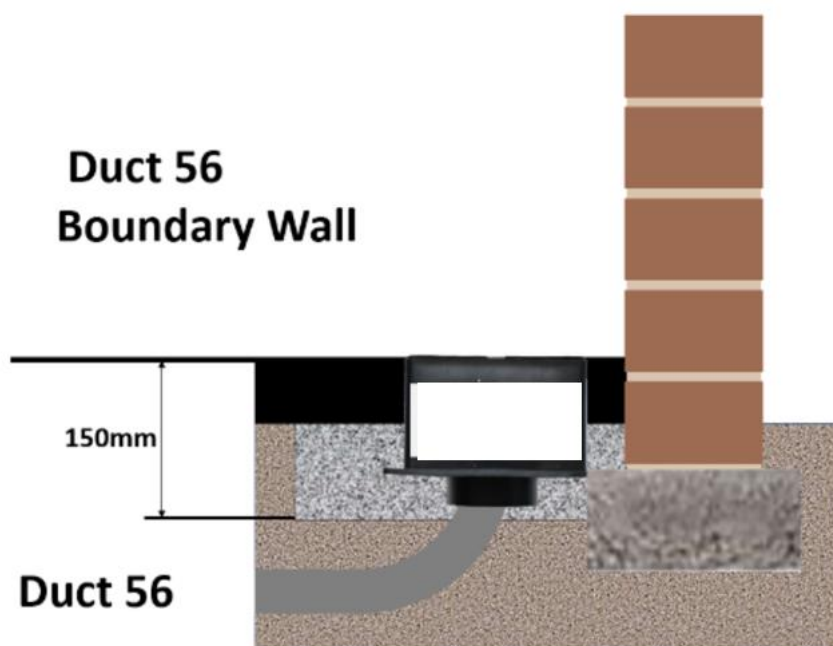


Diagram 10 - Duct 56 fitted to toby box

### 8.3 Surface marker

When burying duct 56 at the curtilage, ensure it's positioned under the pin kerb, kerb stone for the 'soft dig' provision engineer to easily access it.

Th duct 56 must be sealed with cap sealing 16E using Tape Adhesive Rubber 25mm.



Duct 56 Under Wall/Pin Kerb

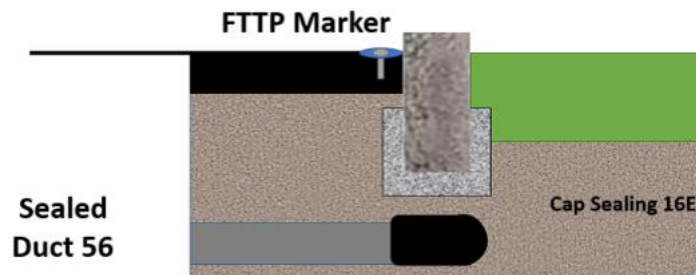


Diagram 11 - Duct 56 buried at curtilage and marker

## 8.4 Lateral duct positioning

When selecting the ideal curtilage position for the lateral to aim for, you must consider the L2C task that will follow on from your provision.

Recommended target positions will be soft dig terrain on the premises side of the curtilage, avoiding driveways, areas of high footfall, difficult terrain etc.

*Note:* If a duct 56 lead-in exists please see section 7 (utilising existing network)



Diagram 12 - Bad & Good examples of toby box positioning

## 8.5 Splitting a single lateral

Please remember where required a single duct 56 lateral can be split between 2 premises as shown below.



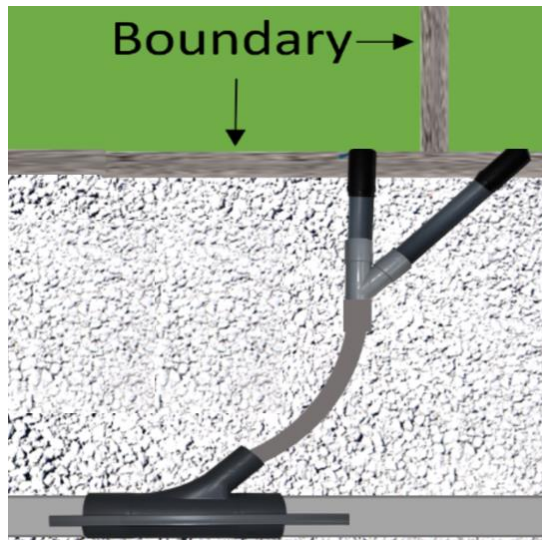


Diagram 13 – Single lateral split to 2 premises

## 9 *Duct 56 Solution*

This section provides guidance on the policy rules that must be followed when providing a duct 56 infrastructure into a DiG estate. A summary of the policy rules is followed supporting scenarios which are used to help communicate the new policy.

*Note:* The list of scenarios is not exhaustive.

**Caution:** Before P&B is undertaken, remember to consult the L2C considerations mentioned earlier in this document.

### 9.1 Policy Summary

- The maximum allowable distance from the furthest toby box/marker to the CBT Box is 100 metres to allow use of 6mm/4.5mm Cobra at the L2C stage to provide the lead-in cable.

**Caution:** Remember, the 100 metre distance is a maximum and should only be used in exceptional circumstances where the positioning of a closer CBT is not achievable.

- The 100 metres distance between the toby box/marker to the CBT can be exceeded up to a maximum of 150 metres including the customer lead-in distance from the toby box to the premises. However, an intermediate box must be positioned to ensure any rodding from the toby box/marker to the CBT box does not exceed 100 metres.

- Where a new duct 56 route from the toby box to the CBT is a significant uphill climb, this will impact the distance the L2C engineer can rod and the maximum distance from the CBT to the toby box should be reduced. to 75 metres or lower where the situation dictates.
- No more than 12 Duct Tee 56/56 (item code: 095004) shall be installed onto a spine or rider duct within either the 75, 100 or 150 metre designs above.
- Pre-roping of the duct route between the toby box/marker and the owning CBT box should not be provided as part of the Plan & Build (P&B) task. This will avoid ropes becoming tangled and potentially damaging any installed cables later.
- Box to box “Back-roping” when installing a cable should not be provided unless a planned follow up cable installation is due to take place.
- A road crossing must be duct 54 with a box (JMF/B 4) either side if required for turning.
- A road crossing can be duct 56 to serve a maximum of two toby boxes/markers where no turning of the duct 56 is needed. A road crossing footway box will not need to be provided on the premises side of the road.
- Where a single lateral duct is used for provision to two properties at a shared boundary wall via a toby box, a medium toby box must be installed.
- Boxes hosting CBTs should be positioned to capture the maximum number of premises and avoid sterilisation of ports at a CBT.
- Where BT duct already exists within an estate it must be utilised whenever possible. This will be dependent on the spare capacity, condition and location of the duct.

**Warning:** We must never use another Communications Providers duct or boxes in the public highway.

## 9.2 Network scenarios

The following scenarios will supply guidance on the policy and cover various build options. The list of scenarios is not exhaustive and are used to show the maximum deployment of the policy.

### 9.2.1 Scenario 1: spine duct + 56/56 tees < 100 metres

- 12 Duct Tee 56/56 can be connected along a spine section of duct 56 and extended to the toby box/pin marker at the curtilage of each property.
- To avoid twisted ropes and potential cable damage, there should be no pre-roping of the duct from the toby box/pin marker to the CBT.



- The distance from the final toby box/pin marker to the CBT must not exceed 100 metres to enable the L2C engineer to use Cobra rods that have a maximum reach of 100 metres.
- It is expected that the L2C engineer will need to excavate down to the access the duct below ground in the customers land to enable rodding.
- The box to box route for future cables must be roped at the duct provision stage.

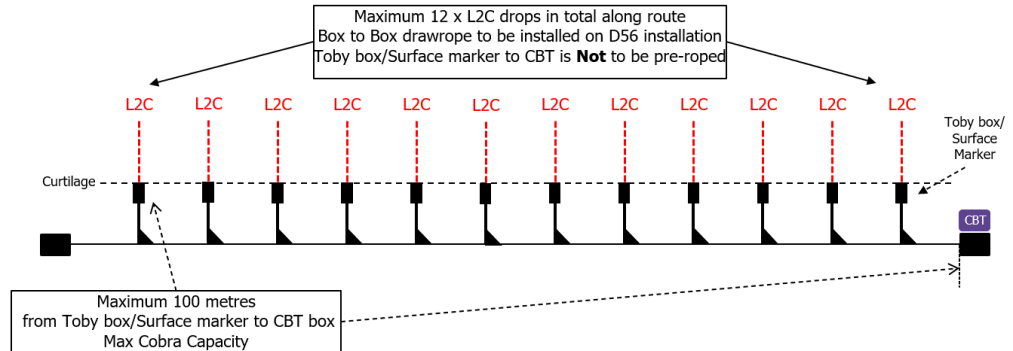


Diagram 14 - Scenario 1 - spine + 56/56 tees < 100 metres

**Warning:** Remember, the 100 metre distance is a maximum and should only be used in exceptional circumstances where the positioning of a closer CBT is not achievable.

### 9.2.2

#### Scenario 2: spine duct + 56/56 tees > 100 metres

In this scenario we have up to 12 premises that we wish to serve from a CBT, but the distance exceeds 100 metres, however the furthest property is still within the 150-metre maximum reach of the CBT.

- To avoid sterilising ports on the CBT we will need a mid-route box to break the route down into two sections that are each less than 100 metres.
- This will allow the L2C engineer to Cobra rod both sections and provide the lead-in cable.

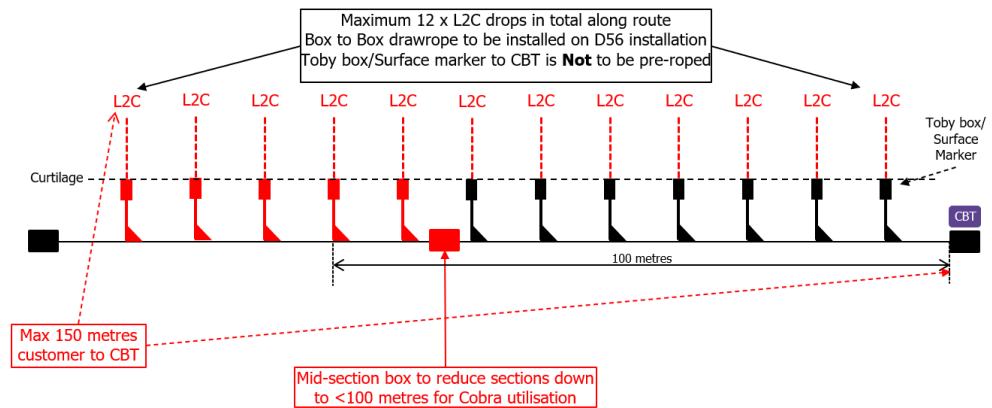


Diagram 15 - Scenario 2 - spine duct + 56/56 tees  $\geq$  100 metres

**Warning:** Remember, the 100 metre distance is a maximum and should only be used in exceptional circumstances where the positioning of a closer CBT is not achievable.

### 9.2.3

#### Scenario 3: rider duct + 56/56 tees < 100 metres

In this scenario we have up to 12 premises that we wish to serve from a CBT via a “Rider” duct. The distance between the CBT and the final toby box/pin marker does not exceed 100 metres.

The end of the “Rider” duct should be capped at its end to allow future extension of the “Rider” duct if required.

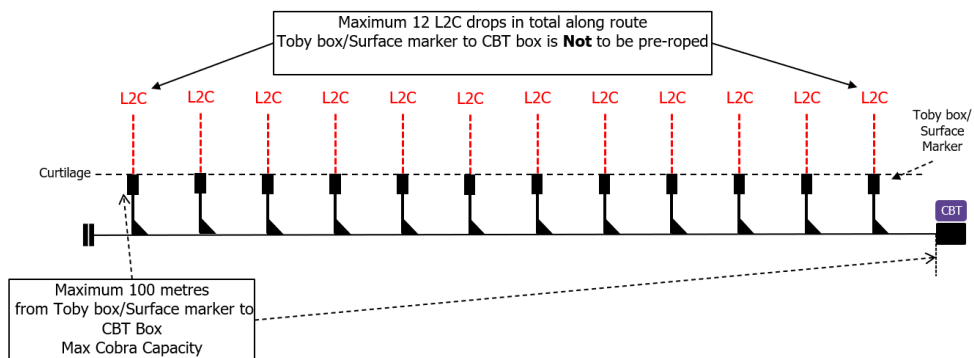


Diagram 16 - Scenario 3 - rider duct + 56/56 tees < 100 metres

**Warning:** Remember, the 100 metre distance is a maximum and should only be used in exceptional circumstances where the positioning of a closer CBT is not achievable.

#### 9.2.4 Scenario 4: rider duct + 56/56 tees > 100 metres

In this scenario we have up to 12 premises that we wish to serve from a CBT via a “Rider” duct, but the distance exceeds 100 metres, however the furthest property is still within the 150 metre maximum reach of the CBT.

To avoid sterilising ports on the CBT we will need to supply a mid-route box to break the route down into 2 sections that are < 100 metres.

- This will allow the L2C engineer to Cobra rod the 2 sections to supply the lead-in cable.
- The end of the “Rider” duct should be capped at its end to allow future extension of the “Rider” duct if required.

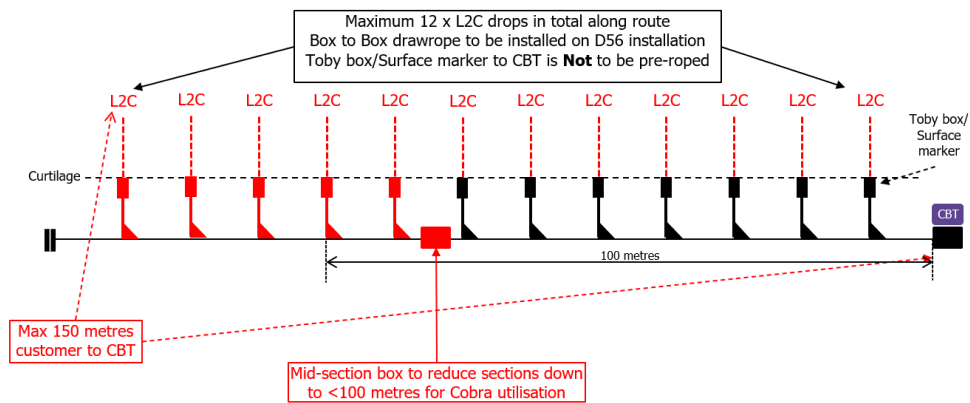


Diagram 17- Scenario 4 - rider duct + 56/56 tees > 100 metres

#### 9.2.5 Scenario 5: spine + 56/56 tees – two-way provision

In this scenario we have a spine section of > 100 metres and > than 12 premises into between the 2 boxes. The solution below follows policy:

- Supply 56/56 tees from each direction
- All toby boxes/pin markers are within 100 metres of their owning CBT
- No intermediate boxes are needed
- For longer spine sections, the same principle can be applied but intermediate boxes will need to be provided.

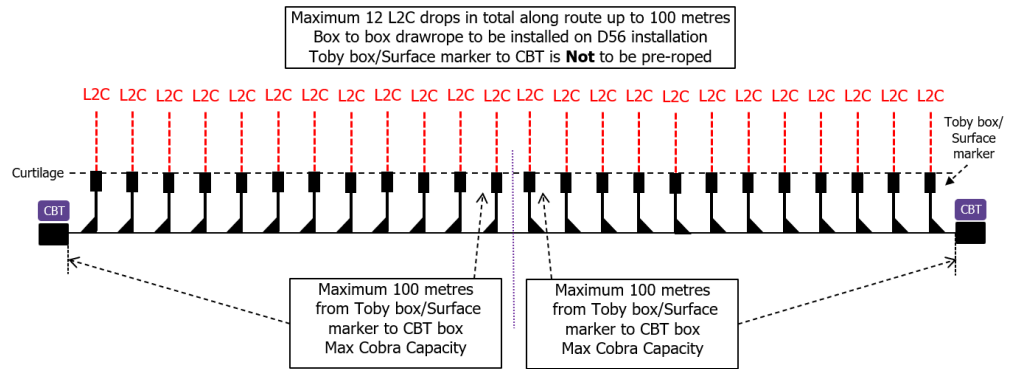


Diagram 18 - Scenario 5 - spine + 56/56 tees – two-way provision

### 9.2.6 Scenario 6: double tee solution

In this solution, provision of the lateral duct from the “Spine” or “Rider” duct has been split again with the addition of a second tee as it approaches the curtilage.

- The maximum fill in the duct 56 entering the CBT box must still be 12 lead-in cables.
- This solution can be used if the toby boxes/pin markers are still provided in locations that will enable a simple L2C solution.

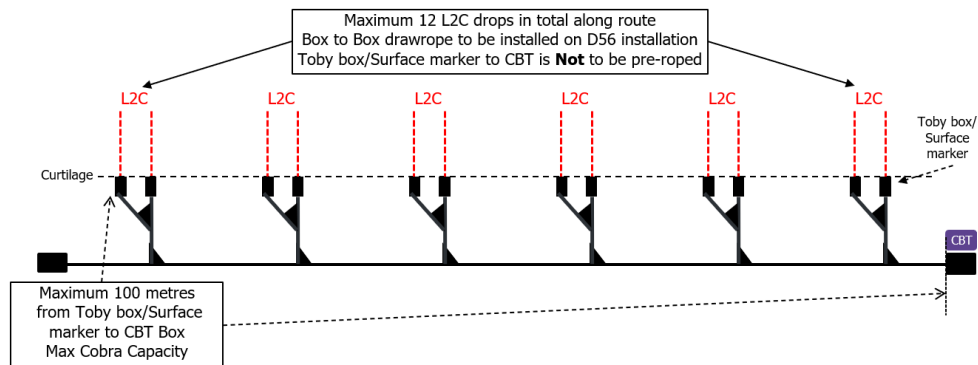


Diagram 19 - Scenario 6 - double tee solution

### 9.2.7 Scenario 7: single medium toby box solution

In the scenario below we have identified that a **medium** toby box can be sited on the mid- position in-between premises in such a position that both properties can be served from the same medium toby box where a boundary wall exists’.

**There should never be a shared under pin kerb solution, as the exit sleeve only has 1 lead in tube opening.**

- This will be dependent on the L2C lead-in terrain and must not be used where the L2C solution will require excavation to driveways, concrete, tar resin, etc.
- Full guidance on the use of the medium toby box in these locations can be found in EPT/UGP/B101 - FTTP D.i.G Estates, Civils & Cabling.
- Install one medium toby box per two single dwelling properties, in the mid boundary position (final lead-in terrain allowing).

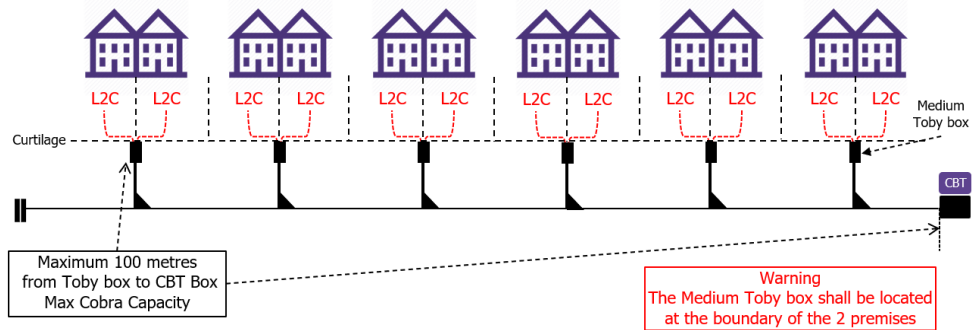


Diagram 20 - Scenario 7 - single medium toby box solution

### 9.2.8 Scenario 8: mixed deployment solution

The diagram below shows a scenario where we may need to use a mixture of the deployment methods shown in earlier scenarios.

A mixture of all solutions can be used but still must follow the standard rules document in the Policy Summary section of this document.

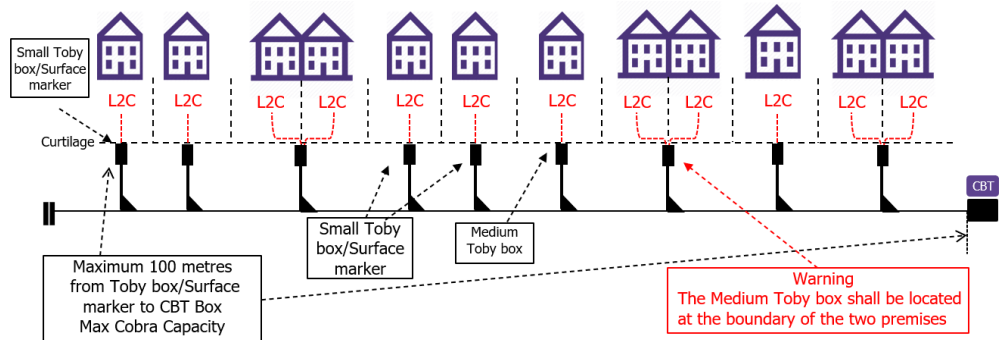


Diagram 21 - Scenario 8 – mixed deployment solution

### 9.2.9 Scenario 9: duct 56 road crossing

There may be occasions where it will be helpful to provide network to premises on the opposite side of a road (carriageway).

- The standard policy is to provide a CBT and associated build on the same side of a road.

- Provision of a single duct 56 road crossing from a box on the CBT side of the road at carriageway depths direct to a maximum of two toby boxes/pin markers Box is acceptable.
- If the requirement is to support more than two toby boxes/pin markers on the opposing side of the road then a new JBF4/JMF4 box must be constructed to allow for the turning of cables.

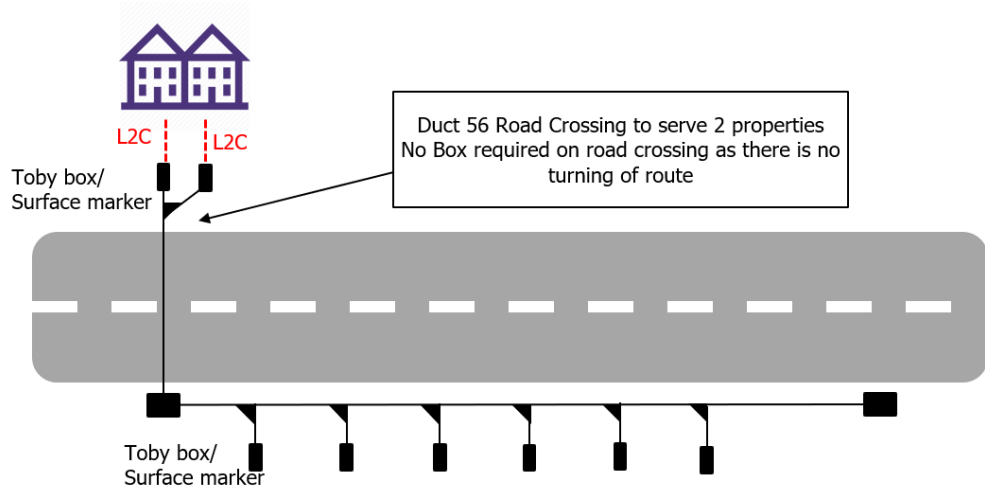


Diagram 22 - Scenario 9 – duct 56 road crossing

### 9.3 Cul-de-sacs - Planning duct 56 provision

When designing duct 56 network for Cul-de-Sacs we need to allow for the number of acute bends within a small area and how the L2C engineer will be able to successfully rod and cable from the customer to the CBT. Provision of multiple 90-degree bends is **not acceptable** as this will inevitably result in the L2C task failure.

To allow for the variety and complexity of cul-de-sacs, we have provided guidance that must be followed when designing and providing the network into cul-de-sacs or any locations where acute turning of the duct 56 is required.

The standard policy of 12 L2C lead-in cables in a duct 56 on route to the CBT is still the largest allowable amount. However, it may not always be achievable to reach 100 metres without supplying a box to support the acute turning of the duct 56.

#### 9.3.1 Example 1: non-compliant network

The example below shows a poorly designed network with no thought of how the L2C engineer will be able to rod back to either box from some of the premises.

**Warning:** This type of design is unacceptable and must not be provided.



Diagram 23 - Example of a non-compliant cul-de-sac design

### 9.3.2

#### Example 2: cul-de-sac – policy compliant – turning boxes

To allow successful L2C deliveries boxes or road crossings or a mixture of both will be needed to be provisioned in locations where acute turns in the duct may result in rodding and cabling failure. Diagram 24 shows areas where the design should position boxes to allow a successful L2C cabling activity.

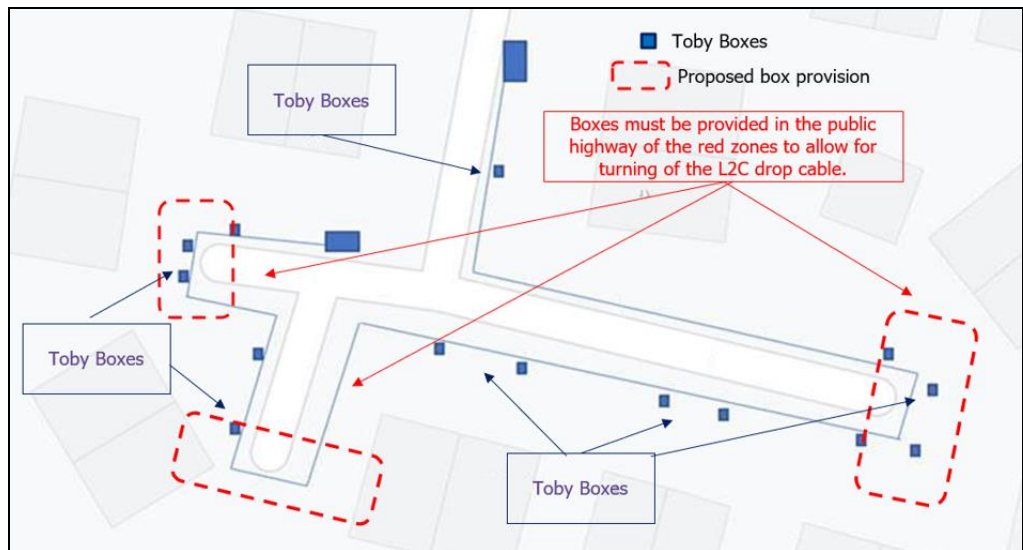


Diagram 24 - Turning boxes solution

### 9.3.3 Example 3: cul-de-sac – policy compliant – road crossing

An alternative solution to the problem shown in Example 1 would be to provide strategically placed road crossings and boxes as shown in diagram 25 below.

Do not use JB26 boxes for turning duct. You must follow the policy stated in ["Duct Entries into BT Jointing Chambers" \(EPT/UGP/B054\)](#)

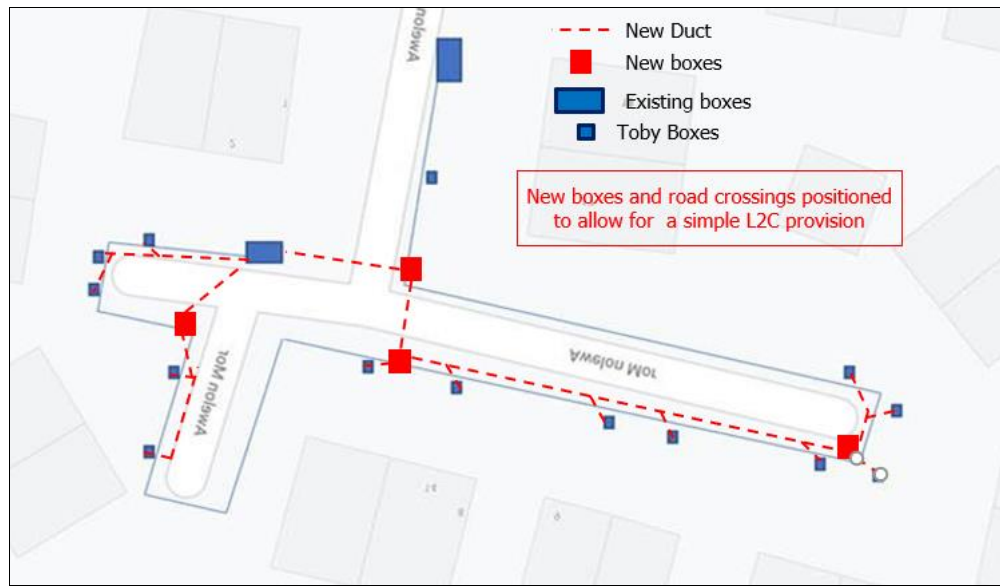


Diagram 25 - Cul-de-Sac – policy compliant examples – road crossing solution

## 9.4 Duct 56 Synthetics

The table below provides a guide to the synthetics used for the duct 56 solution. Team must always refer to the live copy of the synthetics that is held on CANDID.

Code	Item	Unit of Issue
X062	Constructing Jointing Chamber 'Footway No. 102	per chamber
X062A	Constructing Jointing Chamber 'Modular No. 102	per chamber
X063	Constructing Jointing Chamber 'Footway No. 104	per chamber
X063A	Constructing Jointing Chamber 'Modular	per chamber



	No. 104	
X088	Fit, recover, or fit and recover Jointing Chamber 'JB 26'	per chamber
X35Q	Laying Duct in Soft or Unsurfaced (One Way) DiG Trunk Duct	per linear metre
X35R	Laying Duct in Footway (One Way) DiG Trunk Duct	per linear metre
X35S	Laying Duct in Carriageway (One Way) DiG Trunk Duct	per linear metre
X35T	Laying Duct in Footway (One Way) DiG Lateral Duct in Conjunction	per linear metre
X35U	Laying Duct in Soft / Unsurfaced (One Way) DiG Lateral Duct in conjunction	per linear metre
X35V	Laying Duct in Footway (One Way) from existing duct that remains	per linear metre
X35W	Provision of Toby Box at customer curtilage	per box
X35X	Laying Duct in Soft / Unsurfaced One Way DiG Lateral Duct to be laid from existing	per linear metre
X35Z	ONSA – DIG Survey and Design	per metre

Table 2 - Duct 56 solution synthetics

## 10 ***Duct 54 Solution***

This section provides guidance on the policy rules that must be followed when:

1. Providing duct 56 laterals where an existing duct 54 trunk route exists within a partial DiG estate.
2. When providing a new duct 54 trunk infrastructure (trunk and laterals) into a DiG estate.

A summary of the policy rules is followed supporting scenarios which are used to help communicate the new policy.

Note: The list of scenarios is not exhaustive.

### 10.1 **Policy Summary**

Where BT duct already exists within an estate it must be utilised whenever possible. This will be dependent on the spare capacity, condition and location of the duct.

**Warning:** We must never use another Communications Providers duct or boxes in the public highway.

- Existing duct 54 will have copper cables within the duct and this should be taken into consideration when designing your solution.
- It is expected that you will be able to apply the same rules to the provision of duct 56 laterals from a duct 54 trunk as per duct 56 laterals from a duct 56 trunk. (See section 9).
- Diagram 26 below illustrates techniques for laying duct 56 laterals and toby boxes/pin markers from an existing duct 54 trunk. For the duct 56 laterals, techniques like the double-tee described earlier in the duct 56 section of this document can also be employed.

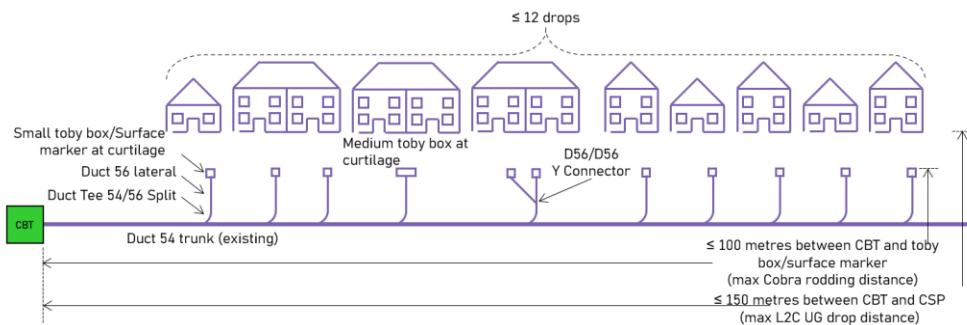


Diagram 26 - Existing Duct 54 trunk with new Duct 56 laterals

**Warning:** Remember, the 100 metre distance is a maximum and should only be used in exceptional circumstances where the positioning of a closer CBT is not achievable.

- Break out of the duct 54 using a Duct Tee 54/56 Split Tee (item code 094976), then lay duct 56 to a toby box/pin marker at the curtilage of the customer's premises.
- The maximum allowable distance from the furthest toby box/pin marker to the CBT's box is 100 metres to allow use of 6mm/4.5mm Cobra at the L2C stage to provide the lead-in cable.
- The 100 metres constraint from the toby box/pin marker to the CBT can be extended to no more than 150 metres between CBT and CSP by positioning an intermediate chamber so that any rodding does not exceed 100 metres.
- A maximum of 12 54/56 tees can be installed onto a spine/trunk/rider duct within either the 100 metre or 150 metre designs above.

*Note:* [EPT/UGP/B101 - FTTP D.i.G Estates, Civils & Cabling](#) also has guidance on using duct 56 laterals with duct 54 trunk.

## 10.2 Network Scenarios

### 10.2.1 Scenario 10: Mid-point jointing chamber

Diagram 27 below, illustrates how a mid-point chamber can be used to extend the reach of the network.

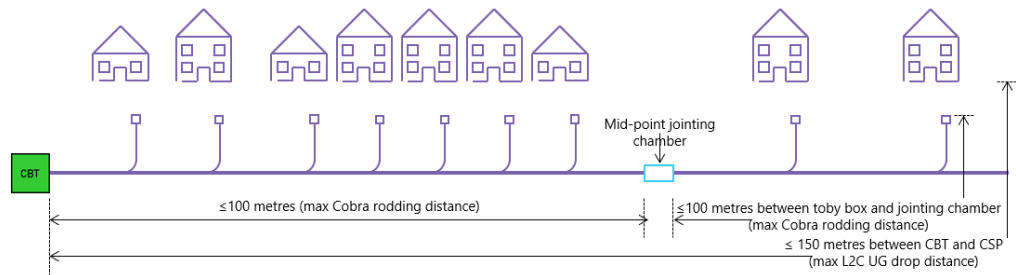


Diagram 27 - New mid-point jointing chamber in existing Duct 54

### 10.2.2 Scenario 11: In-filling sections of “No Duct” (ND)

Diagram 28 below, illustrates a route where the existing trunk duct does not cover the full route with sections where cables are still DiG.

Where sections of no duct (ND) are encountered and new sections of duct are required to complete the route. The planner should take into consideration the size of the copper cable(s) existing along the route and install duct sections with a diameter to match the sections either side of the ND.

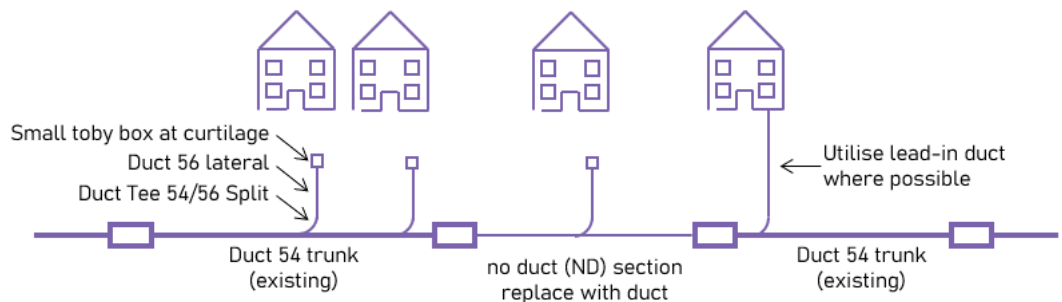


Diagram 28 - Scenario 11 - In-filling sections of ND with duct

# 11 Micro Duct Solution

**Warning:** The use of the Micro duct solution is only to be used with the authorisation of the Chief Engineers Office. Please contact the author of this document for further information.

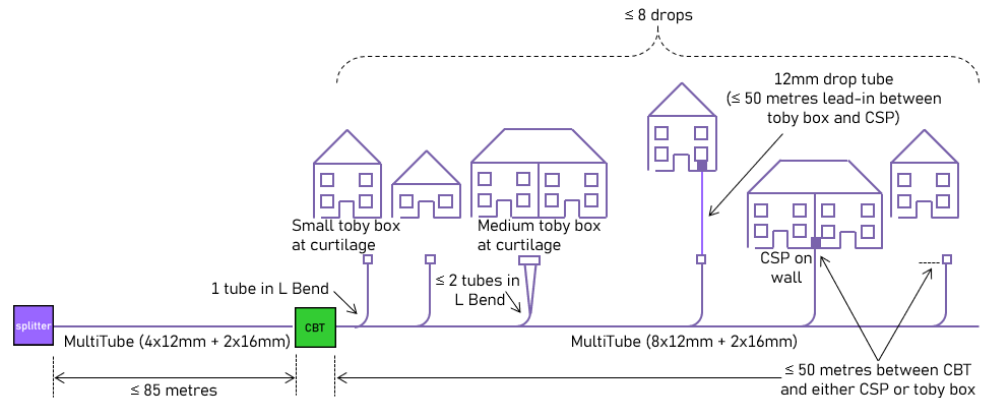


Diagram 29 - Micro Duct schematic

## 11.1 Plan and Build

- Conduct a ground penetrating radar scan to identify buried services and enable the most efficient deployment. They provide radar ground penetration and mark up all utilities including water and gas with pinpoint location and depth. Footpaths on site are all marked. When excavating on a footprint this size, it does not remove the need to CAT scan before breaking ground.
- Tubing networks shall be designed to optimise tube use.
- Use the 16mm tubes for distribution cables and CBT tails.
- Use the 12mm tubes for drop cables.
- CBT shall be no more than 85 metres from the serving splitter node unless an intermediate box is available for fleeting; this is the maximum distance that COF250 or COF600 can be pushed into the drop tube.
- A CBT should be placed no more than 50 metres from the customer premises unless an intermediate box is available for fleeting, this is the maximum distance that drop cable can be pushed into the drop tube.
- No more than eight drops are allowed in a route simply because the Micro Duct contains eight 12mm tubes.
- The network shall be built to the curtilage of a premise with tubing or duct so that no civils work is required in the Public Highway at the L2C stage. The duct/tubing must be installed in a way where it can be accessed in the public highway.

Where there is:

- A clear route without obstacles to the customer property, use a small toby box.
- A garden wall across the frontage of the property, place a medium toby box at the base of the wall.
- Where permission from the owner has been obtained the network shall be built to the wall of the premises with drop tube and terminated in a CSP.
- Build to the wall is likely to be for semi-detached properties where the CSP is positioned on the boundary of the two premises.
- It is mandatory that duct or tubing shall be left capped and where possible it should penetrate into the customer garden up to 300mm to enable easy access without the need to excavate the public highway/footway and covered with a layer of sand.
- A tubing Installation video can be viewed via this link: [Micro Duct Trial](#).
- To prevent the ingress of rainwater, tape up the end on the drum after cutting a piece of tubing from a large drum.
- To aid the installation of the cable into tubing use "Overblow Cable Lubricant 1 Bottle" (item code: 092790).
- A photograph of the frontage of the premise to capture surface types from the curtilage to the wall is required for future reference.
- The photograph below shows the customer L bend that can accommodate up to two tubes, ideal for semi-detached/maisonette/terraced properties.



Diagram 30 - Customer L Bend

### 11.1.1 Issues during the trials

- When 16mm tubing was left in ground without stop ends, we were unable to push the cable through due to water and other substances entering the tube

<b>Caution:</b> Be mindful that in hot weather the cable may become sticky and pushing into the tube can be problematic.
--

## 11.2 Micro duct - Lead to Cash

- For exceptions to this policy, please contact the author for a solution.
- Where the network has been built to the curtilage and a L2C order is received, there are four colours of 12mm lead-in tube: black, grey, green, and brown. These colours allow the cable from the curtilage to the CSP to be laid either above or below ground, to suit the customer and the layout of the customer's garden.

*Note:* 12mm lead-in tube is very robust which allows for creativity in avoiding a major dig in the customer's garden.

- All lead-in drop tubes shall be labelled with the customer address at the CBT location.

- Where the customer connection requires the cable to run up a garden wall under capping, tubing is not required under the capping or through the wall. The drop cable will leave the tube in the Toby Box and re-enter a tube on the premise side of the wall to the CSP.

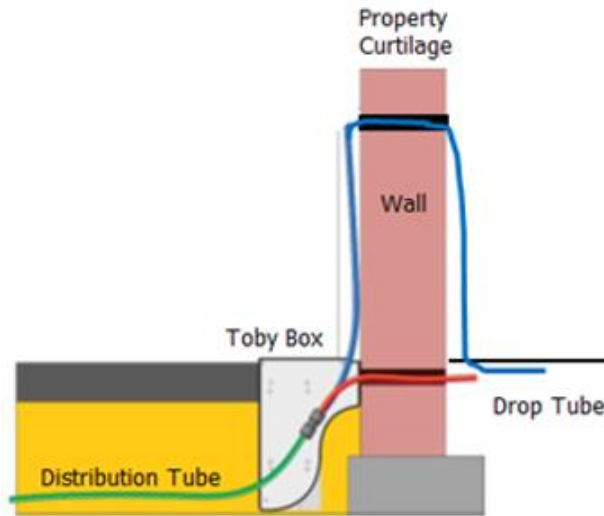


Diagram 31 - Tubing not required under capping

## 12 ***Stakeholders***

Stan Edwards - Head of Network Policy, Quality & Accreditation

Carl Morrell - Underground Specialist

Peter Houghton - Senior Network Health & Innovation Manager

Rex Wade - Fibre Innovation Professional

## 13 ***Glossary***

A list of abbreviations is available here: [Openreach acronym glossary](#)

## 14 ***Further Guidance***

[EPT/ANS/A040 - One Fibre Network – Build Quality Manual for Engineers.](#)

[EPT/ANS/A068 - Survey Network Note's & Survey Markers](#)

[EPT/UGP/B101 - FTTP D.i.G Estates, Civils & Cabling](#)

[NWK/LNK/C541 - FTTP - Brownfield - Scale Architecture - Policy](#)

[NWK/LNK/C573 - TM Node Jointbox Capacity](#)

**END OF DOCUMENT**