CHORUS

UFB Ready Property Guidelines

Volume 2 - SDU and RoW Greenfield Development

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Document Control

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1. Introduction

1.1.1. Objectives of Manual

The objective of this Manual is to provide the design and deployment standards for developers for new property developments or subdivision within Chorus' UFB areas and areas with existing Chorus fibre infrastructure. This document is separated into 4 volumes which covers different topics of the network.

This document is Volume 2 which covers:

- SDU and RoW infrastructure deployment
- The pathway from the lead-in to the star wiring box.

1.1.2. Intended Audience

The intended audience of this document are Chorus, Service Companies personnel, service providers, property developers and their contractors involved with the design and installation of optical fibre networks in new properties or property subdivision.

1.1.3. Chorus Network Specified Product (CNSP)

CNSP is an assessment and approval pathway for particular types of product and test equipment to ensure that a product meets criteria for:

- Whole of life performance
- Longevity, and
- Durability

Where a product is listed within the CNSP process, Chorus service partners must use that product from the approved supplier.

1.1.4. Contractual Reference

This document may be provided to Chorus Partners, Service Companies, Chorus Customers and 3rd party service providers for use alongside the relevant contracts for service or the relevant Standard Terms Determination.

Throughout this document, Chorus New Zealand is referred to as Chorus.

This document does not, in any way, vary the terms of the main contract between Chorus and the service provider. If there is any conflict between the relevant contract and statements made in this document, the terms of the relevant contract shall prevail.

1.2. Related Reference Material

It is the responsibility of the contractor to research, understand and abide by the relevant national or local compliance standard as applicable to the location and tasks. The table below lists the national and international standards that may be associated or referenced within this standard. This list is not exhaustive.

Document No.	Document Title
AS/NZS 1367	Coaxial cable and optical fibre systems or the RF distribution of analogue and digital television and sound signals in single and multiple dwelling installations
AS/NZS 3000	Electrical Installations
AS/NZS 3080	Telecommunications installations – Generic cabling for commercial premises
ANZS3084-2003	Telecommunications Installations standard.
AS/NZS 3085	Telecommunications installations - Basic requirements
AS/NZS 3086	Telecommunications installations – Integrated telecommunications cabling systems for small office/home office premises
AS/NZS 3112	Approval and test specification - Plugs and socket-outlets
AS/NZS ISO / IEC 15018	Information technology - Generic cabling for homes
AS/NZS ISCO / IEC 24702	Telecommunications installations - Generic cabling - Industrial premises
IEEE 802.3 2012	Power over Ethernet

Document No.	Document Title
	TCF Premises Wiring - Cable Installers Guidelines for Telecommunication Services http://www.tcf.org.nz/library/85f5318d-fc71-409f-a04d-48ff414107f7.cmr

1.3. Occupational Safety and Health

1.3.1. Field Activity

Chorus prides itself on its quality installations for all customers. This company is fully cognisant of its health and safety obligations under the Health & Safety at Work Act 2015, including all its subornment legislation. The company provides fit for purpose equipment and complete our work to industry good practice standards.

All Service Providers engaged by Chorus are required to accept and apply the same high standards, ALL THE TIME.

We adopt work practice safety precautions that are proportionate to the specific risk exposure that each site may present. These include but are not limited to;

- Contracted Service Partners providing Chorus with project Specific Health and Safety Plans that include risk assessment prior to commencement of any works.
- Project specific safe work method statements or job safety analysis being created and shared with Chorus prior to commencement of works so that Chorus can ensure that any risks or the hazards that sit behind these, have been identified are managed properly.
- All persons undertaking associated works have appropriate levels of competency and training and that these meet the recognised industry standards and expectations.
- All incidents or events associated with the project are notified to Chorus within the agreed timelines and full investigations undertaken to identify root cause. This information can be shared with developers as required.
- Appropriate investigations and corrective actions are undertaken and completed to prevent recurrence after any significant event.
- All fibre and other waste material is to be removed from site and disposed, or recycled, in accordance with the Build Partner and Chorus environmental waste minimisation and management plans.

Technicians working on the Chorus network in customer premises including sub-divisions will be required to adhere to and comply with both their own company health and safety requirements, as well as the any developer's site specific protocols as required by the customer.

Technicians are responsible for establishing a robust hazard identification and management practice.

1.3.2. Optical Fibre Safety

This Chorus Build and Provisioning Programme provides supervision, of workers and/or site based safety supervisors with the general safety rules, task specific safety procedures and good practice industry standards for the installation of quality fibre optic cable systems, (cable handling, blowing, splicing, pulling, terminating testing and troubleshooting tasks as required for a great customer experience).

Our technicians take pride in their workmanship and this includes the appropriate steps to correctly dispose of fibre scraps carefully.

This is achieved with the use of disposable sharps containers that have a sealed lids.

Remembering that fibre scraps provide the same risk as would be experienced with glass splinters.

Handling cleaning chemicals and adhesives for quality checks are completed carefully and all Chorus technicians are familiar with the Material Safety Data Sheets (MSDS's) information pertaining to cleaning chemicals used.

Copies of further fibre optic safety and installation safe work method statements and a host of other safety related documentation can be made available to prospective subdivision developers upon request.

1.4. Glossary of Terms Used

The following list describes some of the terms used in this document:

Term	Description
ABFFP	**Air Blown Fibre Flexibility Point** An enclosure which is installed in an underground pit. The enclosure houses an optical fibre splitter which acts as a flexible fibre network connectivity point.
ATA	**Analog Telephone Adapter** A device that connects regular telephones to a broadband network for voice over IP (VoIP) service. The ATA delivers dial-tone, manages the call setup and provides the conversion between voice signals from an analogue telephone and IP packets.
BDD	**Buried Distribution System** An oval underground pit which provides a storage and connectivity point for microducts or FATs
BUDI I-FFP	**Building Distribution Internal Fibre Flexibility Point** A wall-mounted enclosure which houses optical fibre splitters which acts as a flexible fibre network connectivity point. Typically used for MDU with up to 48 premises.
CCA	**Copper Clad Aluminium** A type of substandard wire used in Ethernet cable that is **NOT** recommended by Chorus. Such cable type will not achieve the performance requirements for high speed broadband.
CNSP	**Chorus Network Specified Product** A list of products which are technically approved by Chorus to ensure network compatibility and reliability.
CO	**Central Office** An exchange building which houses Chorus transmission equipment
Drop Cable	A 2F cable installed from the FFP or FAT in the Chorus distribution network. This is typically also referred to as the Service Lead.
ETP	**External Termination Point** An outdoor enclosure mounted on the side of a premise which provides a point of connectivity from the lead-in fibre cable and the premise fibre cable.
FAT	**Fibre Access Terminal** An enclosure which provides breakout access of Chorus' cables to the lead-in cables into premises.
FFP	**Fibre Flexibility Point** An enclosure which provides a connectivity point between the feeder fibres from the CO to the distribution fibre to premises.
FTTP	**Fibre To The Premise** Optical fibre network constructed pursuant to the UFB Initiative
GPON	**Gigabit Passive Optical Network** A type of telecommunications network that uses a point-to-multipoint FTTP which uses unpowered optical splitters to enable a single feeder optical fibre to serve multiple premises.
GPX I-FFP	**GPX Internal Fibre Flexibility Point** A wall-mounted enclosure which houses optical fibre splitters which acts as a flexible fibre network connectivity point. Typically used for MDU with more than 48 premises.
Handhole	A small pit that is installed at the premises boundary as the location where the lead-in pipe into the premises is terminated. It is also used as a location to join microducts.
IBDN	**In Building Distribution Network** The optical fibre distribution network within a building premise.
I-FFP	**Internal Fibre Flexibility Point** An FFP which is installed indoors, typically in a TER
ID	Internal Diameter
Lead-In Cable	The Lead-In Cable is a cable that is installed from the premises boundary to the building within the premises. This can be a large multi-fibre cable to feed an MDU or a Service Lead connecting a single unit such as an SDU
LFC	**Local Fibre Company** The operator of the local optical fibre network such as Chorus
MDU	**Multi Dwelling Unit**

Term	Description
	A building which has two or more premises such as an apartment building.
Microduct	A specially manufactured tube that is used for fibre installation through the blowing technique.
Micronet	An Ericsson System consisting of microducts and cables used by Chorus for the optical fibre distribution network.
NZCCPTS	New Zealand Committee for the Co-ordination of Power and Telecommunication Systems
OD	Outer Diameter
OFDF	**Optical Fibre Distribution Frame** An optical fibre distribution frame installed in the CO to provide connectivity between the Chorus active transmission equipment to the outside plant network.
OLT	**Optical Line Terminal** A GPON Access Node installed in Chorus' CO that provides for the delivery of UFB services. The GPON OLT is installed in Chorus exchange buildings
ONT	**Optical Network Terminal** A GPON network equipment installed in the customer premise that provides for the delivery of UFB services.
PE	Poly Ethylene
RGW	**Residential Gateway** Equipment installed in the premise connected to the ONT which is used to centralise communications.
RoW	**Rights of Way** More than one premises with separate ownership sharing a common access to the public roads.
RSP	**Retail Service Provider** Telecommunication companies who use Chorus' optical fibre network to create retail UFB-based services which are sold to residents, businesses, schools and health premises.
Ribbonet	An Ericsson System consisting of microducts and cables used by Chorus for the optical fibre distribution network.
SDU	**Single Dwelling Unit** A premises which has a single customer connections
Service Lead	A Service Lead is a cable that connects from the Chorus distribution network to a single premises. The Service Lead can be a Drop Cable or an Indoor Cable.
TER	**Telecoms Equipment Room** A location in an MDU where the lead-in cable terminates into an I-FFP and where the IBDN converges.
TSG	**The Subdivision Group** The Chorus contact point for property developers. Refer to the Chorus website www.chorus.co.nz for more details
TV	Television
UFB	**Ultra-Fast Broadband** FTTP broadband service providing high speed internet connectivity.
UPS	**Uninterrupted Power Supply** Battery pack which provides backup power supply to keep critical devices powered in the event of a power outage.
UTP	**Unshielded Twisted Pair** A type of twisted pair copper cabling used for carrying transmission signals
VOD	**Video On Demand** Video service where the end user is able to order videos on demand.
VoIP	**Voice Over IP** A methodology for the delivery of voice communication over IP network such as the internet.

2. SDU Greenfield or Subdivision

2.1. SDU & RoW Greenfield or Subdivision Process

As part of the Chorus strategy to improve efficiencies to deploy fibre-ready buildings, the following section outlines the process and scope of work between Chorus and the property developer/builder.

Section	Area of Responsibility	Demarcation of Responsibility
General Network Design	- Lead-In Network Design - Distribution Network Design - Network Design - Customer Premise Network Design	**Chorus, Developer & Builder** will work together to understand the development scenario and work out the fibre capacity and the number of lead-ins required.
Distribution Network (communal) outside of the development	Supply and installation of materials: Pipes, Ducts, cables, enclosures, handholes	**Chorus** will be supplying and installing the pipes, conduits, microducts, pits hand holes, and cabling for the communal network, up to the street boundary of the development.
RoW Network (communal) within the RoW	Supply and installation of materials: Pipes, Ducts, cables, enclosures, handholes	**Developer/builder** is responsible for completing all civil works, and installing supplied Chorus network items between street boundary and individual property boundaries. Items to install could include pipe, microducts, handholes or pits as specified on design plans. **Chorus** will be supplying and the pipes, microducts, pits and handholes for the RoW network and install and commission any associated cabling.
If the Developer is also building the individual premises as part of the development, then following will also apply		
Lead In	Installation of lead-in pipes or cables	**Developer/builder** are responsible for providing the trench and installing green lead-in pipe in the trench, extending the RoW Network pipe from the premise boundary (for RoW's) or from the communal network (SDU's) to out of the ground at the premise wall, at the ETP location with a white or grey 20mm pipe. **Chorus** will be supplying the pipes for the lead-in. At time of customer provisioning, Chorus will install fibre cable through green pipes from the communal network to the premise ETP.
ETP to ONT	Supply of materials & installation	**Developer/builder** are responsible for installing a conduit from the ETP location to the star wiring box. An optical cable, composite cable, Cat6 or pull cable is installed through the conduit to be connected or used as a pull cable. The ONT location must have one power point available for the ONT. **Note**: *If a cable or conduit is not installed, Chorus may need to surface mount cables or drill new holes to connect the premises*. **Chorus** is responsible for the install of the ETP at time of provisioning, installing an optical cable through the conduit or terminating to the Chorus compliant optical cable already in the conduit. An ONT will be installed at the other end in a star wiring box or wall mounted as required.
Customer Premise	Supply of materials, installation and termination	**Developer and builder** are responsible for installing all premise cabling, termination including testing and commissioning. A star wiring configuration is highly recommended. Please refer to Volume 4 of this document or the TCF wiring standard at the following link: http://www.tcf.org.nz/assets/guidelines/tcf-premises-wiring-cable-installers-guidelines-endorsed-oct-2015.pdf

Section	Area of Responsibility	Demarcation of Responsibility
Network Testing	End-to-End testing of the Chorus communal network	**Chorus** will perform a quality audit and test the optical performance of the Chorus communal network to each premises.
Customer Premise Network Testing	Testing of the Ethernet/telephony cabling in each premise	**Developer and builder** are responsible for all testing and commissioning of the Ethernet/telephony cabling in each premises.

Table 1. SDU & RoW Deployment Responsibility Demarcation

2.2. UFB Underground Deployment

For an underground deployment in developments of more than a single new lot, regardless if it is on a hard surface or grass surface, a Channell Handhole is to be installed at the premises boundary. The Channell hand hole is usually installed at the boundary of two adjacent premises and is shared.

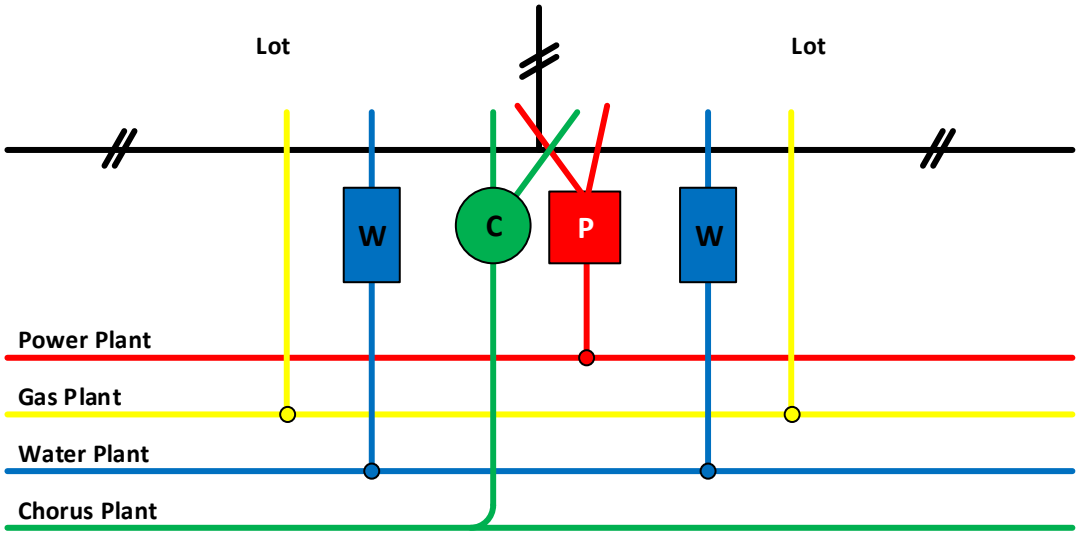


Figure 1. Channell Handhole at the Premises Boundary

Please refer to Volume 1 of this document for the full detail and instructions about the deployment of our network within new developments of more than 1 lot, including the following sections about Microduct and Pit and Pipe systems.

2.2.1. Single lot SDU developments

For single lot SDU developments, the developer is not typically expected to install any of our network within that new lot – it is expected that the final purchaser of that lot will be responsible for installing the Chorus lead-in from the street to the new premise.

If the developer is in fact building the new premise(s) as part of the development, then Section 4 of this document will apply and for greenfield RoW's, Section 3 will apply.

For a new single rear section down a long driveway, if the developer is in fact installing all the services down to the end of the driveway, then this would treated as 'RoW' for deployment purposes, with the developer installing a 20mm pipe down the driveway and a handhole out at the street boundary.

If this is not the case, then the following points will apply for the Chorus Service Company when installing the communal network out at the street boundary:

- If in a hard surface, install a handhole in a suitable location for the future provisioning of the service lead and take the extended communal network into the handhole.
- If in a soft surface, and the extension of the communal network is 20mm pipe, then leave the 20mm buried in a suitable location for the future provisioning of the service lead and use an above ground mark post to indicate its location.
- If in a soft surface, and the extension of the communal network is a microduct, then leave the Microduct on a UFB above ground mini marker post in a suitable location for the future provisioning of the service lead.

2.2.2. Microduct Deployment

A distribution microduct bundle is deployed along the front of the premises and a single microduct tube is allocated to each SDU. This deployment method is the most common in Greenfield areas where there is no existing Chorus distribution network.

The following outlines the deployment at the premise boundary:

- One microducts is laid to each premises boundary into a Channell hand hole. The hand hole is usually installed at the boundary of two adjacent premises and is shared.

The following outlines the requirement for the property developer from the boundary to the premises:

- A green 20mm pipe is installed from the Channell handhole at the boundary to each of the premises.
- At the boundary, each 20mm pipe is brought into the Channell handhole.
- At the premises, the 20mm pipe is transitioned above ground into a grey or white 20mm pipe up to the location where an ETP is to be installed.

The ETP will be installed during provisioning when the customer requests for service from their RSP, or you can purchase the Chorus approved ETP from an electrical wholesaler.

2.2.3. Pit & Pipe Deployment

A pit & pipe system is used if it is an existing infrastructure is a pit & pipe system. A green 20mm pipe is installed from the nearest pit

In a new area where there is no existing Chorus distribution network, the microduct system is usually deployed as outlined in the previous section. There are mainly two scenarios of a lead-in pipe to be deployed in a subdivision which are:

- A 20mm pipe is allocated to each SDU from the Chorus pit & pipe system
- A 20mm pipe is allocated to each SDU from the pole closest to the premises.

In either of the scenarios above, Chorus deployment is as follows:

- A green 20mm pipe is deployed to the premises boundary into the Channell Handhole

3. RoW Greenfield or Subdivision

3.1. RoW Infrastructure Requirement

Premises within the RoW are treated similar to a SDUs in the communal network. Chorus deployment to the street boundary of the RoW is similar to the SDU with an increased capacity depending on the number of premises. The requirement on the property developer from the street boundary to the premise boundaries are as shown in the flowchart below.

The design of the lead-in network from boundary depends on:

1. The number of premises within the RoW
2. Weather it is a greenfields subdivision or an infill
3. If it is an infill, weather the existing lead-in network can be repurposed.

At the street boundary of the RoW, a Channell handhole is installed. The Chorus communal network will be installed into the handhole. Depending on the number of premises within the RoW, either 20mm pipes are installed to each premise boundary from the handhole or a 20mm or 50mm pipe is installed to FATs within the RoW.

The 20mm pipes will end inside in each section in a suitable position for its future extension to the premises when they are built, with a preformed 90deg bend and short vertical section of white PVC pipe taken above ground level at that point to indicate the end of the 20mm pipes. If, however, the developer is also building the individual premises as part of the RoW development, then the 20mm pipes will be extended to the new premises – please refer to section 4.

For more than 4 premises in the RoW, one or more FATs are to be installed within the RoW. The number of premises served from a single FAT depends on the FAT capacity. Depending on the number of premises, the lead-in can be a 12F ABFU or a higher fibre count ABF cable or fixed fibre cable.

Depending on the network design the FAT may be installed underground in a pit, such as an OFDC closure, or may be an above ground terminal, such as an IFDB. The selection of the FAT is determined by its placement with respect to accessibility and network protection against damage from external factors such as traffic.

***Note1**: The lead-in to an IFDB must be a ruggedized 1-way Ribbonet with a 12F ABFU. Only the OFDC can be terminated with loose fixed fibre or ABF microcable.*

***Note2**: For the scenario of an infill in an existing UFB built area, there may be a limited number of spare microducts available to individually feed multiple premises. In this case, the existing lead-in may be repurposed to feed multiple premises.*

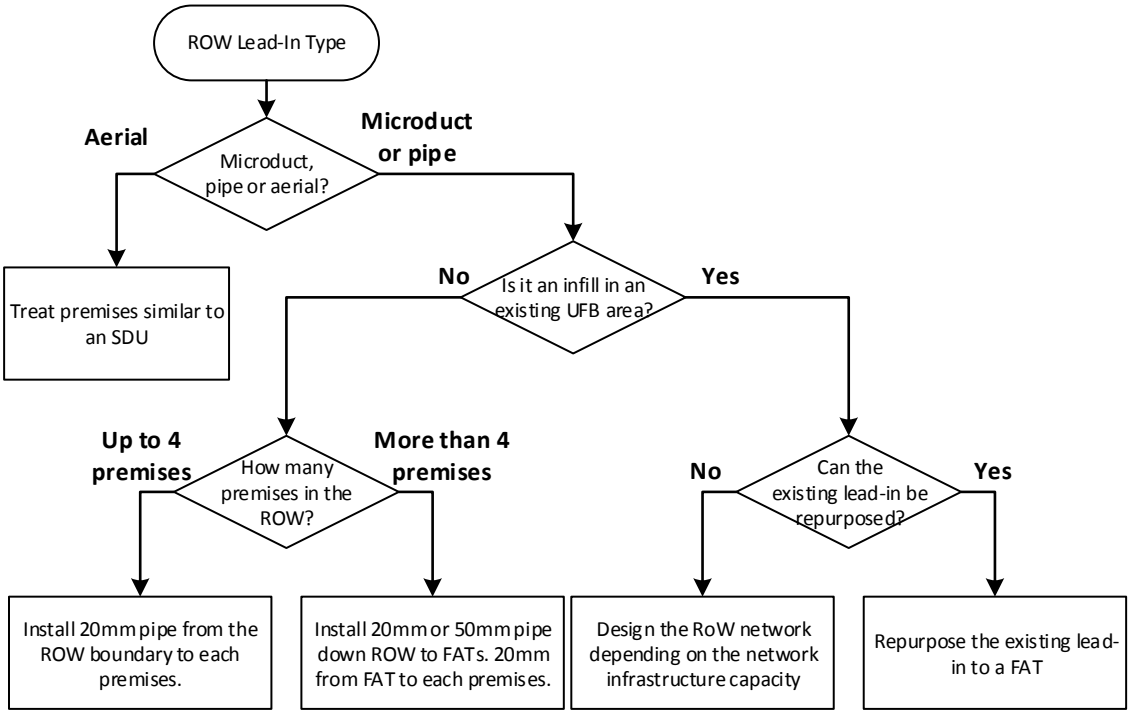


Figure 2. RoW Lead-In Infrastructure Requirements Flowchart

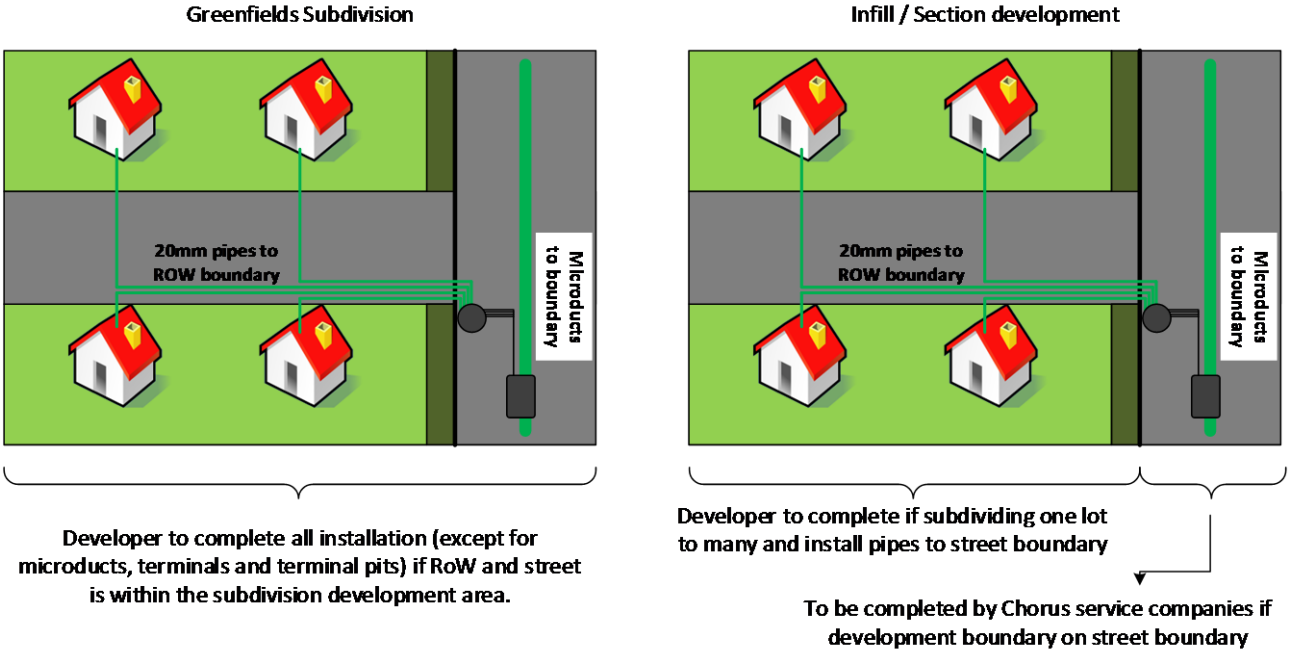


Figure 3. Demarcation of Responsibility for Greenfield & Section Development

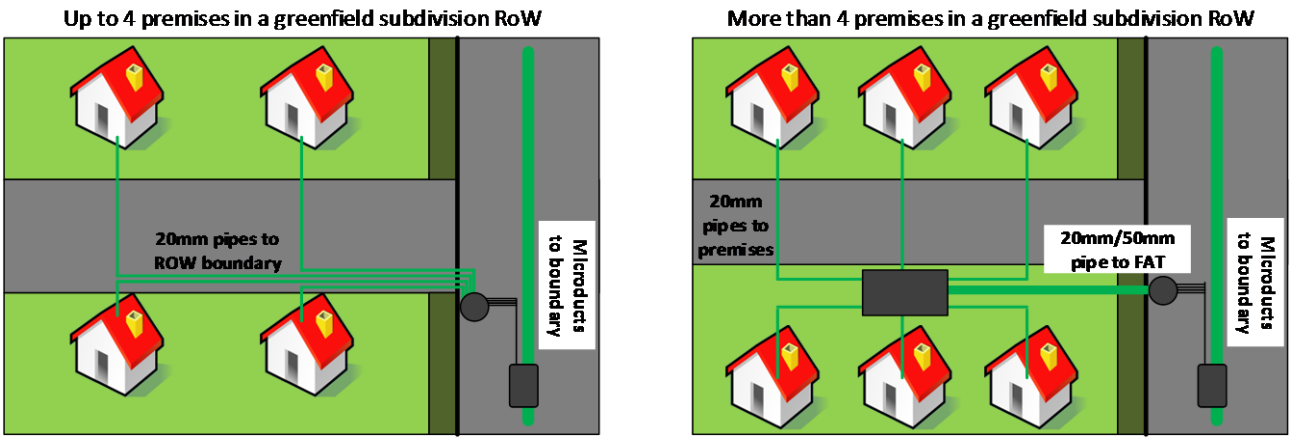


Figure 4. Example of Greenfield Subdivision RoW Lead-In Infrastructure

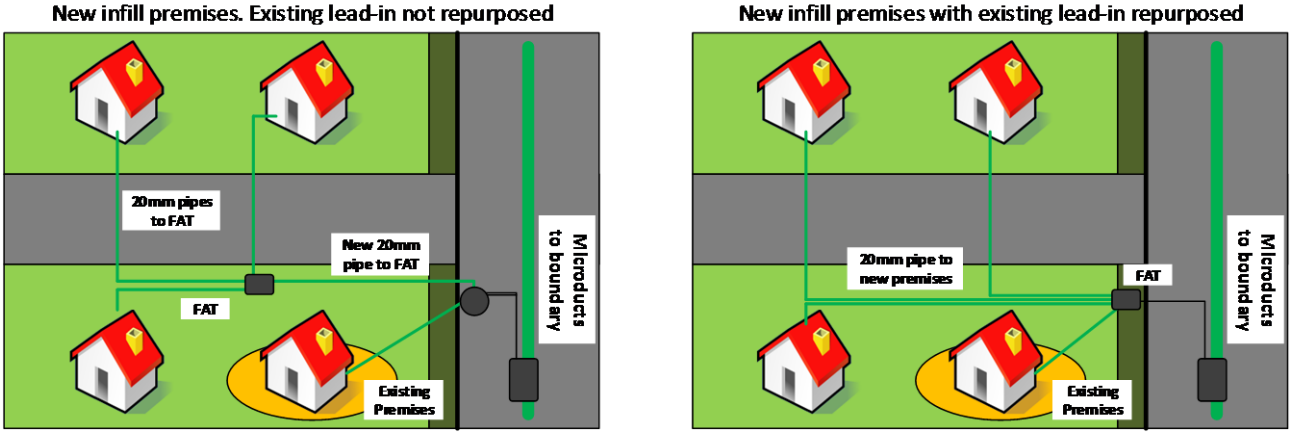


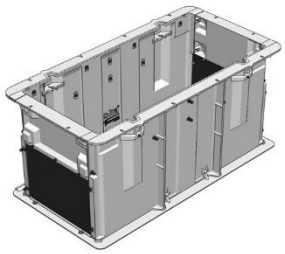
Figure 5. Example of Infill RoW Lead-In Infrastructure

NOTE: *A single rear section down a long driveway is not classed as a RoW if that driveway doesn't carry any other services etc for another premise. In this situation, the rear section is typically classed as a SDU and the SDU deployment rules would apply. If, however, the developer is in fact installing all the services to the end of the driveway, then this would treated as a 'RoW' for deployment purposes, with the developer installing a 20mm pipe down the driveway and a handhole out at the street boundary.*

3.1.1. Pit Requirements

If an underground FAT is installed in the RoW, the recommended pit size is L762mm x W305mm x D600mm. An example is the Channell SGLB 1230 plastic pit and polymer concrete lid. This pit has a Class B bolt down lid which suitable for footpaths. As such, it must be not be installed in the road or driveway.

If the pit needs to be installed on a driveway, a SIKA 1200 x 600 x 700H chamber with a Class D .

Humes Part ID	Description	Photo
91023	Channell SGLB 1230 plastic pit and polymer concrete lid 762x305x600mm, Class B bolt down, no floor.	
D210-07-120607	SIKA Aluminium Chamber 120 x 600 x 700H Class D 210kN (Roadway) design load.	

3.1.2. Connectivity at the Premises

Each premises within the RoW will be treated similar to an SDU – refer to Section 4.

4. Network to ETP Lead-In

4.1. Overview

If the developer is also building the premises within the development, then this section will apply.

The network is typically built up to the boundary of the property. A lead-in pipe is needed to get the network cable from the point on the boundary where the Chorus communal network is situated to the point on the building where the internal cabling needs to connect to the External Termination Point (ETP).

4.1.1. Boundary to ETP

The following outlines the requirement on the property developer from the boundary to the premises, or in the case of a large RoW, from the pit to the premises:

- A green 20mm pipe with associated pre-formed bends are installed from the Channell handhole at the boundary or pit in the RoW to each of the premises.
- A draw tape must be installed in the 20mm green pipes to facilitate cable installation when the premises are connected. Depending on the Chorus communal network, there are different cable or microduct choices. The draw tapes are used to haul the correct cable or microduct to the property.
- At the premises, the 20mm pipe is transitioned above ground via a preformed 300mm radius bend into a white or grey 20mm pipe up to a location where an ETP is to be installed and capped.
- The ETP is the connection point between the inside and outside cabling. The ETP should be positioned as close as possible to the front of the building at a minimum height of 300mm above finished ground level (with a maximum height of 1500mm).

The ETP will be installed during provisioning when the customer requests for service from their RSP. Or you can purchase the Chorus approved ETP from an electrical wholesaler.

***Note**: Chorus is working on upfront fibre connection to greenfield premises before owners or tenants move in. In this case, the ETP, internal wiring and the ONT will be installed prior to customer provisioning.*

4.1.2. ETP Location and Installation

Fibre ETP will ideally be installed a minimum of 300mm and not more than 1,500mm above the finished ground level, measured from the bottom of the ETP. Fixings used on a building must be appropriate for the type of wall that it is mounted. Either galvanised or stainless steel fittings can be used but they must not be mixed as the different metal types will react and rust over time.

If an aerial lead-in is installed, the cable is to be routed to ground level into the ETP.

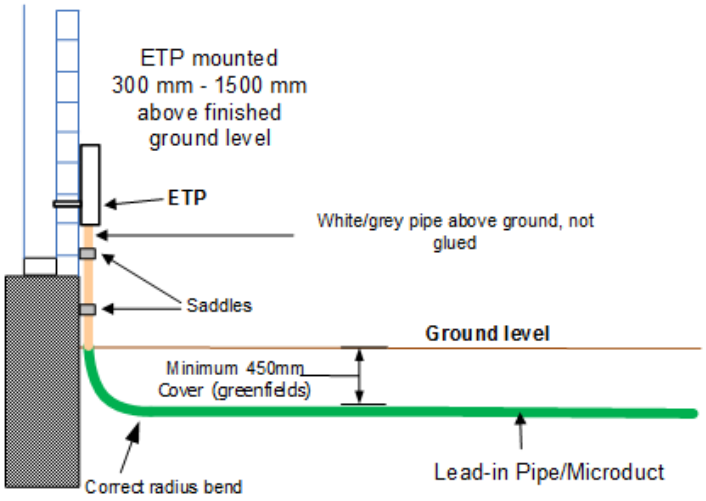


Figure 6. Lead-In Pipe and ETP Installation

4.1.2.1. Gas Regulator Exclusion Zone

Various AS/NZS standards detail an exclusion zone for gas regulators for reticulated gas supply and for gas cylinders housed outdoors. No potential sources of ignition can be installed within this zone. A telecommunications ETP (fibre or copper) cannot be installed within the gas regulator exclusion zone.

In order to comply with AS/NZS Standards no new fibre or copper ETPs can be installed within the Gas Regulator Exclusion Zone.

- ASNZS 3000 - Electrical Installations (known as the Australian/New Zealand Wiring Rules) outlines the Exclusion Zone measurements for Gas Cylinders and Reticulated Gas Supply regulators.
- ASNZS 4645 – Gas Distribution Networks outlines the requirement for gas regulators to have sufficient safe clearances from various building features including sources of ignition.
- ASNZS 60079 – Explosive Gas Atmospheres defines sources of ignition.

Any network transitioning the exclusion zone is required to be housed in continuous duct without any joints or junctions.

There are two types of gas regulators used in New Zealand. They are the 'Vented' and the 'OPSO' (Over Pressure Shut Off). They each have different clearance requirements. They are identified by their colour. The vented is **light brown**, and the OPSO is **light grey**.

Gas regulators and meters often (but not always) have a white metal cover with windows in the front and side. The colour of the regulator should be able to be seen through one of these windows. If not, the cover can be removed to allow the technician to observe the regulator colour. If in doubt, treat as a vented regulator.

Vented Gas Regulator | OPSO Gas Regulator

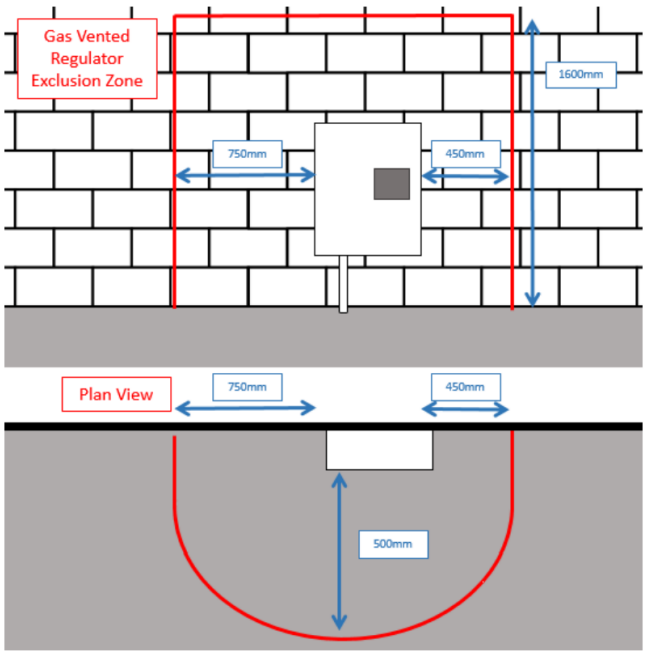


Figure 7. Vented Gas Regulator Exclusion Zone