UFB Ready Property Guidelines

Volume 2 - SDU and ROW Greenfield Development

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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. Artefact Constraints

This Process and Procedure is constrained by the Design Rules OR Deployment Standard in the following Chorus internal artefacts. These documents will not be publically available and only to be referenced by Chorus personnel and their contracted partners.

Document No.	Document Title
ND0588	UFB Premise Boundary Deployment Standards
ND0574	UFB MDU Design and Installation
ND0563	NGA Provisioning and Assure Task Handbook
ND0635	UFB MDU Cable and Terminals Installation Handbook
ND13006	UFB Aerial Road Crossing, RoW and Infill Technical Guide

1.1.3. 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.

1.1.4. 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.

1.1.5. 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.

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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
	TCF Premises Wiring - Cable Installers Guidelines for Telecommunication Services http://www.tcf.org.nz/library/85f5318d-fc71-409f-a04d-48ff414107f7.cmr
ND13005	Chorus Service Provider Health & Safety Plan

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1.3. Occupational Safety and Health

Reference; Chorus Service Provider Health & Safety Plan (ND13005)

1.3.1. Field Activity

All network activity must be undertaken is strict accordance with all relevant legislative requirements and industry standards, including but not limited to those for traffic management, electrical safety, and work at height and work practice safety precautions that apply to individual sites. In addition expectations and responsibilities detailed in ND13005 must be met and include (but are not limited to):

- Service Partners providing Chorus with project Specific Health and Safety Plans prior to commencement of works. Safe working at height processes and systems must be in place.
- 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 Chorus related hazards have also been included and addressed as per expectations within Chorus documentation.
- All persons undertaking associated works have appropriate levels of competency and training and that those meet the recognised industry best practice and expectations.
- All relevant permits have been obtained and are readily available at the location for inspection upon request and that such documentation is retained on the project file after completion of works.
- All events associated with the project are notified to Chorus within the agreed timelines specified within Section 7 of ND13005 and where determined, appropriate investigations and corrective actions are also undertaken and completed.
- 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 will be required to adhere to and comply with both their own company health and safety requirements, and any site specific protocols as required by the customer. Technicians are responsible for establishing a robust hazard identification practice.

1.3.2. Optical Fibre Safety

In addition to the above requirements it is expected that hazards and appropriate control measures in relation to the handling and disposal of optical fibre will also be included. Chorus has clear expectations around the use, storage, handling and disposal of optical fibre and that includes;

- When working in both outdoor and indoor areas, special care should be taken to catch and safely dispose of ALL fibre shards and waste. We suggest you place a ground sheet down before beginning any fibre work.
- It is recommended that all Service Technicians carry a vacuum cleaner to ensure that fibre shards and waste is collected thoroughly.
- Any person who gets cut by a fibre or who gets a fibre shard lodged in their skin should be taken immediately for medical assessment and assistance, and the appropriate H&S reporting process should be followed according to Section 7 of ND13005.

Any damaged or missing optical safety labels should be reported to someone with the authority to correct the matter and also as a hazard or near miss – again according to Section 7 of ND13005.

NOTE: This section is not designed to be exhaustive and cover all scenarios. Any technician operating in the network should refer to their company's specific health & safety requirements and standards.

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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**

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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	**Regional 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.

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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 - Drop 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-in cables required.
Distribution and Lead In Network	Supply of materials: Pipes, Ducts, cables, enclosures, handholes	**Chorus** will be supplying the pipes, conduits, microducts and pits for the communal network. Fibre cables or microducts to be supplied for installation up to the boundary of the premises.
	Installation of lead-in pipes or cables	**Chorus** is responsible to install the fibre cable, pipe or microduct from the communal network to the property boundary into hand holes. At time of customer provisioning, Chorus will install fibre cable through green pipes to the premises. **Developer and builder** are responsible for providing the trench, install hand holes and green lead-in pipe in the trench. At the property boundary, bring the green pipe into the hand hole installed at the boundary.
ETP to ONT	Supply of materials & installation	**Developer and 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. **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.
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
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

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2.2. UFB Underground Deployment

For an underground deployment, 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 will be serving two adjacent premises.

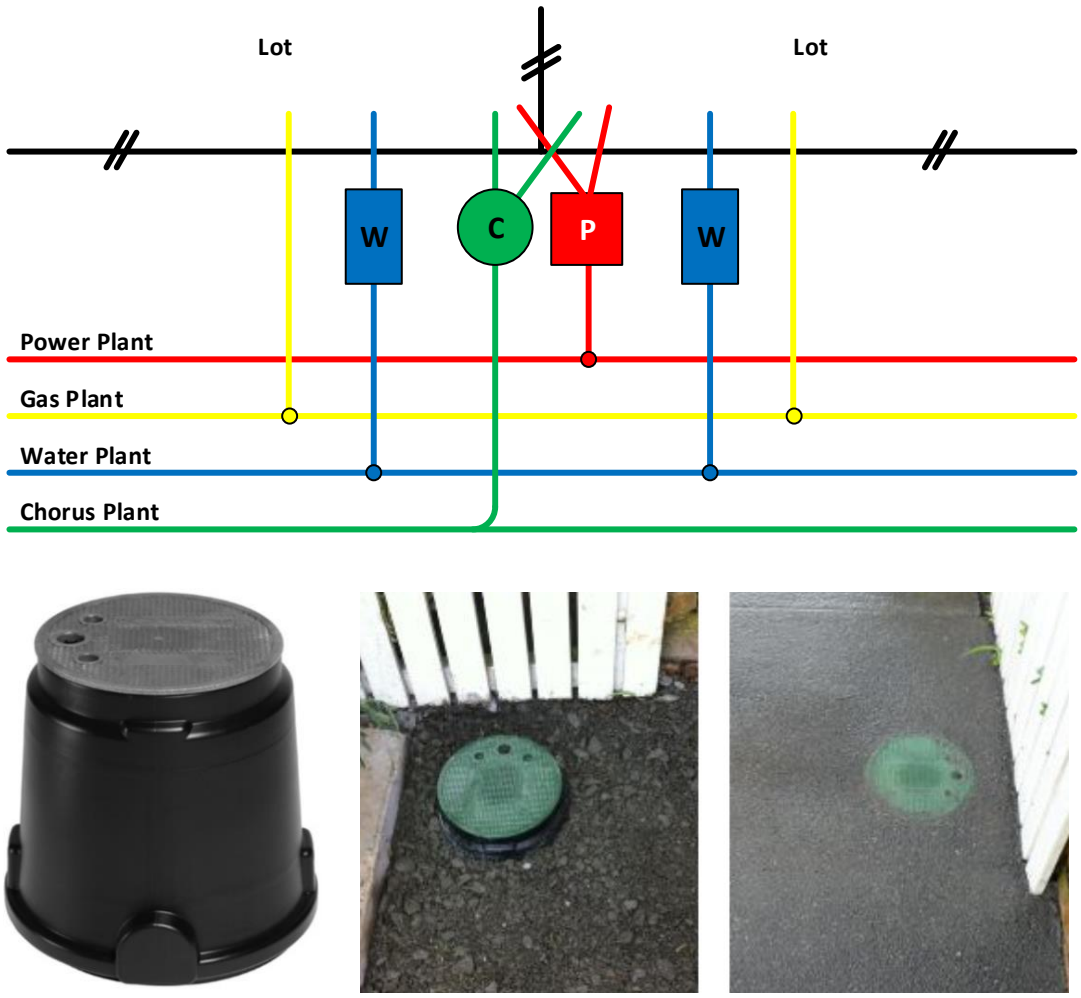

Figure 1. Channell Handhole at the Premises Boundary

2.2.1. 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 by Chorus 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 hand hole 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 an ETP.

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.

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2.2.2. Pit & Pipe Deployment

A pit & pipe system is used if it is an existing infrastructure or extending an existing infrastructure. 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

The requirement for the property developer from the boundary to the premises is similar to a microduct scenario as outlined in the previous section.

2.3. UFB Aerial Deployment

An aerial solution may be used if there is existing pole infrastructure. However, in greenfield deployments, an underground lead-in is usually deployed.

In a new area where there are no existing poles for deployment, the microduct system will be deployed as outlined in the previous section. In an aerial drop lead scenario, there is no requirement for any underground infrastructure such as pipes from the boundary to the premises. However, most greenfield deployments will be through an underground feed.

An aerial drop cable and an ETP will be installed during provisioning when the customer requests for service from their RSP.

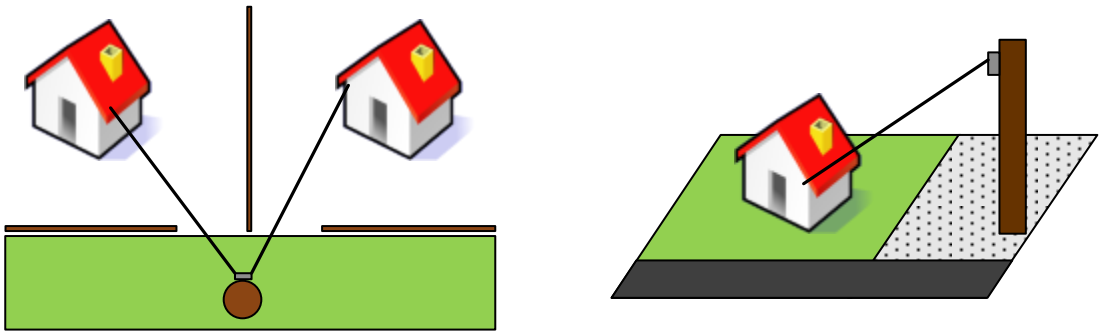

Figure 2. UFB Aerial Installation

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3. ROW Greenfield or Subdivision

3.1. ROW Infrastructure Requirement

Premises within the ROW are treated similar to an SDUs in the communal network. Chorus deployment to the 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 boundary to the premises are as shown in the flowchart below.

At the boundary of the ROW, a Channell hand hole is installed. The Chorus communal network will be installed into the hand hole. Depending on the number of premises within the ROW, either 20mm pipes are installed to each premises from the hand hole or a 50mm pipe is installed to a pit within the ROW.

For more than 4 premises in the ROW, a single microduct with 12F ABFU is installed to FATs in the pit. If there are more than 6 premises, multiple pits are installed to serve up to 6 premises for every pit with a FAT.

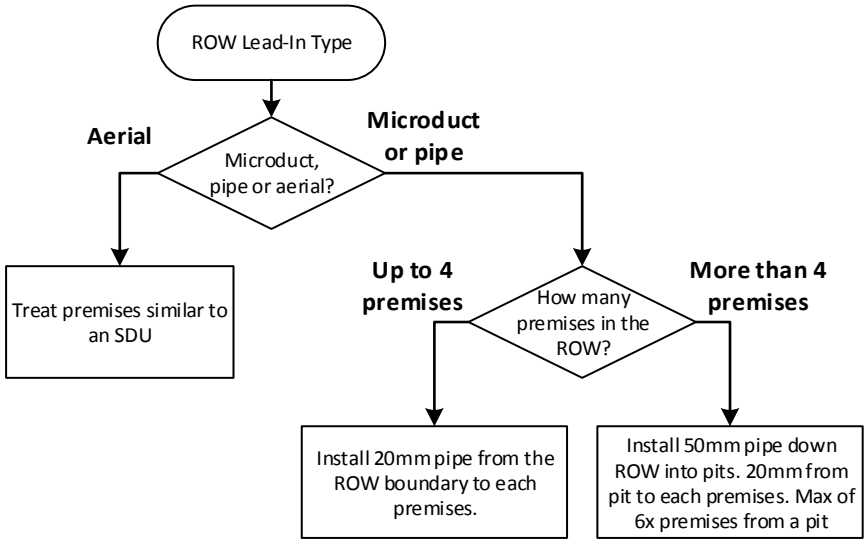
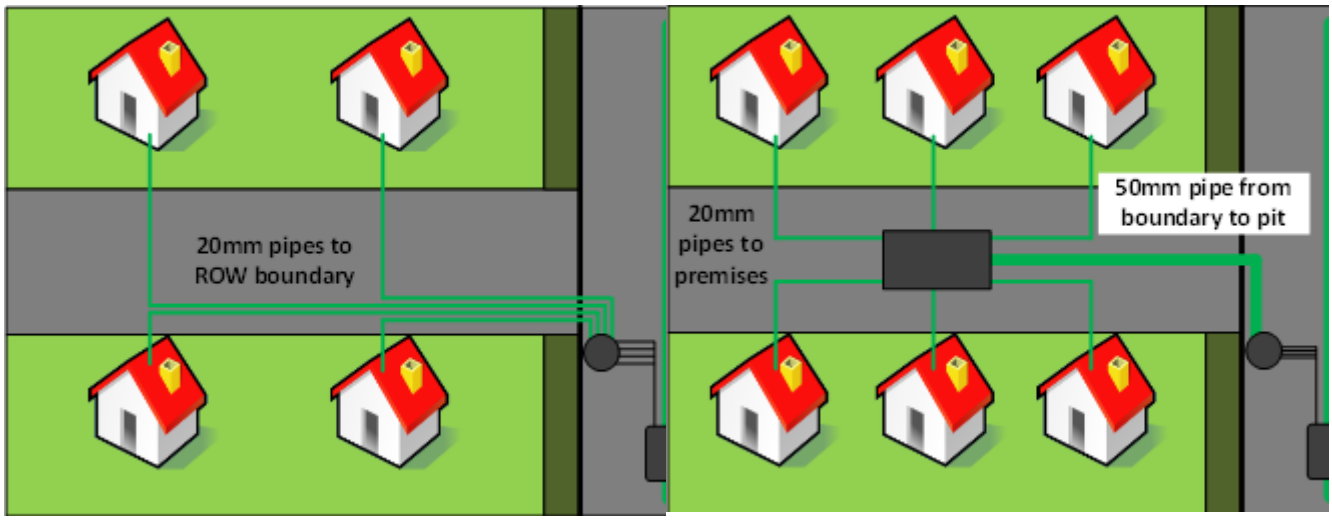


Figure 3. ROW Lead-In Infrastructure Requirements Flowchart



Up to 4 premises in ROW

More than 4 premises in ROW

Figure 4. Example of ROW Lead-In Infrastructure

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3.1.1. Pit Requirements

In the situation where there are more than 4 premises in the ROW, a pit is to be installed as a central distribution point. 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 can handle occasional light vehicle traffic. However, **if heavy load traffic such as trucks are expected, the pit must be not be installed in the road or driveway**.

It is advisable for the pit to be positioned where there will not be any regular traffic over it.

Class B loading is defined as:

Footpath manholes and manhole necks shall be designed to resist the vertical and lateral forces generated by a 40 kN dual tyre wheel. Reduced load factors of 1.35 and 1.1 shall be allowable in the design of the element. Units to be used on footpaths or footways where it is possible for a motor vehicle to mount the footway or for light vehicles, such as park tractors, or livestock to use the pedestrian facility.

Humes Part ID	Description	Photo
91023	Channell SGLB 1230 plastic pit and polymer concrete lid 762x305x600mm, Class B bolt down, no floor. **If heavy load traffic such as trucks is expected, the pit must be installed away from and road or driveway**	

3.1.2. Connectivity at the Premises

Each premises in the ROW will be treated similar to an SDU. The 20mm pipe from the boundary or pit must be installed all the way to the outer wall of each premises. The 20mm pipe is transitioned above ground into a grey or white 20mm pipe. The ETP will be installed during provisioning when the customer requests for service from their RSP.

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4. Network to ETP Lead-In

4.1. Overview

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 terminate to the points 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 hand hole 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 into a white 20mm pipe up to an ETP.
- 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.

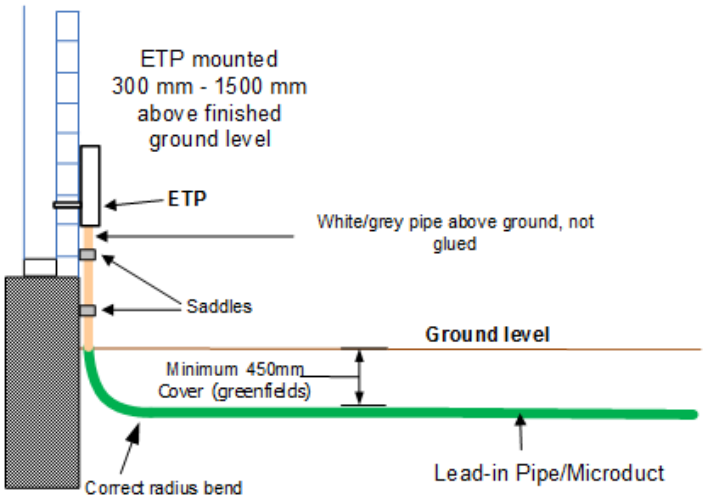

Figure 5. Lead-In Pipe and ETP Installation

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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

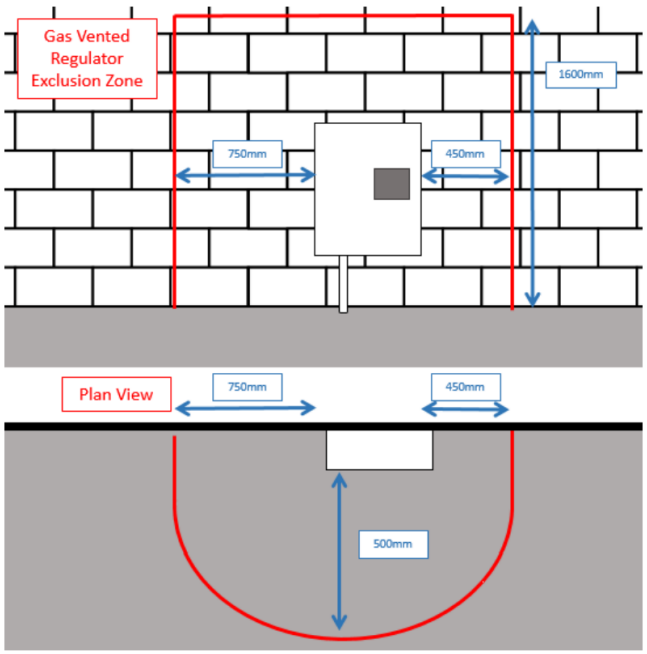

Figure 6. Vented Gas Regulator Exclusion Zone

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