

**COMMUNICATIONS  
ALLIANCE LTD**



INDUSTRY GUIDELINE

G645:2017

FIBRE-READY PIT AND PIPE SPECIFICATION FOR  
REAL ESTATE DEVELOPMENT PROJECTS

## **Industry Guideline G645:2017 Fibre-Ready Pit and Pipe Specification for Real Estate Development Projects Industry Guideline**

This Guideline was issued in draft form for public comment as DR G645:2016 and DR2 G645:2016

First published as G645:2011

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## INTRODUCTORY STATEMENT

The revised ***Fibre-Ready Pit and Pipe Specification for Real Estate Development Projects*** Guideline (G645:2016) is designed to:

- outline the minimum standard for Telecommunications Pit and Pipe installation within a Real Estate Development Project to be considered a Fibre-Ready Facility;
- describe recommended processes for the design and installation of Pit and Pipe facilities for use in the deployment of Optical Fibre Lines in a Real Estate Development Project; and
- describe the recommended materials used in the design and installation of Pit and Pipe facilities.

The draft Guideline was released for public comment earlier in 2016 as DR G645:2016 to:

- add content on multi-unit and multi building developments, including super lots;
- clarify the definition of popular Conduit sizes;
- maintain consistency with other industry documents; and
- update several of the figures.

The draft Guideline has been revised further, including to:

- address the public comments received in the first round of consultation;
- add new content on 'new lots fronting an existing private road (made or unmade)';
- add new content on guard wires to reduce the risk of damage to copper cables from lightning strikes;
- clarify the content related to Laneways; and
- update the content on Pit lids.

James Duck  
Chair  
***Pit and Pipe Revision Working Committee***

JUNE 2017

## TABLE OF CONTENTS

<b>1</b>	<b>GENERAL</b>	<b>3</b>
1.1	Introduction	3
1.2	Scope	3
1.3	Objectives	4
1.4	Guideline review	4
<b>2</b>	<b>ACRONYMS, DEFINITIONS AND INTERPRETATIONS</b>	<b>5</b>
2.1	Acronyms	5
2.2	Definitions	5
2.3	Interpretations	9
<b>3</b>	<b>GENERAL</b>	<b>10</b>
3.1	Introduction	10
3.2	Customisation based on Carrier advice	11
3.3	Guard Wire for Lightning Protection	11
3.4	Shared Trenching	12
3.5	Certification	12
3.6	Registration of Plans	13
3.7	Ownership	13
<b>4</b>	<b>DESIGN</b>	<b>14</b>
4.1	Before You Start	14
4.2	Architecture(s)	14
4.3	New Lots fronting an existing public road (made or unmade)	20
4.4	Starter Conduit	23
4.5	Express Conduits	26
4.6	Minimum Conduit Size	27
4.7	Pit Selection	28
4.8	Pit Spacing	30
4.9	Pit Locations	31
<b>5</b>	<b>MULTI UNIT, MULTI BUILDING DEVELOPMENTS INCLUDING SUPER LOTS</b>	<b>37</b>
5.1	Introduction	37
5.2	Key Requirements	37
5.3	Fibre-Ready requirement across frontage of public street	38
5.4	Residential – Horizontal	38
5.5	Residential – Vertical	43
5.6	Commercial / Industrial (including mixed use i.e. combined with residential developments)	43
<b>6</b>	<b>CONDUIT INSTALLATION</b>	<b>44</b>
6.1	Alignments	44
6.2	Depth of Cover	44
6.3	Clearance from Other Carriers and Services	45
6.4	Trenching and Backfill	45
6.5	Conduit Joints	45

6.6	Conduit Bends	45
6.7	Pit Entry	47
6.8	Conduit Sealing	49
6.9	Road Crossings	49
6.10	Testing	50
<hr/>		
7	PIT INSTALLATION	51
<hr/>		
7.1	Manufacturer Requirements	51
7.2	Bedding and Backfill	51
7.3	Orientation	52
<hr/>		
8	MATERIALS	54
<hr/>		
8.1	Conduit	54
8.2	Pits and Pit Lids	54
8.3	Physical Labelling of Material	57
<hr/>		
9	DOCUMENTATION	58
<hr/>		
9.1	As-Built Documentation	58
<hr/>		
10	REFERENCES	59
<hr/>		
	APPENDIX	61
<hr/>		
A	CONDUIT COMBINATIONS AT PIT END	61
<hr/>		
	APPENDIX	63
<hr/>		
B	STARTER CONDUIT TERMINATION METHODS	63
<hr/>		
	PARTICIPANTS	64
<hr/>		

# 1 GENERAL

## 1.1 Introduction

- 1.1.1 The development of the Guideline has been facilitated by Communications Alliance through a Working Committee comprised of representatives from the telecommunications industry.
- 1.1.2 The Guideline should be read in the context of other relevant codes, guidelines and industry documents.
- 1.1.3 The Guideline should be read in conjunction with related legislation, including the *Telecommunications Act 1997* (the Act).
- 1.1.4 If there is a conflict between the requirements of the Guideline and any requirements imposed on an entity by statute, the entity will not be in breach of the Guideline by complying with the requirements of the statute.
- 1.1.5 Compliance with this Guideline does not guarantee compliance with any legislation. The Guideline is not a substitute for legal advice.
- 1.1.6 Statements in boxed text are a guide to interpretation only and not binding as Guideline rules.

## 1.2 Scope

- 1.2.1 The Guideline applies to the following sections of the telecommunications industry under section 110 of the Act:
  - (a) Carriers; and
  - (b) persons who install:
    - (i) Optical Fibre Lines; or
    - (ii) facilities used, or for use, in or in connection with Optical Fibre Lines.
- 1.2.2 The Guideline applies to Developers.
- 1.2.3 The Guideline deals with the following activities:
  - (a) carrying on business as a Carrier; or
  - (b) supplying Goods or Service(s) for use in connection with the supply of a Listed Carriage Service.
- 1.2.4 The Guideline describes recommended processes for the design and installation of Pit and Pipe Facilities, including a Fibre-Ready Facility, for use in the deployment of Optical Fibre Lines in a Real Estate Development Project.

- 1.2.5 The Guideline does not describe maintenance procedures or arrangements following the completion of the installation of a Fibre-Ready Facility.

*NOTE: Refer to Division 4, Part 1 of Schedule 3 to the Act for additional information on the maintenance of a facility by a Carrier.*

- 1.2.6 The Guideline does not apply to in-premises Conduit i.e. beyond the Lead-In Conduit.

*NOTE: In premises telecommunications pathways:  
(a) should be provided to meet Carrier requirements; and  
(b) should comply with AS/CA S009.*

### **1.3 Objectives**

The objectives of the Guideline are to:

- (a) outline the minimum standard for Telecommunications Pit and Pipe installation within, and in proximity to, a Real Estate Development Project to be considered a Fibre-Ready Facility;
- (b) describe recommended processes for the design and installation of Pit and Pipe facilities for use in the deployment of Optical Fibre Lines in a Real Estate Development Project; and
- (c) describe the recommended materials used in the design and installation of Pit and Pipe facilities.

### **1.4 Guideline review**

The Guideline will be reviewed after 5 years, or earlier in the event of significant developments that impact on the Guideline or a chapter within the Guideline.

## 2 ACRONYMS, DEFINITIONS AND INTERPRETATIONS

### 2.1 Acronyms

For the purposes of the Guideline:

**PVC**

means Poly Vinyl Chloride.

**SDU**

means Single Dwelling Unit.

**MDU**

means Multi Dwelling Unit.

### 2.2 Definitions

For the purposes of the Guideline:

**Access**

has the meaning given by section 372L of the Act.

**Act**

means the *Telecommunications Act 1997 (Cth)*.

**Alignment**

means the longitudinal centre line of a Conduit run.

**Bend**

means a preformed curvature in a Conduit.

**Building Lot**

has the meaning given by section 372Q of the Act.

**Building Unit**

has the meaning given by section 372S of the Act.

**Carriage Service Provider**

has the meaning given by section 87 of the Act.

**Carrier**

has the meaning given by section 7 of the Act.



**Conduit**

means a tube or Pipe that physically accommodates cables and offers mechanical protection for cabling, allowing them to be drawn in and/or replaced.

*NOTE: The terms Pipe and Conduit are used interchangeably in this document. Both are used in industry and for the purposes of this document mean the same thing.*

**Cul-de-sac**

means a roadway end that has no potential for road traffic to travel beyond the roadway end and serves no more than either:

- (a) 24 Building Units; or
- (b) 24 Network Termination Devices.

*NOTE: Possible examples of a Cul-de-sac include where there are Building Units and kerb and gutter planned or in place all the way around the roadway end, designated use such as parkland, or no easement exists beyond the roadway end.*

**Curve**

means a curvature in a Conduit achieved by flexing to a minimum radius of 130 times the nominal diameter of the Conduit without kinking.

**Developer**

means the party (or their agent) commercially responsible for the Real Estate Development Project.

**Express Conduit**

means Conduit feeding into or out of one or multiple Real Estate Development Project(s).

*NOTE: Express Conduits are often located along arterial roads.*

**Fibre-Ready Facility**

has the meaning given by section 372W of the Act.

**Fibre-Ready Pit and Pipe**

means a Fibre-Ready Facility that is constructed of multiple Pits and Conduits.

**Laneway**

means a roadway with minimal or no verge between the trafficable area and the property boundaries on each side of the street.

**Lead-In Conduit**

means Conduit that extends from an end wall of a Pit to the premises.

*NOTE: A Lead-In Conduit may connect to an existing Starter Pipe.*

**Line**

has the meaning given by section 7 of the Act.

**Network Termination Device**

has the meaning given by AS/CA S009.

*NOTE: A possible example of a Network Termination Device for an optical network includes the optical network termination unit that is located on a property.*

**Optical Fibre Line**

has the meaning given by section 7 of the Act.

**P20**

means Conduit that is white and has:

- (a) a wall thickness of between 1.4mm and 1.7mm:
- (b) an internal diameter of not less than 23.3mm; and
- (c) an outside diameter of not more than 26.7mm.

**P50**

means Conduit that is white and has:

- (a) a wall thickness of between 3.1mm and 3.65mm:
- (b) an internal diameter of not less than 53.0mm; and
- (c) an outside diameter of not more than 60.3mm.

**P100**

means Conduit that is white and has:

- (a) a wall thickness of between 4.5mm and 5.2mm:
- (b) an internal diameter of not less than 104.9mm; and
- (c) an outside diameter of not more than 113.9mm.

*NOTE: Refer to Section 8.1 and Figure 17 for more information on the materials and nominal dimensions, including wall thickness, of P20, P50 and P100 Conduit.*

**Pipe**

has the same meaning as Conduit.

*NOTE: The terms Pipe and Conduit are used interchangeably in this document. Both are used in industry and for the purposes of this document mean the same thing.*

**Pit**

means a manhole, pit or any other access hole or chamber in the ground.

**Real Estate Development Project**

has the meaning given by section 372Q of the Act.

**Reticulation Conduit**

means Conduit within a Super Lot that joins Pits on branch routes.

**Shared Trench Agreement**

means an agreement between organisations (e.g. utilities) that install services in a trench in a Real Estate Development Project which includes specification of the:

- (a) depth below ground level of the services;
- (b) alignment of services; and
- (c) separation of the services from one another.

**Starter Conduit**

means Conduit that extends from an end wall of a Pit, at least 1 metre and no more than 10 metres unless under a retaining wall or embankment into each property beyond the property boundary point served from the Pit.

**NOTES:**

1. Starter Conduit is also referred to as a service Conduit or drop Conduit.
2. Where a Starter Conduit extends under a retaining wall or embankment then it should be locatable for subsequent work to connect it to a Building Unit.
3. Refer to clause 4.4.1 for more information on how a Starter Conduit may have a length up to 25m with prior Carrier consent.

**Street Conduit**

means a section of Conduit that is not intended to connect directly to a Building Unit.

**Super Lot**

means a Building Lot that is:

- (a) intended for future development;
- (b) larger than a Building Lot used for a single dwelling unit (SDU); and
- (c) not used for a SDU.

**NOTES:**

*1. Examples of Super Lot use include for education, commercial, or light industrial development, or for Multi-Dwelling Units (MDUs) such as terraces or apartments.*

*2. A Super Lot is typically identified as part of a master planning stage of a Real Estate Development Project.*

**Telecommunications Alignment**

means an Alignment used only for Telecommunications.

**Telecommunications Network**

has the meaning given by section 7 of the Act.

**2.3 Interpretations**

In the Guideline, unless the contrary appears:

- (a) headings are for convenience only and do not affect interpretation;
- (b) a reference to a statute, ordinance, code or other law includes regulations and other instruments under it and consolidations, amendments, re-enactments or replacements of any of them;
- (c) words in the singular includes the plural and vice versa;
- (d) words importing persons include a body whether corporate, politic or otherwise;
- (e) where a word or phrase is defined, its other grammatical forms have a corresponding meaning;
- (f) mentioning anything after include, includes or including does not limit what else might be included;
- (g) words and expressions which are not defined have the meanings given to them in the Act; and
- (h) a reference to a person includes a reference to the person's executors, administrators, successors, agents, assignees and novatees.

## 3 GENERAL

### 3.1 Introduction

- 3.1.1 The *Telecommunications Legislation Amendment (Fibre Deployment) Act 2011* amended the Act to:
- (a) enable the Minister to specify new developments in which fixed lines which are installed need to use optical fibre;
  - (b) require passive infrastructure like pit and pipe that is installed to be fibre-ready;
  - (c) impose penalties on Developers that are constitutional corporations that sell property without fibre-ready passive infrastructure;
  - (d) enable Carriers to seek Access to passive infrastructure that is owned by a non-Carrier; and
  - (e) enable the Australian Communications and Media Authority to make standards for customer equipment and cabling for use with superfast networks.
- 3.1.2 This Guideline outlines the minimum requirements for Telecommunications Pit and Pipe installation within, and in proximity to, Real Estate Development Projects to be considered a Fibre-Ready Facility.
- 3.1.3 The rules of this Guideline are organised into 6 main sections:
- (a) **Section 4 Design**, outlines the permitted configurations and sizes of Pits and Conduit with the respect to the property allotments and roadways they pass.
  - (b) **Section 5 Multi Unit, Multi Building Developments Including Super Lots**, outlines the rules for the design of multi-unit, multi-building developments including Super Lots.
  - (c) **Section 6 Conduit Installation**, outlines the rules for the placement of the Conduit in the ground; interconnection, bending and entry into Pits; and testing of the Conduit.
  - (d) **Section 7 Pit Installation**, outlines the rules of placing Pits in-ground and the orientation with respect to Conduits, roadways and allotments.
  - (e) **Section 8 Materials**, outlines the minimum standard of materials to be used.
  - (f) **Section 9 Documentation**, outlines the minimum level of documentation deemed acceptable for transfer of Conduit to a Carrier under a 'build and transfer' arrangement.

### 3.2 Customisation based on Carrier advice

- 3.2.1 To avoid subsequent disruption to the Real Estate Development Project, the Developer shall engage with a Carrier at the design stage to incorporate Carrier specific requirements.

**NOTES:**

1. This assumes that only a Carrier with experience or plans to operate Telecommunications Network(s) that use Optical Fibre Lines would engage with a Developer in relation to a Fibre-Ready Facility.

2. Developers should arrange registration with a Carrier six months prior to their estimated project completion to allow sufficient time for provision of advice on Carrier requirements.

### 3.3 Guard Wire for Lightning Protection

- 3.3.1 To reduce the higher risk in certain geographic areas of Australia of damage to copper telecommunications cables as a result of lightning strikes, a Carrier may specify the need to install a guard wire above the Conduit in certain areas.

*NOTE: Fibre-Ready Pit and Pipe may be used for the installation of copper telecommunications cables prior to the installation of optical fibre cable as part of a superfast network.*

- 3.3.2 A guard wire should not be installed in a trench that contains, or may contain in the future, high voltage (HV) power cables.
- 3.3.3 Where the Conduit is to be installed in a shared trench, and prior to installation, obtain in writing from the other utility provider(s) their approval or any objections to the installation of the guard wire in the shared trench.
- 3.3.4 Subject to detail provided by the Carrier requesting the installation of a guard wire, typical requirements for a guard wire are that it is:
- a) Made from stainless steel, of type 316 or similar, that:
    - (i) Has a nominal diameter of 2.5 mm;
    - (ii) Is annealed;
    - (iii) Is cold drawn; and
    - (iv) Has a tensile strength between 620 MPa and 760 MPa;
  - b) Installed:
    - (i) A nominal 100 mm above the newly installed Conduit;
    - (ii) with a minimum of 350 mm cover; and

- (iii) To bypass Pits with a minimum of 100 mm separation from the Pit wall(s).

c) Recorded on 'as-built' plans.

### 3.4 Shared Trenching

- 3.4.1 If a Real Estate Development Project will have multiple utility services (e.g. two or more of communications, electricity, gas, sewer and water) installed in one service trench then a Developer shall ensure there is in place a documented Shared Trench Agreement for the utility services to enable cost effective installation of Pit and Pipe infrastructure.
- 3.4.2 A Shared Trench Agreement should comply with recognised industry practices for safety and separation of services.

**NOTES:**

1. One example of practices for the separation of services is the use of barrier strips between service types, although this is not typically used between nests of Conduits of the same service type.

2. Refer to AS/CA S009 and AS/NZS 3000 for separation distances between electrical and telecommunications cables.

3. Refer to AS /NZS 4645.2, AS /NZS 4645.3 and AS/NZS 60079.10.1 for separation distances from gas services.

### 3.5 Certification

3.5.1 A Developer shall check if it needs to supply to:

- (a) State planning authorities; or
- (b) Local Government Areas (e.g. council or shire)

certification that the design for Fibre-Ready Facilities within the Real Estate Development Project conforms to this guideline.

3.5.2 A Developer shall check if it needs to supply to:

- (a) State planning authorities; or
- (b) Local Government Areas (e.g. council or shire)

certification that Fibre-Ready Facilities will be or have been installed within the Real Estate Development Project in a way that conforms to this Guideline.

*NOTE: This certification might be provided by a Carrier providing communications services under clause 3.5.3.*

3.5.3 Some authorities may require a Carrier to certify it will be providing communications services (of a certain type and standard) to the Real Estate Development Project before final approval is granted.

3.5.4 The nature of the telecommunications services provided to the Real Estate Development Project is for the Developer and approving authority to determine, subject to complying with provisions of Part 20A of the Act with regard to Fibre-Ready Facilities or where fixed lines must be optical fibre lines.

*NOTE: In addition to legislation there are regulatory instruments that may be relevant.*

### **3.6 Registration of Plans**

The owner of completed Pit and Pipe assets (e.g. the Carrier taking on the Telecommunications Network responsibility) in a Real Estate Development Project should register the plans with the Dial Before You Dig service.

*NOTE: Dial Before You Dig is a national service designed to prevent damage and disruption to Pipe and cable networks. To contact the service phone 1100 or visit the website at <http://www.1100.com.au>.*

### **3.7 Ownership**

The ownership of Developer installed Pits and Conduits does not automatically transfer to a Carrier. There needs to be a legally documented and executed agreement facilitating the change of ownership.



## 4 DESIGN

This section outlines the minimum permitted configurations and sizes of Pits and Conduit with respect to factors such as the property allotments and roadways they pass.

### 4.1 Before You Start

- 4.1.1 A Developer should check for existing infrastructure assets (e.g. electricity, gas and water mains) prior to the design of Pit and Conduit in a Real Estate Development Project.

*NOTE: One way to check for existing infrastructure assets is to contact the Dial Before You Dig service. Another is to contact the local suppliers of utility services.*

- 4.1.2 Design processes shall consider both the short and long term requirements of the area, including:

- (a) a need for Express Conduit;
- (b) lot density;
- (c) how to handle exceptional cases (e.g. a Cul-de-sac, difficult terrain); and
- (d) site usage e.g. commercial sites.

- 4.1.3 Design processes for Pit and Conduit in a Real Estate Development Project shall include engagement with non-telecommunications utilities e.g. electricity, gas, water.

- 4.1.4 Design processes for Pit and Conduit in a Real Estate Development Project should take into consideration physical properties of the site e.g. soil type.

### 4.2 Architecture(s)

- 4.2.1 Two permitted Pit and Pipe architectures that may be used are:

- (a) Single Side of the Street; or
- (b) Dual Side of the Street.

- 4.2.2 Combinations of clauses 4.2.1(a) and 4.2.1(b) are permitted.

- 4.2.3 Under "Single Side of the Street" construction Street Conduit is placed on only 1 side of a street with road crossings used to reach allotments on the other (non Street Conduit) side of the street.

- 4.2.4 Refer to Figures 1 and 2 for examples of "Single Side of the Street" construction.

*NOTE: Figures 1 and 2 are example illustrations and Conduit arrangements can exceed two lots per Pit. Refer to Table 5 in*

Appendix A for more information on Conduit combinations at a Pit end.

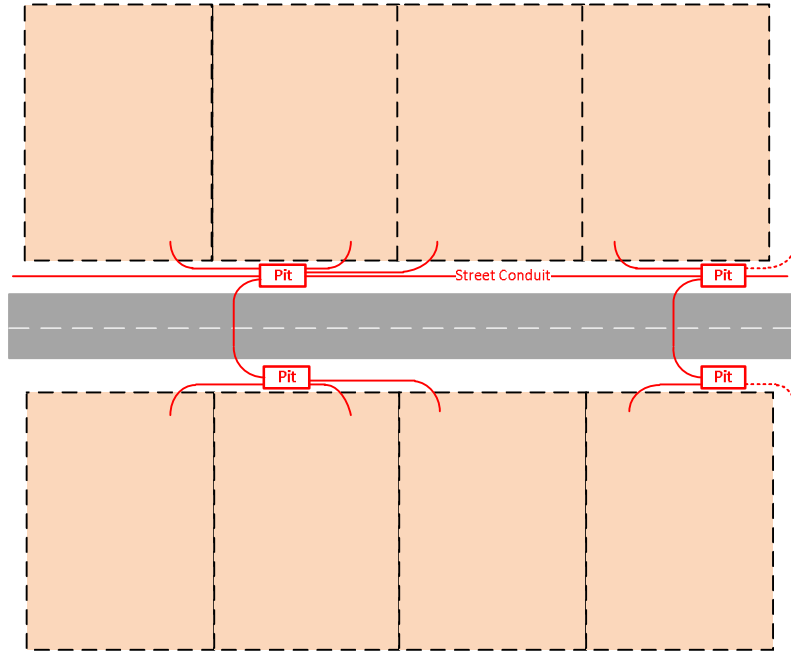


Figure 1(A)

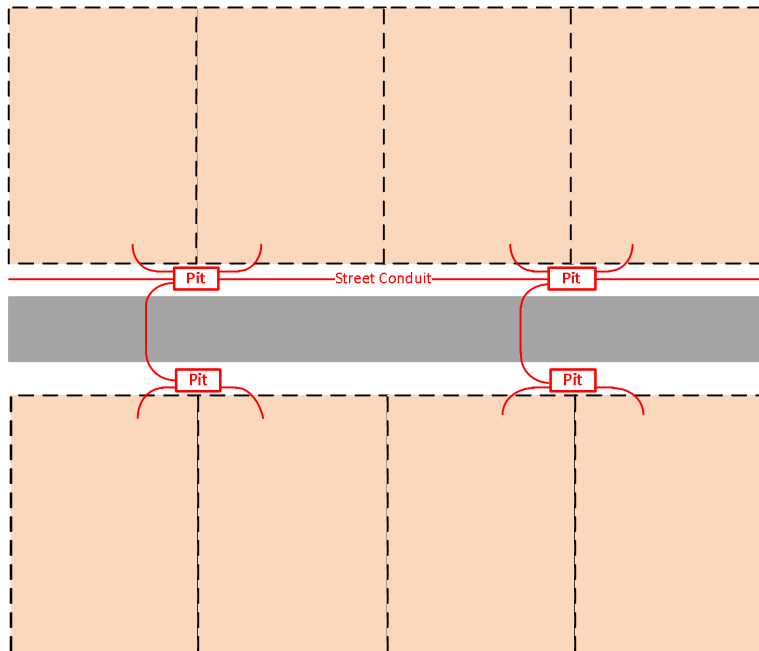


Figure 1(B)

**FIGURE 1**  
**Examples Of A Single Side Of Street Architecture**

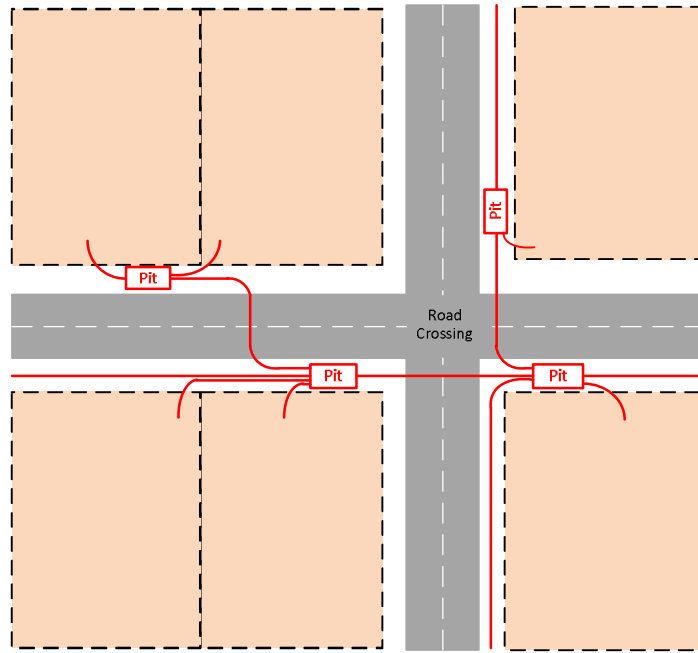


Figure 2(A)

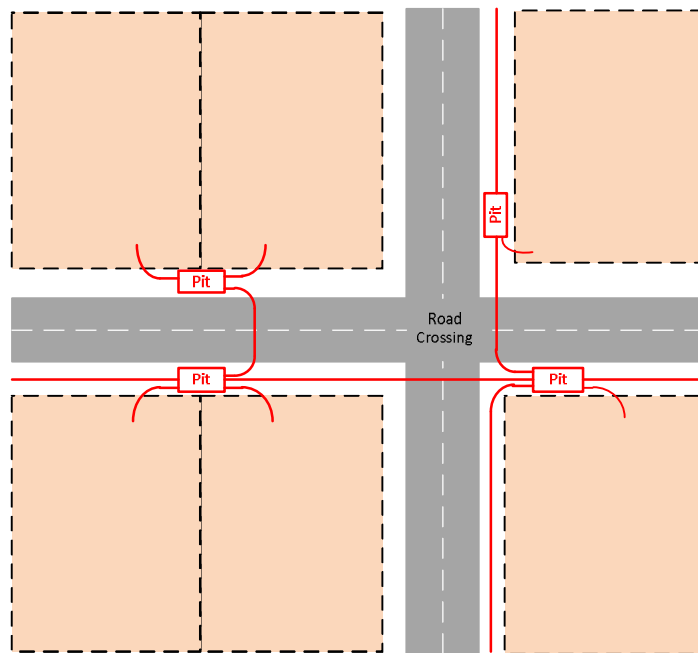


Figure 2(B)

**FIGURE 2**

**Example Of Road Crossing Conduits At Intersections  
(Single Side Architecture)**

- 4.2.5 Under "Dual Side of the Street" construction:
- (a) Street Conduit is placed on both sides of the street.
  - (b) Road crossings are generally placed at road intersections.

- 4.2.6 Refer to Figures 3 and 4 for examples of "Dual Side of the Street" construction.

**NOTES:**

1. While Figure 3 is an example illustration, Conduit arrangements can exceed two lots per Pit. Refer to Table 5 in Appendix A for more information on Conduit combinations at a Pit end.

2. While Figure 4 is an example illustration, it is unusual to have four separate road crossings at the one intersection.

- 4.2.7 In addition to road crossings required to service the non "Street Conduit" side of the street, road crossing should be installed at every road intersection to allow connection to every line of "Street Conduit" installed, unless otherwise specified by the Carrier.

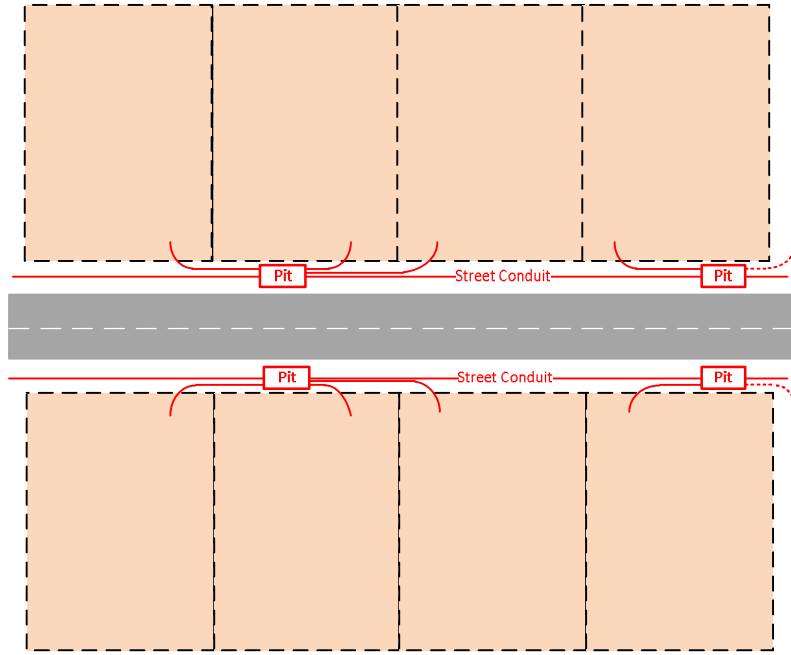


Figure 3(A)

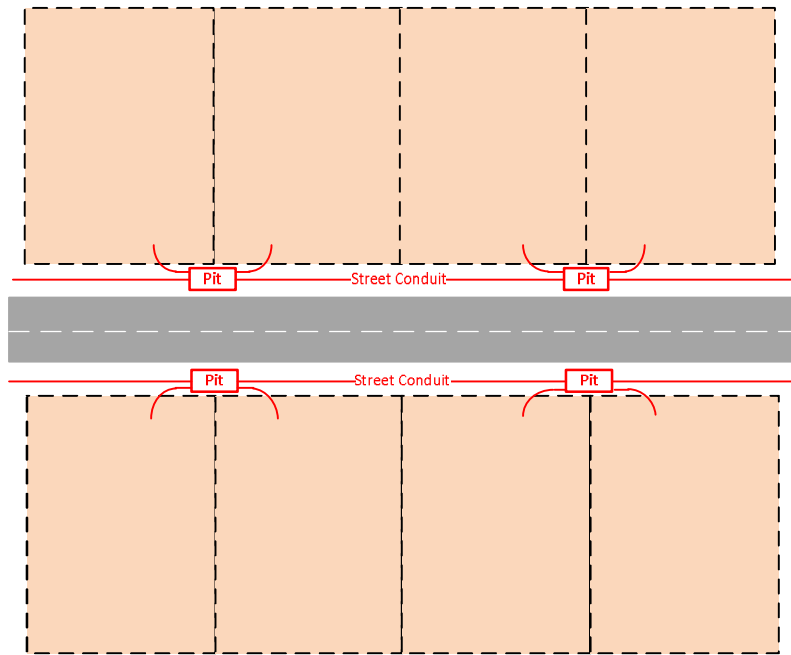


Figure 3(B)

**FIGURE 3**  
**Examples Of A Dual Side Of Street Architecture**

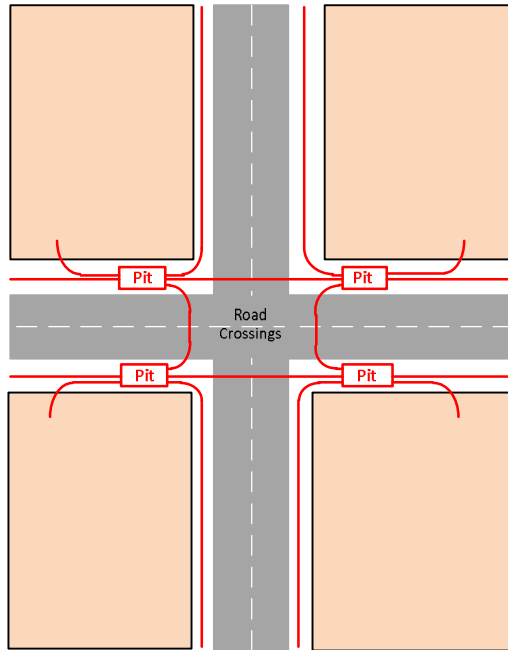


Figure 4

**FIGURE 4**

**Examples Of Road Crossing Conduits At Intersections  
(Dual Side Architecture)**

- 4.2.8 Refer to Figure 5 below and Figure 9 and Figure 10 in section 4.9 for examples of "Lane Way – No Verge" construction.
- 4.2.9 Where the Laneway is, or will become public property, the property boundaries should include a suitable 'excision' so that a Pit is located on public property with sufficient area to provide working access to the Pit.
- 4.2.10 Pits must not be installed where the possibility of a future installation of a fence will prevent safe working access.

*NOTE: Locating Pits on private property is an exceptional arrangement that should be discussed with the Carrier.*

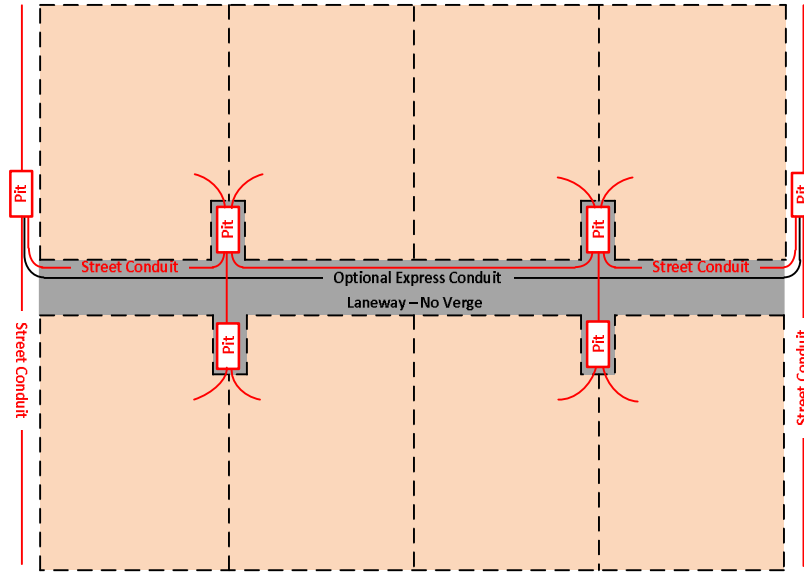


Figure 5(A)

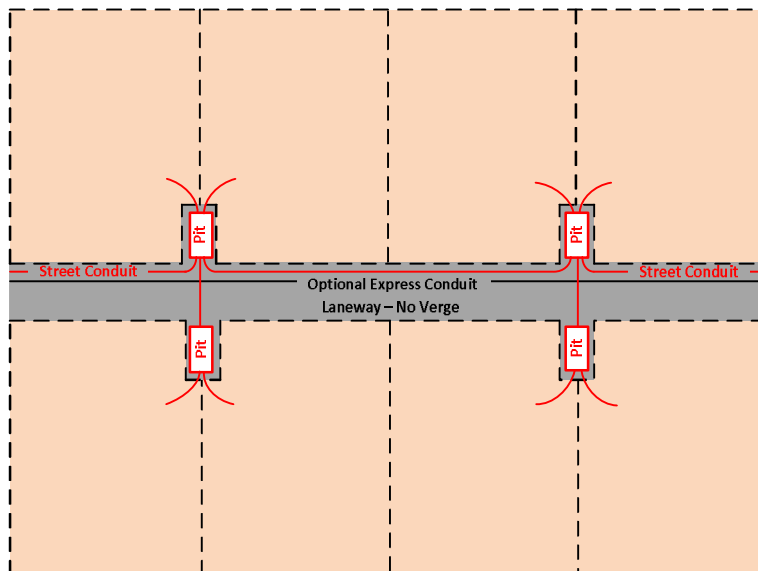


Figure 5(B)

## FIGURE 5

### Example Of Conduit In Laneway - No Verge

#### 4.3 New Lots fronting an existing public road (made or unmade)

- 4.3.1 Street Conduit shall be installed along/across the full frontage of all Building Lots where the existing Carrier network (if any) is not a Fibre-Ready Facility.
- 4.3.2 Installation of road crossings to service individual Building Lots is exceptional and must have prior Carrier approval. This would only be applicable if the network on the opposite side of the road to the new lots was a Fibre-Ready Facility.

- 4.3.3 If acceptable to the Carrier, the Developer must obtain all necessary council and other approvals to perform work on public roadway(s) and associated verge(s).

*NOTE: Carriers have statutory rights under the Telecommunications Act that do not cover Developers.*

- 4.3.4 Refer to Figure 6 below for examples of “New Lots Fronting an Existing Public Road (Made or Unmade)” construction.

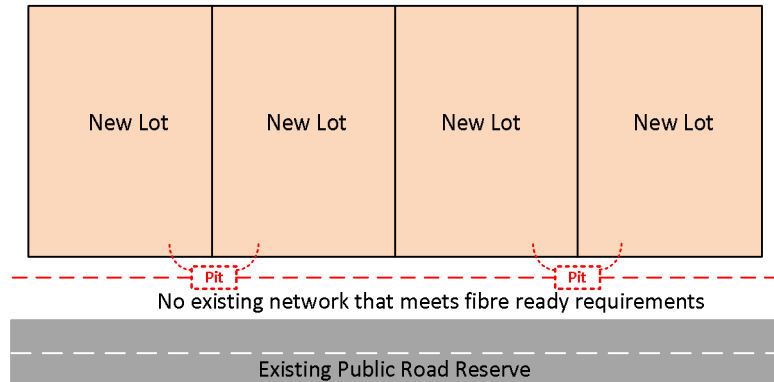


Figure 6(A) – Urban and Rural Residential/commercial/industrial Through road with no existing network

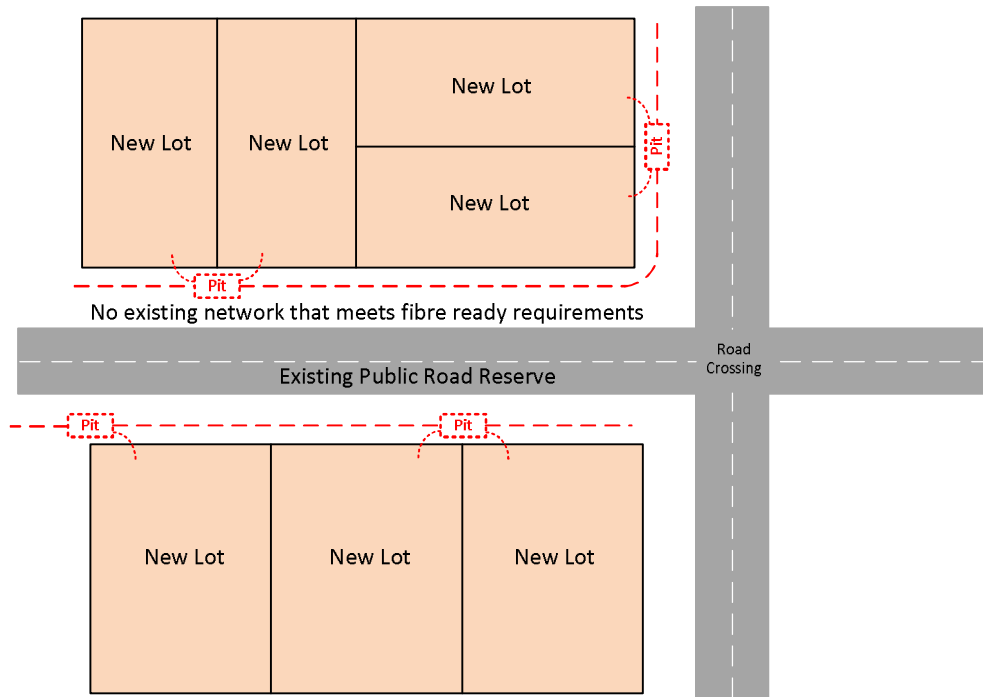


Figure 6(B) – Urban and Rural Residential/commercial/industrial Intersection with no existing network



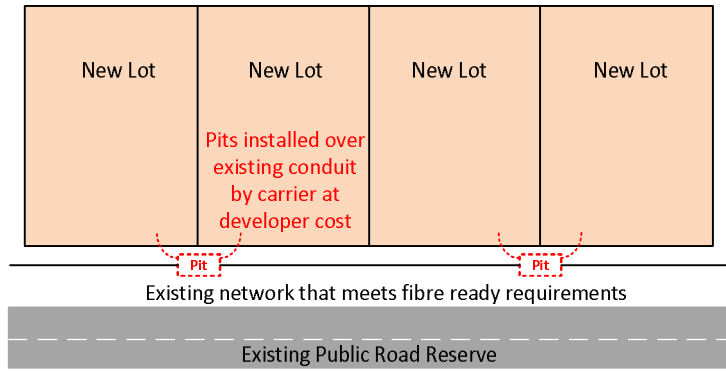


Figure 6(C) – Urban and Rural Residential/commercial/industrial Addition to existing network

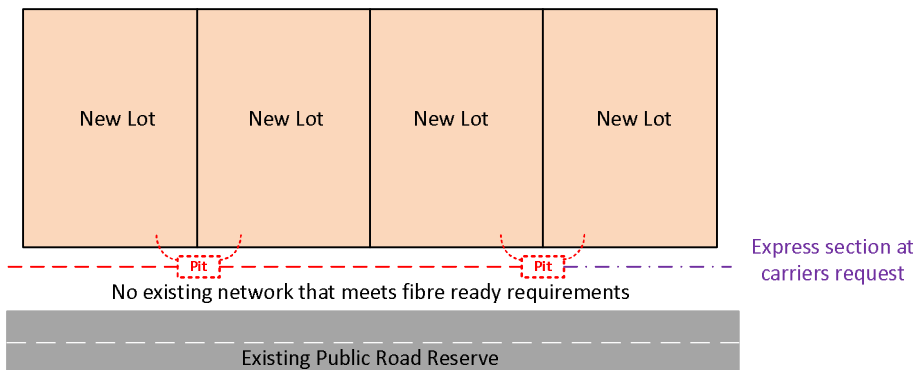


Figure 6(D) – Rural - Through road with no existing network (typically Primary Production but excluding Rural Residential, Commercial, Industrial)

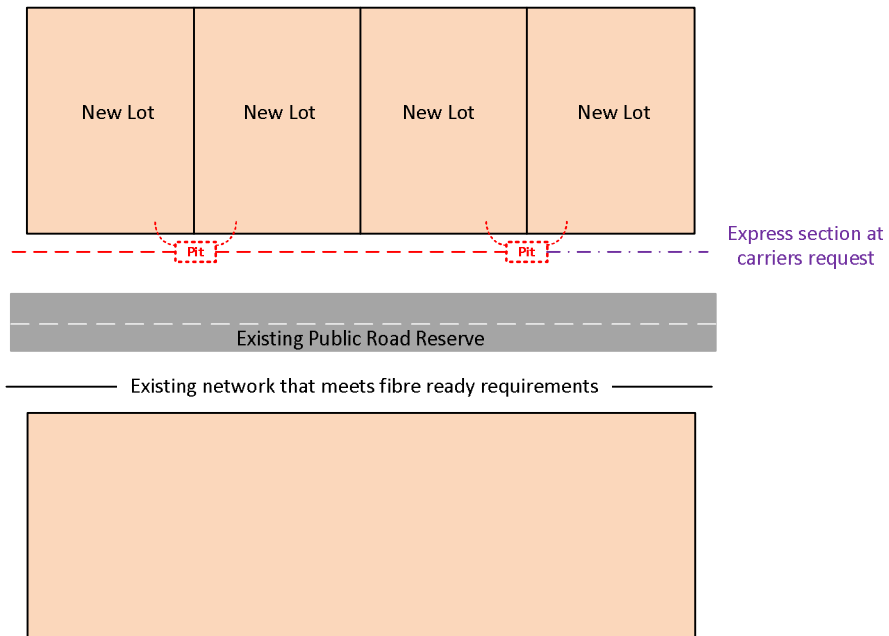


Figure 6(E) – Rural - Through road with no available existing network (typically Primary Production but excluding Rural Residential, Commercial, Industrial)

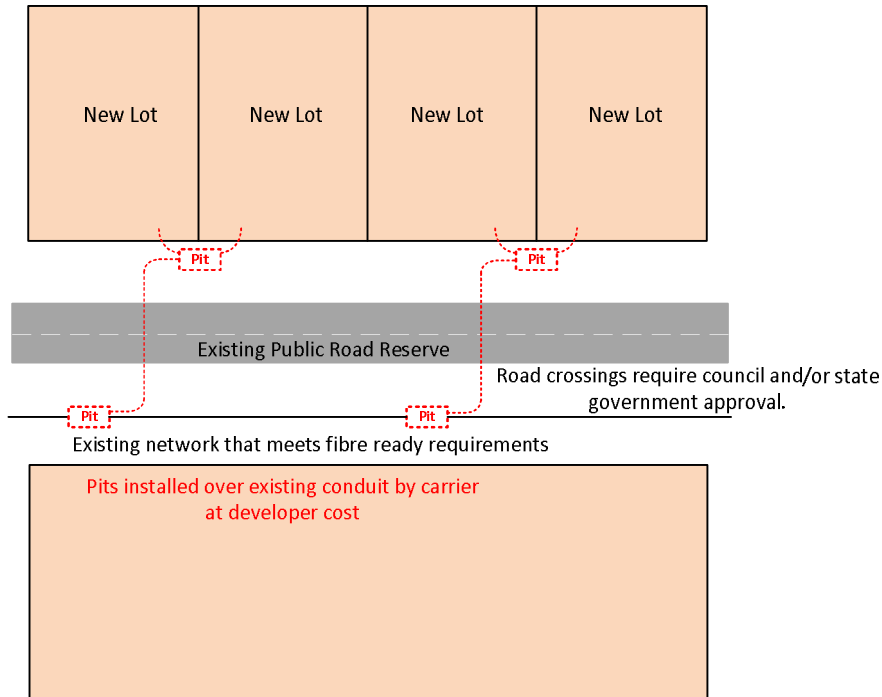


Figure 6(F) – Rural - Through road with existing network  
(typically Primary Production but excluding Rural Residential, Commercial, Industrial)

## FIGURE 6

### New Lots Fronting an Existing Public Road (Made or Unmade)

#### 4.4 Starter Conduit

4.4.1 A Starter Conduit shall have a maximum length from the Pit to the entry point of the Building Lot of:

- (a) 10m; or
- (b) 25m with prior Carrier consent.

*NOTE: A P20 Starter Conduit should not cross a Road or Laneway. Refer to Table 1 for Conduit size for road crossings.*

4.4.2 A Starter Conduit shall terminate within the Building Lot.

*NOTE: Refer to Appendix B for links to additional industry information with termination methods for Starter Conduit.*

4.4.3 A Starter Conduit shall extend a minimum of 1m inside the boundary of the Building Lot.

4.4.4 A Starter Conduit shall have a maximum of a single 90-degree Bend between the Pit and the end of the Starter Conduit within the Building Lot.

4.4.5 A Starter Conduit to a Single Dwelling Unit (SDU) within a broadacre development must not enter a neighbouring Building Lot.

- 4.4.6 A Starter Conduit must be readily locatable within the Building Lot.

**NOTE:**

1. Where a retaining wall exists, or is proposed, on or adjacent to the property boundary, the Starter Conduit may need to be extended beneath the wall foundations and extend further than the nominal distance into the property to allow a gradual rise to a depth that will allow the end of the Starter Conduit to be located. Alternatively, the Starter Conduit may terminate on the roadside of the retaining wall, with the Lead-In Conduit extended through the wall from the 'high side'. Refer to Figure 7 for more information.

- 4.4.7 A Starter Conduit must be installed under a retaining wall prior to the installation of the retaining wall.

**NOTE:** It is allowable to sleeve a P20 Conduit through a small section of P50 Conduit from the property boundary to add some form of protection from the retaining wall / footings. Refer to the examples in Figure 7.

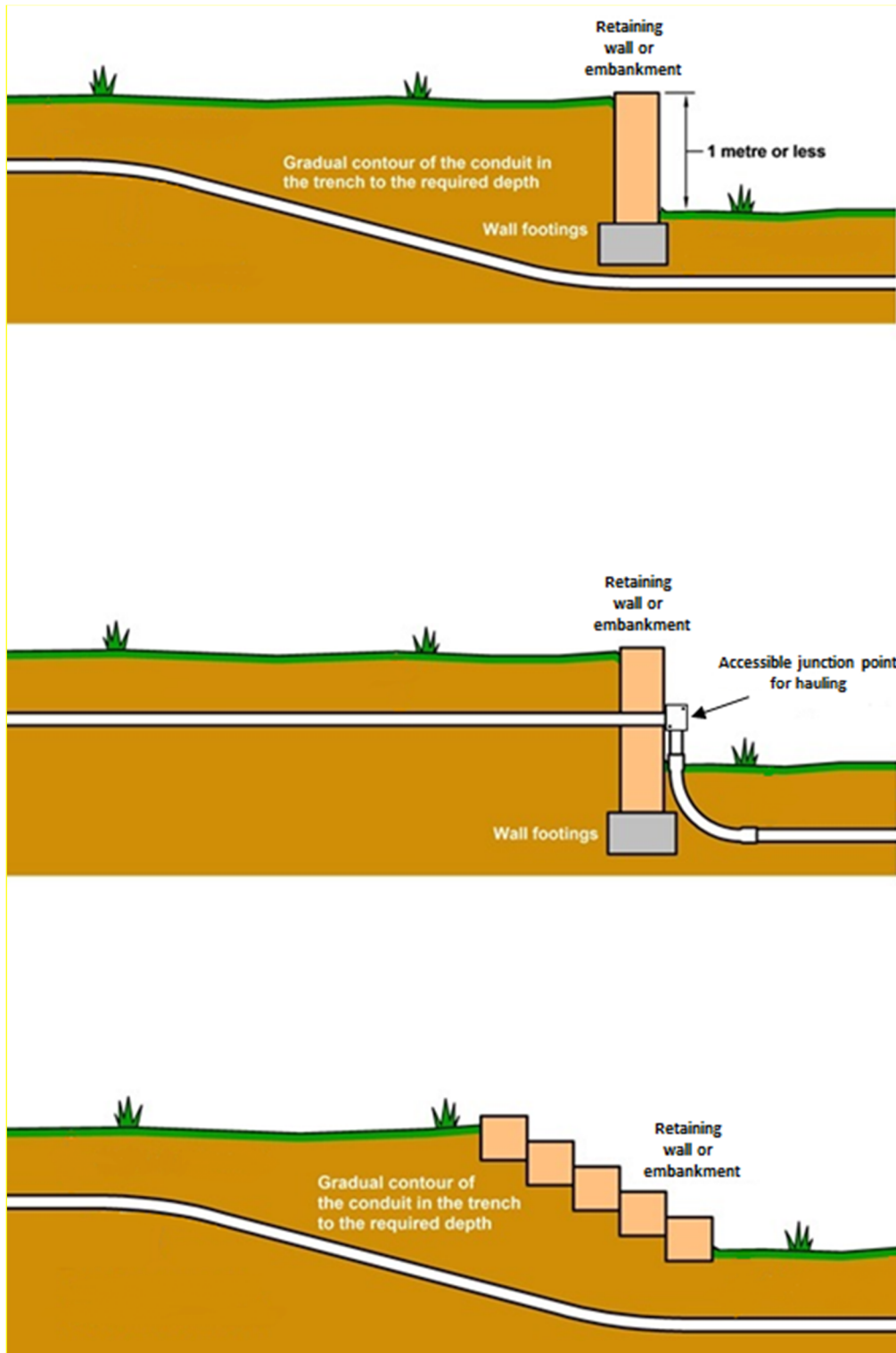
- 4.4.8 Starter Conduit installed under a retaining wall should be installed to rise or sweep up using a Curve or sweeping Bend to between 300mm and 450mm depth of cover within the Building Lot.

**NOTE:**

1. This is for the accessibility to and connection of the future Lead-In Conduit.
2. Refer to section 6.2 for more information on depth of cover.
2. A Curve or sweeping Bend can be applied to P20 Conduits – refer to section 6.6 and Table 3 for more information including minimum requirements.

- 4.4.9 The entry and exit points of an accessible junction point for hauling located on a retaining wall or embankment (refer to Figure 7) should accommodate a Bend Radius of not less than 100mm.

**NOTE:** The accessible junction point for hauling in Figure 7 is not a right angle Bend.



**FIGURE 7**

**Lead-In Conduit Near a Retaining Wall or Embankment**

- 4.4.10 A rot proof draw cord with a minimum 90kg break force must be installed in a Starter Conduit.

- 4.4.11 A draw cord in a Starter Conduit must be labelled at the Pit end of the draw cord.
- 4.4.12 A Starter Conduit draw cord label must include the:
- (a) Corresponding Lot number;
  - (b) Offset distance from left or right boundary.
- 4.4.13 The size of a Starter Conduit per Building Lot in a greenfields site, including Super Lots, must be:
- (a) P20 for a single residential Building Unit;
  - (b) A minimum of a P50 for a single commercial Building Unit;
  - (c) A minimum of a P50 for multiple residential Building Units up to:
    - (i) 24 Building Units in a horizontal development; and
    - (ii) 60 Building Units in a single vertical development building; or
  - (d) P100 for each development of multiple residential Building Units consisting of
    - (i) 25 or more Building Units in a horizontal development; and
    - (ii) 61 or more Building Units in a single vertical development building; or
  - (e) P100 for multiple commercial Building Units.

**NOTES:**

1. A strong recommendation is that a Developer seek Carrier advice on Starter Conduit(s) for commercial Building Unit(s).
2. Refer to the definitions in Section 2.2 as well as Section 8.1 for more information on P20, P50 and P100 dimensions and materials.
3. Refer to Section 5 for additional information on requirements for Starter Conduit size on infill sites.
4. A Building Lot that contains multiple Building Units may require multiple Starter Conduits.

## **4.5 Express Conduits**

- 4.5.1 A Carrier may specify the need for the installation of Express Conduit(s) between any two nominated Pits.
- 4.5.2 Where Express Conduits are required they should be installed in accordance with the Communications Alliance guideline **Fibre To The Premises Planning – Express Conduit**.

## 4.6 Minimum Conduit Size

4.6.1 The Conduit installed in a Real Estate Development Project must be large enough to accommodate:

- (a) all anticipated telecommunications services in the current design phase; and
- (b) a future request for Access from a Carrier e.g. to install a subduct in Conduit other than Starter Conduit.

4.6.2 Refer to Table 1 for the required size for various Conduit functions within the network architecture(s) where the only use of the Conduit is for:

- (a) installing fibre or cable for; or
- (b) connecting fibre or cable to  
a public Telecommunications Network.

*NOTE: Carrier Conduit is used exclusively for public Telecommunications Networks. In a greenfield estate where the Developer retains ownership of the Conduit and the Conduit contains cable for a public Telecommunications Network then separate infrastructure is required for private (e.g. an intercom) services.*

4.6.3 While P100 is the default minimum size for Street Conduit in Table 1, a Developer may install two P50 Street Conduits in place of each P100 Street Conduit, where:

- (a) there is a Carrier nominated for the ownership of the Optical Fibre Lines; and
- (b) the nominated Carrier has agreed in writing to the installation of the two P50 Conduits.

**NOTES:**

1. *The nominated Carrier should be able to demonstrate the chosen combination of internal Conduit diameter and bend radius is capable of permitting Access by another Carrier.*
2. *If there is another combination of Conduits that can be demonstrated to be equivalent to the minimum P100 Street Conduit then an interested party can contact Communications Alliance and propose it for inclusion in a revision of this document.*

**TABLE 1**  
**Conduit Type**

<b>Role in Architecture</b>	<b>Conduit Size</b>
Street Conduit	P100
Road crossing to reach non "Street Conduit Side of the Street" [Single Side Architecture only]	P50
Cul-de-sac Note: refer to definition for Cul-de-sac	P100 OR P50 with Carrier approval
Laneway Note: refer to definition for Laneway	P100 OR P50 with Carrier approval
Road crossings at road intersections	P100
Starter Conduit – single residential Building Unit	P20
Starter Conduit – single commercial Building Unit	P50
Starter Conduit – multiple residential in a horizontal development with less than or equal to 24 Building Unit(s)	P50
Starter Conduit – multiple residential in a single vertical development building with less than or equal to 60 Building Unit(s)	P50
Starter Conduit – multiple commercial Building Units	P100
Starter Conduit – multiple residential in a horizontal development with more than 24 Building Unit(s)	P100
Starter Conduit – multiple residential in a single vertical development building with more than 60 Building Unit(s)	P100

*NOTE: Refer to section 8.1 for more information on requirements for Conduits.*

## 4.7 Pit Selection

4.7.1 The minimum Pit size used in the architecture(s) for Fibre-Ready Pit and Pipe shall be as specified in Table 2 where:

- (a) 'depth' is measured between the inside of the Pit base to under the Pit lid; and
- (b) 'length' and 'width' are measured:
  - (i) along the centreline of the Pit;
  - (ii) on the inside of the base;
  - (iii) at right angles to one another; and
  - (iv) with no obstructions above the measured dimension i.e. the nominal internal base dimension is to be

reduced for any internal protrusions (e.g. ribs) into the space above the base.

*NOTE: As the internal dimensions are critical in determining useable space, and overall dimensions will vary depending on material and/or design used, Pits are specified by the internal dimensions.*

- 4.7.2 A Developer should get confirmation in writing from the Carrier before commencing construction work that the planned Pit sizes are appropriate for their intended use.
- 4.7.3 A network designer should ensure a selected Pit will be fit for purpose, including consideration of:
- (a) internal space e.g. sufficient for the storage of cable and enclosures;
  - (b) Pit surface area e.g. to accommodate the number of Conduits required to penetrate an end wall;
  - (c) required depth of cover; and
  - (d) installation environment e.g. clay, sand, soil;
  - (e) installation method, including the installation guidelines of the Pit manufacturer or Carrier, e.g. so the Pit will not warp under expected use; and
  - (f) Pits being suitable for use with lids for typical Carrier specified Pit sizes (refer to section 8.2 for more information).

**TABLE 2**

**Minimum Pit internal dimensions**

Pit Size Number	Minimum Internal Dimensions			
	Note 1	Length (mm)	Width (mm)	Depth (mm)
2		490	125	500
5		510	260	540
6		1130	340	600
8		1130	340	820
9		1820	380	840

*NOTE: The Pit size number is a common description used by carriers.*



- 4.7.4 If a Carrier requests a Pit at a specific location to accommodate plant that is larger than specified above, then this must be accommodated by the Developer, provided that:
- (a) the requested Pit size was reasonably justified as fit for purpose; and
  - (b) the exact location and size of the larger Pit(s) are specified prior to commencement of construction of the Pit and Pipe.
- 4.7.5 Developers should consult with a Carrier about other space requirements.

## 4.8 Pit Spacing

- 4.8.1 The selection of Pit size can affect the Pit spacing i.e. the number of premises served from a Pit (e.g. a smaller Pit can connect fewer Starter Conduits).
- 4.8.2 A Size 2 Pit shall connect to typically two and a maximum of four single Building Units, and must be connected directly to a size 5 Pit by a P50 (Road Crossing, Reticulation Conduit or Lateral Crossing).

*NOTE: A Size 2 Pit is generally not large enough to joint fibre cables and hence any building units connected via a Size 2 Pit must be associated with a Size 5 Pit located within 50 metres.*

- 4.8.3 A Size 5 Pit shall connect to typically four and a maximum of eight single Building Units via direct (P20) connections, or 12 Building Units indirectly via a single associated Size 2 Pit connected by P50 conduit i.e. at the end of a conduit run.

*NOTE: Refer to Appendix A for maximum allowable combinations of Conduits for a given Pit size.*

- 4.8.4 A Size 6, 8 or 9 Pit shall connect to a maximum of eight single Building Units via direct (P20) connections.

*NOTE: Size 6, 8 & 9 Pits are generally utilised for network reticulation purposes and hence associated indirect Building Unit limitations such as those detailed for Size 2 and 5 Pits do not apply.*

- 4.8.5 Different Pit configurations to those in Figures 1 to 4 will be required for locations that include higher densities of Building Units e.g. apartment blocks.

**NOTES:**

*1. Refer to Appendix A for maximum allowable combinations of Conduits for a given Pit size.*

*2. Refer to Section 5 for more information on higher densities of Building Units.*

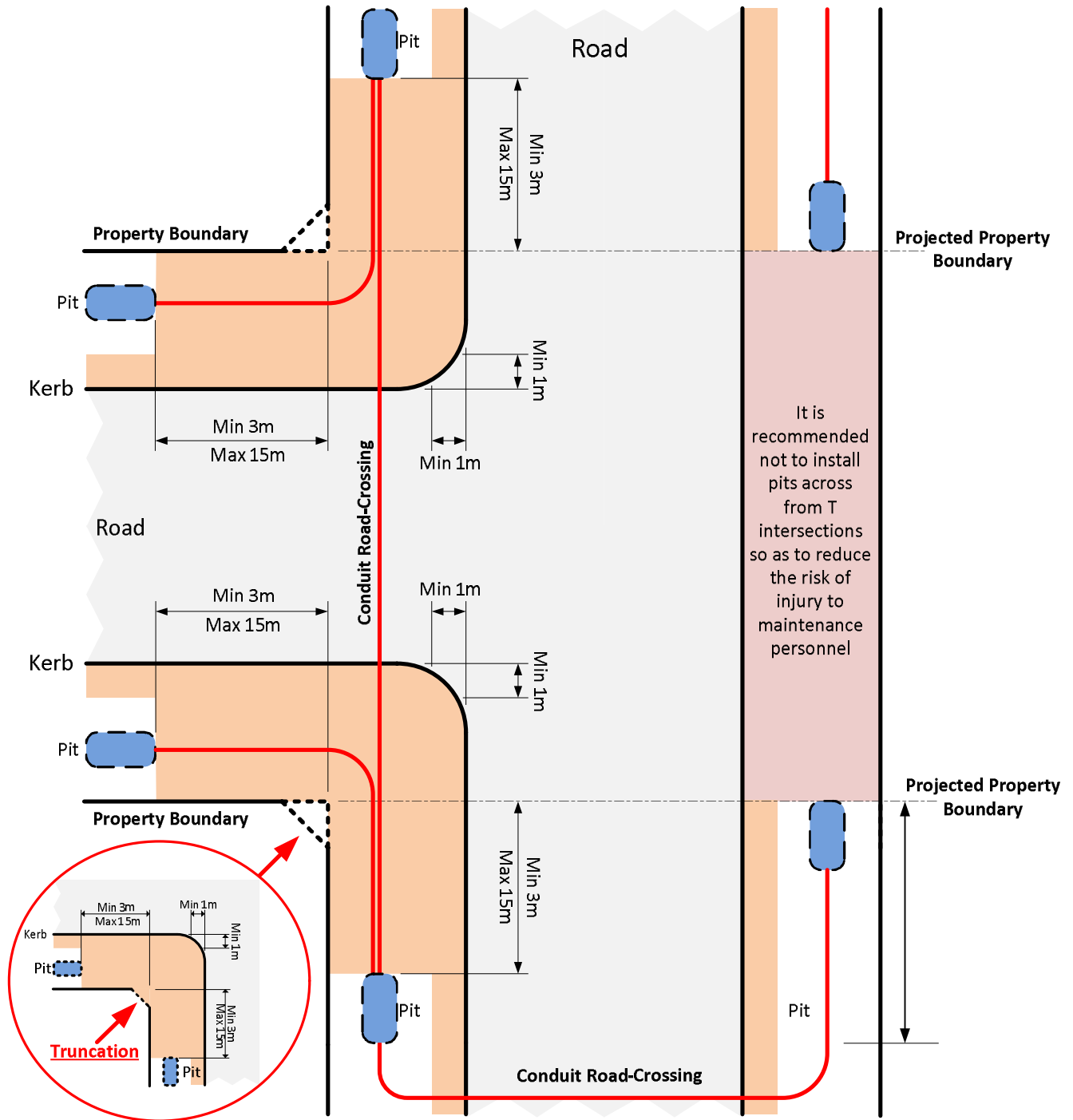
- 4.8.6 Refer to Carrier documentation for whether Road crossings for “Single Side of the Street” construction in low density residential areas are at every Pit or every second Pit.

#### **4.9 Pit Locations**

- 4.9.1 A Pit shall be installed at a change in size of the Conduit e.g. P100 to P50.
- 4.9.2 A Pit shall be installed within 6.5m of where a Street Conduit changes direction by an angle equal to or greater than 90 degrees.
- 4.9.3 Where the requirement in 4.9.2 conflicts with another requirement then a Pit shall be installed:
- (a) at the nearest safe location; and
  - (b) not greater than 15m from where a Street Conduit changes direction by an angle equal to or greater than 90 degrees.

*NOTE: For exceptional circumstances that require a distance greater than 15m a Developer should seek Carrier Consent.*

- 4.9.4 A Pit with a P100 stub, capped and plugged, shall be installed at the end of a route where significant elapsed time is expected between stages of a Real Estate Development Project.
- 4.9.5 Pits shall be installed along the Alignment of the Street Conduit(s).
- 4.9.6 Where the Alignment:
- (a) continues into or exits a street crossing; or
  - (b) bends around a street corner
- then Pit(s) should be installed not less than 3m and not more than 15m, along the Alignment, from the projected property boundary or corner of the adjacent property. Refer to Figure 8 for an illustration.
- 4.9.7 Pits shall be installed at least 1m from the kerb where practical. Refer to Figure 8 for an illustration.



**FIGURE 8**  
**Pit Distance From Kerb**

- 4.9.8 Pits should be installed in an easily accessible location to facilitate installation and operational tasks.
- 4.9.9 Pits must not be installed where safe working access is impeded by a fence, including locations where a fence does not exist but future installation of a fence is foreseeable.

*NOTE: Provision of a gate in the fence does not offer safe working access since a gate may be locked.*

- 4.9.10 Pits located in a public verge should be positioned with their long side parallel to the adjacent property boundary or roadway.

*NOTE: For Pits located in a Laneway refer to clauses 4.9.19, 4.9.20 and 7.3.2.*

- 4.9.11 Pit installation processes shall ensure the correct Pit is installed for the intended use i.e. 'fit for purpose' and 'specific to the task'.

- 4.9.12 A Pit shall not be installed in a:

- (a) driveway;
- (b) roadway area;
- (c) hazardous area; or
- (d) trafficable area;
- (e) unmade section of a future carriageway;
- (f) vehicular access way; or
- (g) on a median strip or traffic island.

- 4.9.13 A Pit should not be installed:

- (a) within one metre of a pole;
- (b) within two metres of a doorway; or
- (c) on a road edge (i.e. immediately adjacent to the kerb).

**NOTES:**

*1. Installation of a Pit within one metre of a low voltage light pole might be acceptable but installation within one metre of an electrical transformer pole is not acceptable.*

*2. Installation of a Pit on a road edge should be avoided but this clause recognises that some kerb areas are very narrow.*

- 4.9.14 After considering clauses 4.9.12 and 4.9.13, Pits are to be placed close to the property boundary of two adjacent allotments, in accordance with agreements, or good engineering practice, to ensure access to, and safety of, other utilities' infrastructure.

- 4.9.15 Pits shall not be placed in known or foreseeable driveway locations. In some situations where it is known prior to the Pit installation that a driveway is to be placed over the proposed location, the Pit shall be slightly offset so as not to be installed in the proposed driveway.

- 4.9.16 The Starter Conduit for each Building Lot must connect to a Pit.

*NOTE: Common industry practice when using a Pit via a road crossing to connect:*

- (a) one to four Building Unit(s) is to use a size 2 Pit;*
- (b) more than four Building Units is to use at least a size 5 Pit.*

*Refer to Table 5 in Appendix A for more information on the maximum Conduit combinations at a Pit end.*

- 4.9.17 Pits must be spaced so that no Conduit section exceeds:

- (a) 100m where there are Starter Conduits in use; or
- (b) 250m where it is unlikely there will be a future need for intermediate Pits e.g. parkland.

- 4.9.18 Pits shall not be placed in a hazardous area, including areas that may be subject to Earth Potential Rise as specified in AS/NZS 3835.1 and AS/CA S009.

*NOTES:*

*1. This may include the area within 15 metres of pad mounted and pole mounted transformers, substations and other high voltage electrical structures but may be further than 15m depending on soil conditions and the nature of the electrical equipment. If unable to comply with AS/NZS 3835.1 then seek expert advice.*

*2. While an optical fibre does not conduct electricity a Carrier might install fibre with a metal sheath or metallic tracer element.*

- 4.9.19 Where easements or property excisions are required for the installation of Pits (and other utility connection devices) due to the absence of a verge and the road pavement extending to the property boundary (i.e. a laneway) then:

- (a) Street Conduit shall be located under the roadway;
- (b) Pits shall be installed with the long side oriented at ninety degrees to the roadway;
- (c) Street Conduit shall enter the Pit at the end closest to the road using preformed Bends; and
- (d) A maximum of 24 Building Units can be connected, unless Carrier consent is obtained to connect more than 24 Building Units.

- 4.9.20 Refer to Figures 9 and 10 below and Figure 5 in section 4.2 for examples of Pit installations in the absence of a verge.

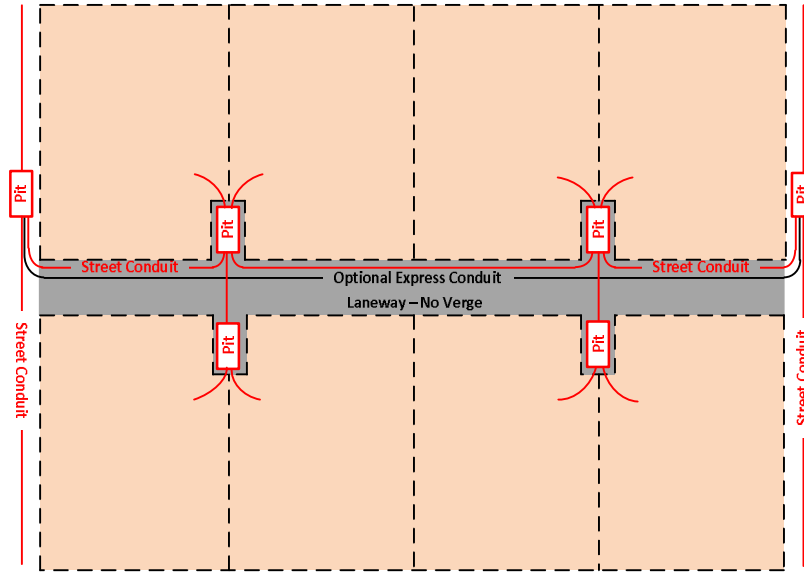


Figure 9(A)

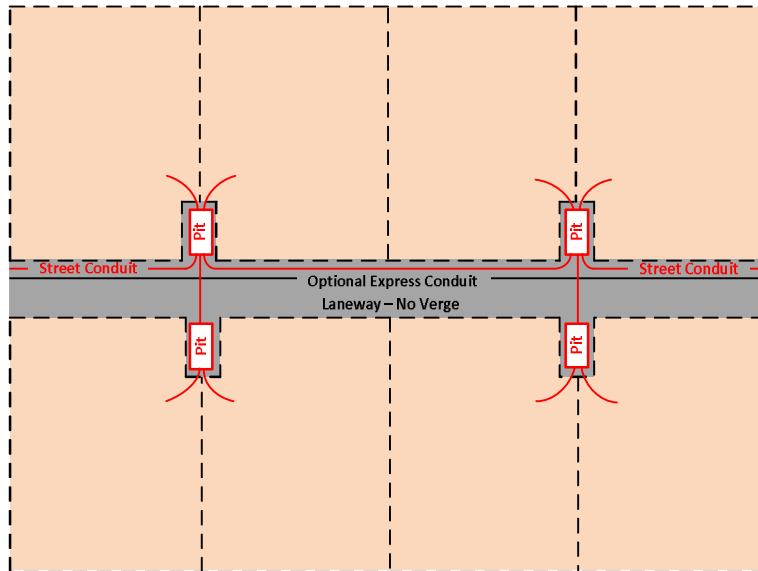


Figure 9(B)

**FIGURE 9**

**Pit Installation In The Absence Of A Verge  
For Single Side Of Street Architecture**

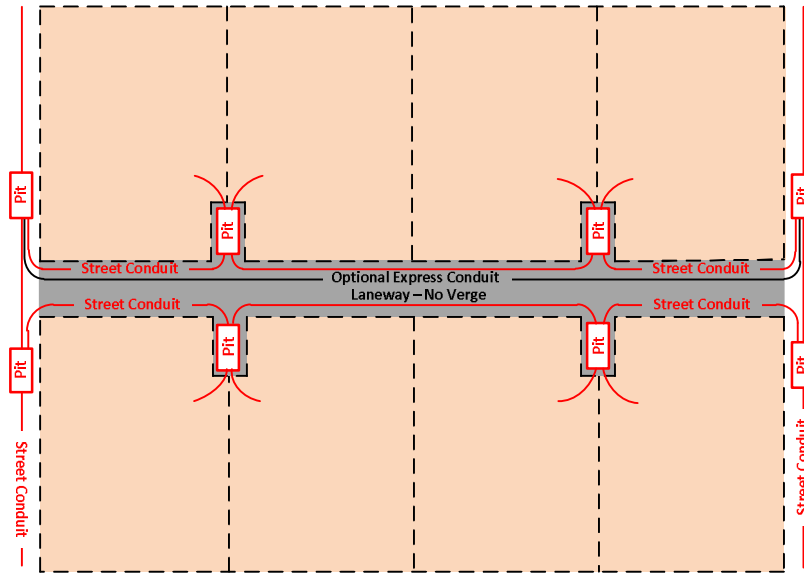


Figure 10(A)

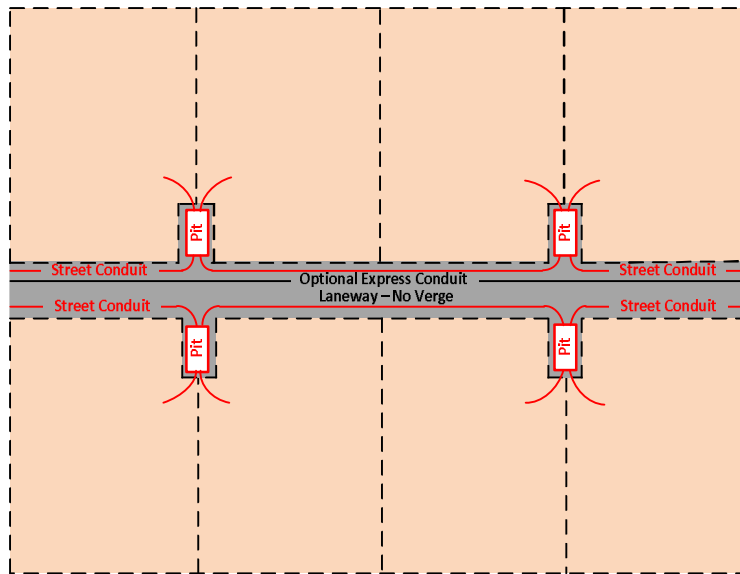


Figure 10(B)

**FIGURE 10**

**Pit Installation In The Absence Of A Verge  
For Dual Side Of Street Architecture**

## 5 MULTI UNIT, MULTI BUILDING DEVELOPMENTS INCLUDING SUPER LOTS

This section outlines the rules for the design of multi-unit, multi-building developments including Super Lots.

### 5.1 Introduction

- 5.1.1 The requirement to provide fibre-ready infrastructure applies to all Real Estate Development Projects (i.e. not limited to subdivisions) including those occurring on a single lot involving the construction of one or more buildings and/or Building Units. (i.e. strata and group title developments, horizontal and vertical Multi-Dwelling Units (MDUs), commercial and industrial).
- 5.1.2 While the basic requirements of the design guidelines (Section 4) apply, due to differing layouts of these developments, special focus is required to ensure appropriate infrastructure is installed in the correct location.

### 5.2 Key Requirements

- 5.2.1 All sides of a Super Lot that are street frontage shall be adequately serviced as part of a new Real Estate Development Project or subsequent stage of a Real Estate Development Project.

**NOTES:**

- 1. This can be achieved by locating Pits and Street Conduit along the road reserve on all sides of the Super Lot that connect into the current stage(s) of the local network.
- 2. Where a Developer believes a variation to this is warranted the Developer should seek prior Carrier consent to the variation.

- 5.2.2 Other than the Lead-In Conduit to a specific Building Unit, all Pits and Conduits shall be located in common property and not installed in or cross individual titles.

**NOTE:** Where there is no common property the Pits and Conduit should be on public property.

- 5.2.3 The length of a Lead-In Conduit from the last Pit to a building shall be not more than 50m.

**NOTE:** A preferred distance is shorter than 50m, unless necessary.

- 5.2.4 The number of pre-formed 90 degree Bends (or equivalent) in a Lead-In Conduit shall be not more than two, including the vertical Bend required where a Conduit transitions from underground to above ground at (or near) the building.
- 5.2.5 Refer to Appendix A for information on the maximum number of Lead-In Conduits from a Pit.



- 5.2.6 While section 4.8 provides some guidance on Pit location, additional clarification is required for these development types.
- 5.2.7 In addition to the general requirements in section 4.8, Pits in multi-unit, multi-building developments, including Super Lots, shall not be installed in any trafficable area, including a:
- (a) roadway;
  - (b) driveway;
  - (c) gateway;
  - (d) vehicular access way;
  - (e) turning circle;
  - (f) car park, including wash bay; and
  - (g) refuse bin storage area.

### **5.3 Fibre-Ready requirement across frontage of public street**

- 5.3.1 Where the existing Carrier network across the frontage of the development is not a Fibre-Ready Facility, Developers shall arrange the installation of suitable Conduit and Pits.
- 5.3.2 Where the existing Carrier network is a Fibre-Ready Facility and additional Pit(s) are required the Developer should arrange the installation of suitable Conduit and Pits with the Carrier servicing the Real Estate Development Project or the Carrier who owns the existing Conduit.
- 5.3.3 The installation and connection of additional Pit(s) to an existing Carrier facility requires explicit permission from that Carrier.

*NOTE: Some or all Carriers may not allow third parties to perform this work due to the risk of damage to and interruption of working services and confusion over Pit ownership and liability.*

- 5.3.4 Carriers may require that additional Pits are installed and connected on a commercial basis.

### **5.4 Residential – Horizontal**

- 5.4.1 For a small scale horizontal residential development (i.e. three or less Building Units) the minimum size of a:
- (a) Lead-In Conduit is P20; and
  - (b) Reticulation Conduit, if required, is P50.
- 5.4.2 Refer to Figures 11 and 12 for more information.

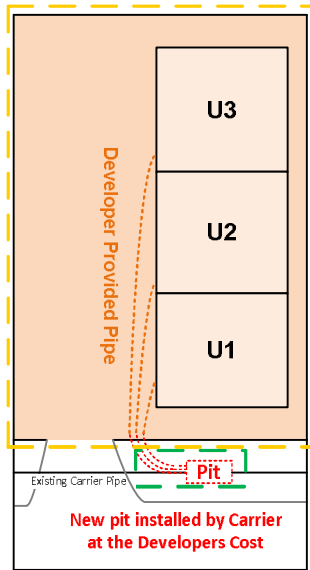


Figure 11 (A)

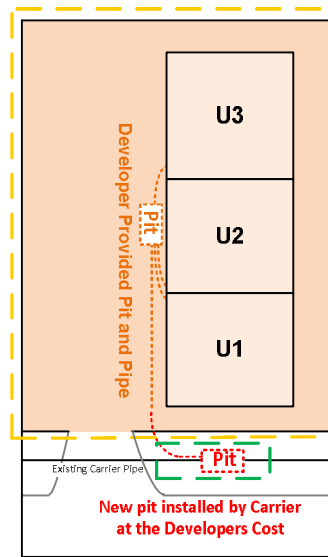


Figure 11 (B)

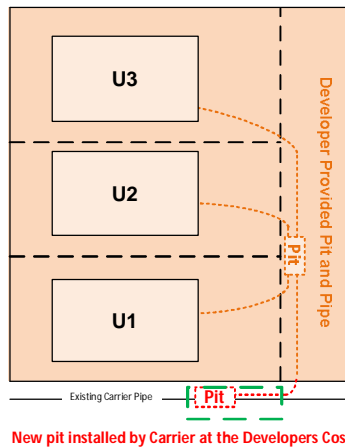


Figure 11 (C)

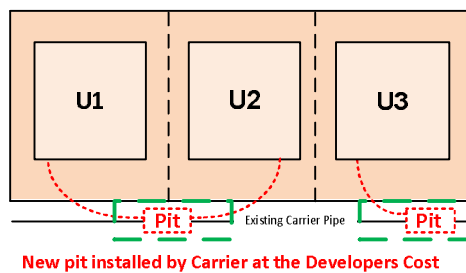


Figure 11 (D)

**FIGURE 11**

**Small Scale Horizontal Development –  
New Pits Added To Existing Facilities**

*NOTE: Figure 11 includes a combination of Developer and Carrier installed Pits and Conduits. The Industry convention is for the Developer to fund the installation of all telecommunications infrastructure.*

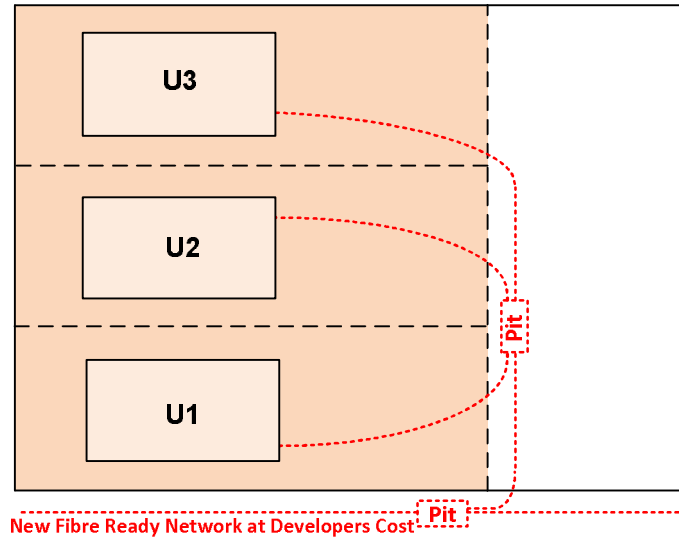


Figure 12 (A)

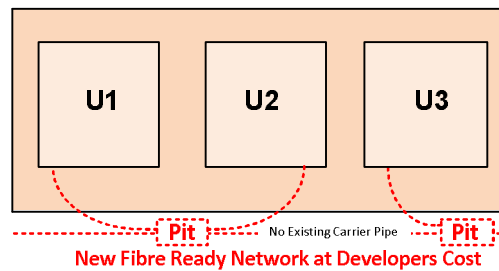


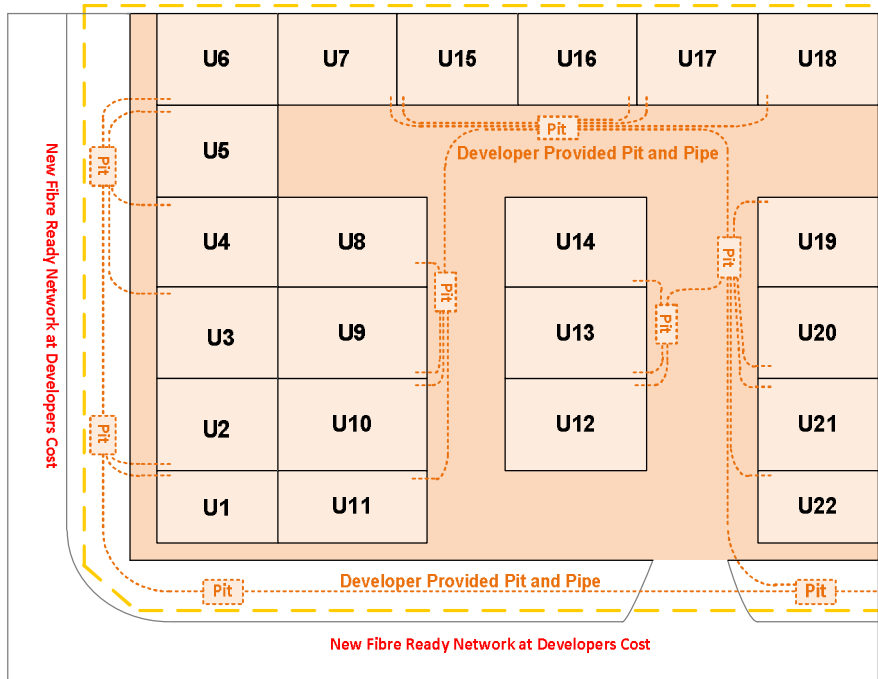
Figure 12 (B)

**FIGURE 12**  
**Small Scale Horizontal Development –**  
**No Existing Facilities**

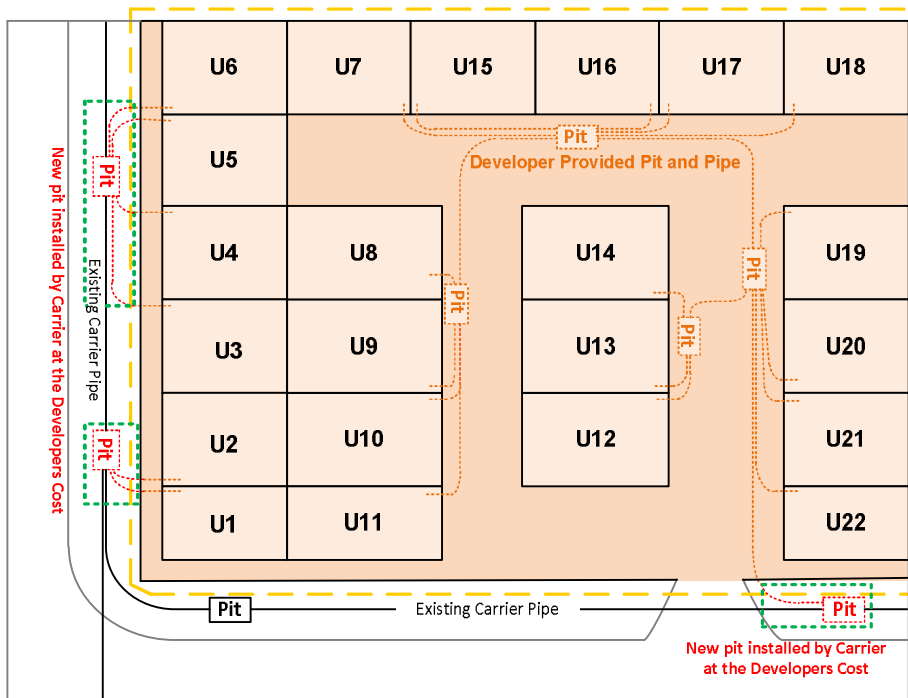
*NOTE: Figure 12 has Developer installed Pits and Conduits. The Industry convention is for the Developer to fund the installation of all telecommunications infrastructure.*

- 5.4.3 For a medium scale horizontal residential development (i.e. from 4 to a maximum of 24 Building Units) the minimum size of a:
  - (a) Lead-In Conduit is P20; and
  - (b) Reticulation Conduit, if required, is P50.
- 5.4.4 For a medium scale horizontal residential development Pits should be installed within the property boundary. Refer to Figure 13 for more information.

*NOTE: This is in addition to Pit(s) installed in the street.*



13(A) Developer installed Pits and Conduits



13(B) Combination of Developer and Carrier installed Pits and Conduits

**FIGURE 13**  
**Medium Scale Horizontal Development –**  
**No Existing Facilities**

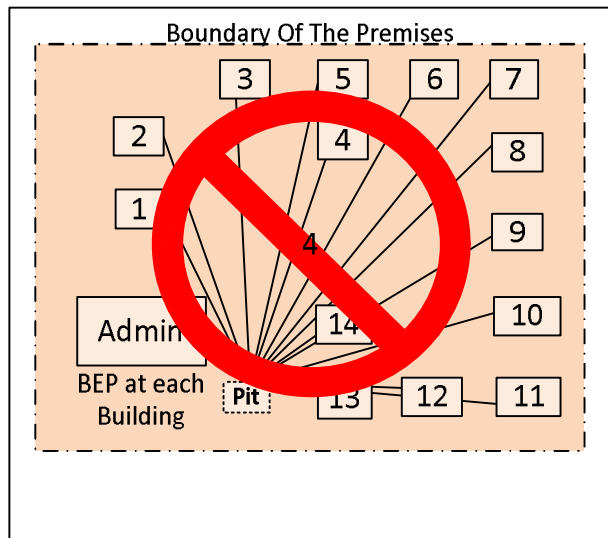
NOTE: Figure 13 has Pits and Conduits installed by (a) the Developer only and (b) the Developer and Carrier. The Industry

convention is for the Developer to fund the installation of all telecommunications infrastructure.

- 5.4.5 Building Units in a medium scale horizontal residential development should not be served from a single Pit. Refer to Figure 14 below for more information.

NOTE: Refer to:

- (a) Appendix A for information about the maximum number of Starter Pipes from a single Pit; and  
(b) section 4.8 for information about the maximum number of Building Units a single Pit can serve.



**FIGURE 14**

**Medium Scale Horizontal Development –  
Not To Be Served From A Single Pit**

- 5.4.6 For a large scale horizontal residential development (i.e. more than 24 Building Units) the minimum size of a:
- (a) Lead-In Conduit is P20;
  - (b) Conduit for lateral crossings is P50;
  - (c) Reticulation Conduit for not more than 24 Building Units is P50; and
  - (d) Reticulation Conduit for more than 24 Building Units, if required, is P100.

## 5.5 Residential – Vertical

- 5.5.1 The minimum size of a Lead-In Conduit(s) to a building containing 2 Building Units shall be either a single P50 or two P20.
- 5.5.2 The minimum size of a Lead-In Conduit to a building containing from 3 to 60 Building Units shall be P50.
- 5.5.3 The minimum size of a Lead-In Conduit to a building containing more than 60 Building Units shall be P100.

## 5.6 Commercial / Industrial (including mixed use i.e. combined with residential developments)

- 5.6.1 The minimum size of a Lead-In Conduit to a commercial or industrial Building Unit shall be P50.

*NOTE: This includes mixed use development that combines a commercial or industrial Building Unit with one or more residential Building Units.*

- 5.6.2 For larger commercial buildings Developers should:
  - (a) engage during the design phase with Carrier(s) likely to install infrastructure in the building;
  - (b) consider whether the minimum size of a Lead-In Conduit should be P100 or multiples of P100;
  - (c) decide on the number of building entry points for telecommunications infrastructure.

**NOTES:**

*1. Larger commercial buildings can have multiple Carriers installing infrastructure to deliver competing telecommunications services to building occupants.*

*2. Multiple building entry points for telecommunications infrastructure means diverse paths for services, resulting in options for redundancy and backup that are valued by building occupants.*

## 6 CONDUIT INSTALLATION

This section outlines the rules for the placement of the Conduit in the ground; interconnection, bending and entry into Pits; and Testing of the Conduit.

### 6.1 Alignments

Conduits must be installed within the designated Telecommunications Alignment, as established by all of the following that exist:

- (a) Any level of Government i.e. Federal, State, Territory or Local;
- (b) Street Opening Conference/ Bodies;
- (c) Any Shared Trenching Agreement to which the Carrier intended to take over ownership of the Conduit is a signatory;
- (d) A Shared Trenching Agreement arranged and negotiated by the Developer with the appropriate utilities.
- (e) Communications Alliance Telecommunications in Road Reserves - Operational Guidelines for Installations (G591).

### 6.2 Depth of Cover

- 6.2.1 The depth of cover must meet the requirements in Communications Alliance External Communication Cable Networks Code (C524);

**NOTES:**

- 1. *Depth of cover requirements may vary, for example:*
  - (a) *from 1000 mm to 1200 mm below the roadway surface for a state or territory road;*
  - (b) *a minimum of 450 mm for a local road reserve; and*
  - (c) *a minimum of 300 mm within private property; and*
  - (d) *other dimensions based on local conditions and authorities.*
- 2. *Refer to section 6.4.3 in C524 for more information.*

- 6.2.2 The depth of cover should take into consideration requirements in:
  - (a) State or Territory government documents (if any); and
  - (b) Local government documents (if any).
- 6.2.3 Depth of cover from finished ground level for Street Conduit between Pits should be either:
  - (a) Less than or equal to 1m in the street verge;
  - (b) A depth to avoid conflict with other service utilities e.g. to meet the requirements of a relevant road authority for a street crossing, boring under drains; or

- (c) A depth to avoid existing natural structures e.g. watercourses.

### 6.3 Clearance from Other Carriers and Services

Clearance from other Carriers and utility services must meet the requirements in C524.

**NOTES:**

1. A Developer should check the clearance requirements with other utilities, particularly where there is a 'shared trench agreement' for the Real Estate Development Project.
2. Refer to section 6.4.4. and Table 4 in C524 for more information.

### 6.4 Trenching and Backfill

6.4.1 Conduits are to be installed into trenches, preferably shared, with appropriate bedding and backfill that complies with the minimum standards set out in:

- (a) section 6 of C524 External Communication Cable Networks where the Developer or its agent must facilitate meeting the obligations on "The Carrier"; and
- (b) Section 5 of AS/NZS 2032 Installation of PVC Pipe Systems.

**NOTE:** C524 is written to describe Carrier actions and responsibilities. A Carrier usually takes on responsibility for an asset (a) after transfer of the asset to that Carrier; or (b) under a nominated Carrier declaration.

6.4.2 Where multiple communications Conduits are placed in a trench the largest diameter communications Conduits should be positioned at the bottom of the Conduit grouping (also known as a "nest").

### 6.5 Conduit Joints

- 6.5.1 Conduit Joints for PVC Pipes are to be made using 'coupler' or 'socket and spigot' bound with solvent cement.
- 6.5.2 Conduit joints shall be water tight and installed in accordance with the manufacturer's instructions.

### 6.6 Conduit Bends

- 6.6.1 All Bends must be prefabricated when the curvature of a Conduit is less than specified in AS/NZS 3084.
- 6.6.2 All Bends must be of the same material as the Conduit to which they connect.
- 6.6.3 Where the Alignment between Pits has a uniform requirement for depth of cover then no more than two ninety degree (or



equivalent) Bends shall be installed in the Conduit between the Pits.

**NOTES:**

1. A road crossing typically requires additional depth of cover and therefore the Conduit would need additional Bends (e.g. of 22.5 degrees) to facilitate this.
2. While clause 6.6.3 sets a limit on the number of Bends in use between Pits, in practice Curves are sometimes used in road crossings to change depth.

6.6.4 All Curve radii must be not less than the minimum specified in Table 3.

6.6.5 Where a Bend greater than or equal to ninety degrees is installed then refer to clauses 4.9.2 and 4.9.3 for Pit installation requirements.

**TABLE 3**

**Minimum Curve and Bend Radii**

Conduit Size	Minimum Curve / Bend radius (see Notes)		
	Long run (mm) no preformed Bends	Long run (mm) using preformed Bends	Short run (mm) using preformed Bends
P100	13,000	5,000	800
P50	6,500	800	300
P20	2,600	Not applicable	300

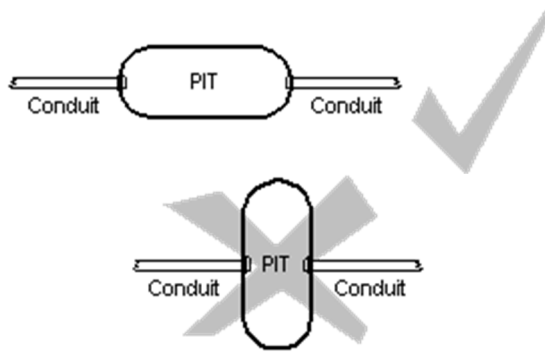
**NOTES:**

1. The long run Bend radius with manufactured or preformed Bends (also referred to as cold form Bends) is typically in multiples of 22.5 degrees for P100 Conduit.
2. The long run Curve radius with no manufactured or preformed may be used on all Conduit runs, including trunk runs e.g. where there is greater than 100m between Pits.
3. A larger Curve radius is required on long runs because there is typically more cable mass to haul through a Conduit.
4. The short run Bend radius may be used on road crossings and Starter Conduit.
5. The short run Bend radius is not to be used on Express Conduit routes.
6. The short run Bend radius should only be used in close proximity to a Pit or opening of a Pipe (e.g. turning up a building wall).

7. Elbows (i.e. a sharp ninety degree change of direction) must not be used.

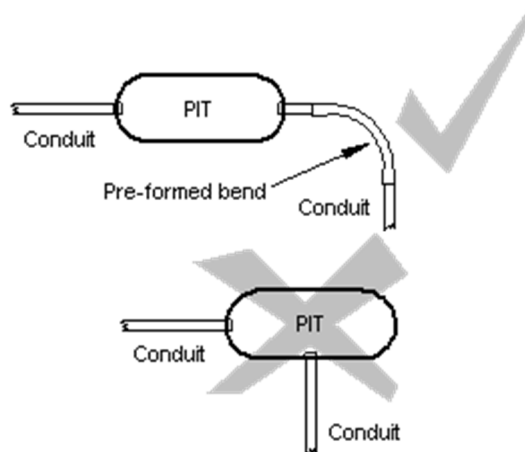
## 6.7 Pit Entry

6.7.1 Conduits shall only enter a Pit at the narrow ends i.e. those faces of the Pit with the least surface area. Refer to Figures 15 and 16 for an illustration.



**FIGURE 15**

### Conduit Entry At Pit Ends – Part 1



**FIGURE 16**

### Conduit Entry At Pit Ends – Part 2

6.7.2 Holes in plastic Pits for Conduits shall be cut with the correct size hole saw to ensure a tight fit for bushes.

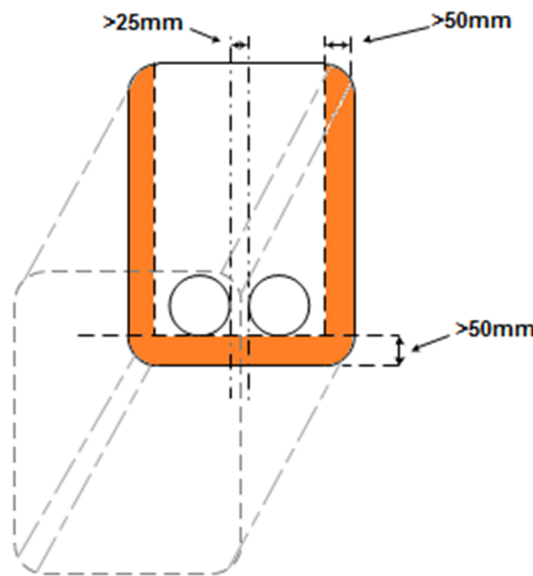
6.7.3 The nearest edge of Conduits shall enter a Pit no less than 50mm from:

- (a) the bottom of the Pit; or
- (b) the side wall of the Pit;

measured from the inside of the Pit to the nearest point on the hole that has been cut.

Refer to Figure 17 for an illustration.

6.7.4 A minimum of 25mm separation must be kept between Conduits in any direction, measured from the outer wall of each Conduit. Refer to Figure 17 for an illustration.



**FIGURE 17**

**Sketch Of Pit Showing Minimum Conduit Entry Spacings**

- 6.7.5 Additional separation between Conduits to that in clause 6.7.4 may be required to accommodate the flange on Pipe bushes.
- 6.7.6 Conduit entries in opposite ends of Pits should align as closely as possible to allow continuous and unrestricted pull through of cable.
- 6.7.7 When entering Pits, Conduits must be cut flush with the end of the Pit.
- 6.7.8 Where a single Conduit enters a Pit end the Conduit should be installed in the centre of the Pit wall.
- 6.7.9 Each Conduit entering a Pit shall be fitted with a bush.

- 6.7.10 Each bush fitted on a Conduit entering a Pit shall be:
- (a) installed flush with the inside wall of the Pit; and
  - (b) adhered to the Conduit.
- 6.7.11 The interface between a Pit and a bush should:
- (a) minimise water ingress and the entry of soil, silt, insects and vermin into the Pit; and
  - (b) provide a smooth entry for cable hauling.

## 6.8 Conduit Sealing

- 6.8.1 Starter Conduit shall be sealed at both ends.

**NOTES:**

1. This is to minimise ingress and build-up of water or debris prior to fibre or cable installation.
2. It is good practice to seal Starter Conduit for downhill runs after the installation of an Optical Fibre Line (e.g. to minimise silt build up and water entry to the premises).

- 6.8.2 Starter Conduit shall be sealed with removable, reusable plugs.
- 6.8.3 Where there is underground reticulation of gas within a Real Estate Development Project and the installation of Street Conduit will not have a fibre hauled through it as part of the installation process then the Street Conduit should be sealed at both ends.

*NOTE: This is to reduce the risk of gas transfer from a gas leak prior to fibre installation. After fibre installation it is the responsibility of the Carrier or owner of the Pit and Pipe infrastructure to decide on sealing of Conduits in the presence of gas services. Some Carriers may prefer to seal all Conduits regardless of other services.*

## 6.9 Road Crossings

- 6.9.1 Conduit in a road crossing shall be locatable e.g. through the use of permanent marking on kerb on both sides of a road.
- 6.9.2 The use of non pre-fabricated Curves may assist in a change of depth of cover for road crossing.

## 6.10 Testing

- 6.10.1 Prior to any handover of ownership of Conduit every Conduit larger than P20 must be proved by passing a mandrel of a diameter no less than 80% of the Conduit internal diameter through its entire length.

*NOTE: A mandrel test of P20 Conduit (e.g. Starter Conduit) is not normally required prior to handover of ownership however a draw cord must be installed as per clause 6.10.3.*

- 6.10.2 Where the mandrel does not pass easily, corrective action must be undertaken, and the mandrel test redone. Results should be recorded on, or with 'as built plans' to meet the requirements of third party certification.
- 6.10.3 A draw cord suitable for use as a hauling aid (e.g. made from polypropylene or equivalent rot-proof material) must be installed in the Conduit.

**NOTES:**

1. A hauling aid (used to install a hauling rope) is not the same as a hauling rope (which is used to haul cable or optical fibre through Conduit).
2. A hauling aid, as typically used in Street Conduit, should have a minimum of both:
  - (a) a 6 - 6.5mm diameter; and
  - (b) a rated 595kg break force or equivalent.
3. A draw cord, as typically used in Starter Conduit and Lead-In Conduit, should:
  - (a) be suitable for hauling; and
  - (b) have a minimum of both:
    - (i) a 3mm diameter; and
    - (ii) a rated 90kg break force or equivalent.
4. Refer to Section 4.4 for requirements on Starter Conduit.

## 7 PIT INSTALLATION

This section outlines the rules of placing Pits in-ground and the orientation with respect to Conduits, roadways and allotments.

### 7.1 Manufacturer Requirements

- 7.1.1 The Pit shall be installed in line with the manufacturer requirements for load class governed by clause 8.2.1.
- 7.1.2 The Pit shall be installed in line with the manufacturer requirements for soil type.

**NOTES:**

1. *in the absence of manufacturer guidelines, refer to section 7.2 for guidance on bedding and backfill for Pits.*

2. *When installed, the Pit shall be able to withstand the required service load (refer to clause 8.2.1) both centrally on the cover and on the surrounding compacted backfill, without subsidence or distortion of the Pit, including the Pit wall.*

### 7.2 Bedding and Backfill

- 7.2.1 Bedding for the Pit shall be a layer of sand or fine crushed rock of an appropriate type approximately 100mm thick.
- 7.2.2 The level of the foundation shall bring the top of the Pit level with and conforming to the:
  - (a) surrounding pavement or surface; or
  - (b) proposed final ground level.
- 7.2.3 Backfill material shall be sand, stabilised sand, fine crushed rock or equivalent.
- 7.2.4 Backfill material shall not contain contaminants, debris, vegetation or waste.
- 7.2.5 Pits must not be distorted by the backfill process.

**NOTE:** *Plastic Pits can deform with compaction of soil by mechanical rammers or vehicle wheels.*

- 7.2.6 All backfilling should be compacted by hand held rammers in layers not exceeding 150mm in thickness to minimise the risk of subsidence.
- 7.2.7 In grassed areas:
  - (a) backfill material shall stop within 50mm of the finished surface level; and

- (b) a suitable top dressing shall be used to complete the reinstatement to the finished surface level.

7.2.8 Compaction should be taken to the full height of the backfill material.

7.2.9 Where the slope of the ground does not exceed 1 in 8 the Pit shall be installed so that the top of the Pit:

- (a) is flush with the ground level or pavement; and
- (b) conforms to the general slope of the ground level or pavement on all sides.

**NOTES:**

*1. Use compact soil in compliance with this specification, otherwise Pits may buckle as soil subsides. If Pits buckle, Pit lids no longer fit.*

*2. Where a concrete collar surrounds the upper rim of the Pit, it is important that the finished level around the collar and upper rim does not create a trip hazard.*

7.2.10 Where the slope of the ground exceeds 1 in 8 the ground should be cut and filled to create a level area for Pit installation.

7.2.11 Pits should:

- (a) conform to the surrounding slope and ground level when reinstating;
- (b) be the correct size and type for the intended use; and
- (c) be installed consistent with clauses 4.9.2 and 4.9.3 where a Conduit changes direction by greater than or equal to ninety degrees.

### **7.3 Orientation**

7.3.1 Pits shall be placed in line with the Conduit they connect with.

7.3.2 Pits located in a verge shall be oriented such that the long side of the Pit is parallel to the:

- (a) allotment boundary; or
- (b) road.

**NOTES:**

*1. Refer to clauses 4.9.10 and 4.9.19 for more information.*

*2. Pits located in private property should be positioned with the long side generally parallel to driveways, pathways, building wall,*

*fence lines, kerb, garden edging or other adjacent 'landscape features' to provide a neat aesthetically pleasing arrangement.*



## 8 MATERIALS

This section outlines the minimum standard of materials to be used.

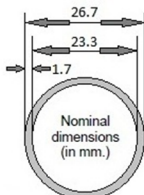
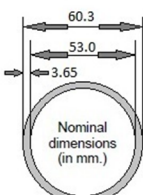
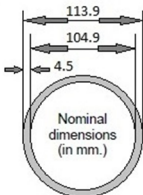
### 8.1 Conduit

- 8.1.1 Conduit material must meet the minimum requirements of:
- (a) C524 External Communication Cable Networks;
  - (b) AS/CA S008 Requirements for Customer Cabling; and
  - (c) AS/NZS 1477 PVC Pipes and fittings for pressure applications.

*NOTE: In special cases that may require the use of polyethylene Pipe a Developer should consult with the Carrier for specific requirements.*

- 8.1.2 Conduit wall thickness for P100 shall conform to AS/NZS 1477 Table 4.2(A) under PN9 nominal sizes DN of 100mm.
- 8.1.3 Conduit wall thickness for P20 and P50 shall conform to AS/NZS 1477 Table 4.2(A) under PN12 nominal sizes DN of 20mm and 50mm.

*NOTE: Refer to Figure 18 for more information on nominal dimensions of P20, P50 and P100 Conduit.*

Conduit dimensions White Telecommunications	Nominal Size (Inside Diameter)	Conduit dimensions White Telecommunications	Nominal Size (Inside Diameter)	Conduit dimensions White Telecommunications	Nominal Size (Inside Diameter)
 <p>Nominal dimensions (in mm.)</p>	<p><b>20 mm</b> PN 12 AS/NZS 1477:2006 table 4.2(A)</p>	 <p>Nominal dimensions (in mm.)</p>	<p><b>50 mm</b> PN 12 AS/NZS 477:2006 table 4.2(A)</p>	 <p>Nominal dimensions (in mm.)</p>	<p><b>100 mm</b> PN 9 AS/NZS 1477:2006 table 4.2(A)</p>

**FIGURE 18**

### Nominal Dimensions of P20, P50 and P100 Conduit

- 8.1.4 The Conduit should be white in accordance with AS requirements, including AS 1345.

### 8.2 Pits and Pit Lids

- 8.2.1 A Pit shall be fitted with a lid that:
- (a) at carrier direction or request:
    - (i) does not exceed 25kg; and
    - (ii) meets the requirements for a minimum classification of Class B in Table 3.1 of AS 3996; or

- (b) without carrier direction or request:
  - (iii) does not exceed 38kg; and
  - (iv) meets the requirements in Table 3.1 of AS 3996; and
- (c) is able to be safely removed using a telecommunications industry standard pit key  
(pit key openings should be 38 mm (L) by 16 mm (W)  
(tolerance +2, -0).

*NOTE: The telecommunications industry is moving to a stronger, lighter Pit lid with a maximum weight of 25kg (e.g. made of composite material). This is to:*

- (a) simplify the manual handling and workplace health and safety procedures for installation and maintenance personnel and*
- (b) reduce damage during development construction activities, that would require the Developer to replace damaged lids prior to hand over to the Carrier.*

*Each Carrier will decide the details of its respective implementation timeframe.*

- 8.2.2 For a particular location the selected Pit, or Pit and frame (collar) combination, installed in accordance with manufacturer instructions will withstand the serviceability design load equivalent to the load rating of the Pit lid required by clause 8.2.1, either by:
- (a) the inherent design strength of the assembly (i.e. the Pit and lid combination); or
  - (b) installation with additional support structure to prevent warping under the appropriate serviceability design load classification, for example by fitting it with a factory preformed concrete Pit collar or Pit frame, or surrounding it with reinforced concrete.

**NOTES:**

- 1. This clause does not replace the requirement in clause 4.9.12 about not installing Pits in locations such as driveways, roadways and vehicular access ways.*
- 2. A plastic collar (i.e. a riser) on a Pit would be insufficient to prevent warping under a vehicle load.*
- 3. This is intended to protect against sinkage of the structural elements of a Pit and to reduce the risk that the bearing capacity of the soil type is inadequate to support vertical loads.*

8.2.3 Pit lid dimensions shall conform to the dimensions and tolerance in Table 4.

**TABLE 4**  
**Pit lid dimensions**

Pit Size Number	Pit Lid Dimensions (with tolerance = +0mm, -2mm)		
	Length (mm)	Width (mm)	Depth (mm) Note 2
2	616	245	46
5	648	398	50
6	651	499	50
8	651	499	50
9	651	499	50

**NOTES:**

1. The Pit size number is a common description used by carriers.
2. Depth is measured at the edge of the lid.

- 8.2.4 Pits must have a gasket fitted between Pit body and Pit lid to minimise silt entering the Pit.
- 8.2.5 The cover surface of the Pit lid shall be designed to prevent water absorption/gathering/pooling.
- 8.2.6 Pit lids shall meet the requirements for slip resistance in AS 4586 and Table 3B of HB198 where the classification is:
- (a) for "External Pavements and Ramps";
  - (b) at least P4 or R11 where the slope of the ground is less than 1 in 14; and
  - (c) P5 or R12 where the slope of the ground is equal to or steeper than 1 in 14.

**NOTES:**

1. The nominated test method shall be either:
  - (a) the "Wet Pendulum Test Method" in accordance with Appendix A of AS 4586; or
  - (b) the "Oil - Wet Inclining Platform Test Method" in accordance with Appendix D of AS 4586.
2. Refer to section 7.2 for more information on Pit installation when the slope of the ground is greater than 1 in 8.

### **8.3 Physical Labelling of Material**

- 8.3.1 Conduits should be labelled as required by AS/CA S008.
- 8.3.2 Pits should be labelled as required by AS/CA S008.
- 8.3.3 Pit lids should be labelled as required by AS 3996, Section 1.6 Permanent Marking.
- 8.3.4 Pit lids labelled with a Carrier name should not be installed without express written approval from the Carrier, including agreement that the Carrier will accept ownership of the Pit and Pipe following any required inspection or certification.

## 9 DOCUMENTATION

This section outlines the minimum level of documentation deemed acceptable for transfer of the Pit and Pipe to a Carrier. Carriers may require the information to be prepared in specific drawing formats (i.e. CAD) and/or use of particular symbols for each network element.

### 9.1 As-Built Documentation

- 9.1.1 Where a Developer is responsible for the construction of Pits and Conduits, and prior to the transfer of ownership of the Pits and Conduits from the Developer to the Carrier, the as-built documentation must be prepared by the Developer for hand over to the Carrier at the time of transfer.
- 9.1.2 The as-built documentation must include:
- (a) The location of all allotment and street boundaries;
  - (b) The location of all Pits and Conduits, relative to known fixed assets e.g. allotment boundaries;
  - (c) The sizes of all Pits and Conduits;
  - (d) The depth of cover for Conduits, measured as actual soil or back fill depth and does not include coverings (for example paving);
  - (e) details from any Shared Trench Agreement, including trench cross sections with all services within 2 metres of the installed Pits and/or Conduit; and
  - (f) results of any mandrel testing for each Conduit section.

**NOTES:**

1. A CAD file would typically contain a legend with Pit types and dimensions.
2. Depth of cover is usually part of a shared trench agreement.
3. Refer to Carrier guidelines and/or requirements for the file formats of as-built documentation.
4. Hand drawn updates of the as-built documentation should include a signature and date of signature from the:
  - (a) civils contractor; or
  - (b) Pit and Pipe contractor.

## 10 REFERENCES

Publication	Title
<b>Australian Standards</b>	
AS/CA S008:2010	Requirements for Customer Cabling Products <a href="http://commsalliance.com.au/Documents/all/Standards/s008">http://commsalliance.com.au/Documents/all/Standards/s008</a>
AS/CA S009:2013	Installation requirements for customer cabling (Wiring rules) <a href="http://commsalliance.com.au/Documents/all/Standards/s009">http://commsalliance.com.au/Documents/all/Standards/s009</a>
AS/NZS 1477:2006	PVC Pipes and fittings for pressure applications <a href="http://infostore.saiglobal.com/Store2/Details.aspx?ProductID=358763">http://infostore.saiglobal.com/Store2/Details.aspx?ProductID=358763</a>
AS/NZS 2032:2006	Installation of PVC Pipe Systems <a href="http://infostore.saiglobal.com/store/Details.aspx?ProductID=362775">http://infostore.saiglobal.com/store/Details.aspx?ProductID=362775</a>
AS/NZS 2566.1:1998	Buried flexible pipelines - Structural design <a href="http://infostore.saiglobal.com/store/Details.aspx?productID=365861">http://infostore.saiglobal.com/store/Details.aspx?productID=365861</a>
AS/NZS 3000:2007	Electrical installations (known as the Australian/New Zealand Wiring Rules) <a href="http://infostore.saiglobal.com/store/Details.aspx?ProductID=366926">http://infostore.saiglobal.com/store/Details.aspx?ProductID=366926</a>
AS 1345:1995	Identification of the contents of pipes, conduits and ducts <a href="http://infostore.saiglobal.com/store/details.aspx?ProductID=224345">http://infostore.saiglobal.com/store/details.aspx?ProductID=224345</a>
AS/NZS 3084:2003	Telecommunications installations - Telecommunications pathways and spaces for commercial buildings <a href="http://infostore.saiglobal.com/store/Details.aspx?productID=367215">http://infostore.saiglobal.com/store/Details.aspx?productID=367215</a>
AS/NZS 3835.1:2006	Earth potential rise - Protection of telecommunications network users, personnel and plant - Code of practice <a href="http://infostore.saiglobal.com/store/Details.aspx?ProductID=375170">http://infostore.saiglobal.com/store/Details.aspx?ProductID=375170</a>
AS 3996-2006	Access covers and grates <a href="http://infostore.saiglobal.com/store/Details.aspx?productid=307453">http://infostore.saiglobal.com/store/Details.aspx?productid=307453</a>
AS 4586:2013	Slip resistance classification of new pedestrian surface materials <a href="http://infostore.saiglobal.com/store/Details.aspx?ProductID=1636572">http://infostore.saiglobal.com/store/Details.aspx?ProductID=1636572</a>
AS /NZS 4645.2:2008	Gas distribution networks - Steel pipe systems <a href="http://infostore.saiglobal.com/store/Details.aspx?productID=1089794">http://infostore.saiglobal.com/store/Details.aspx?productID=1089794</a>

AS /NZS 4645.3:2008	Gas distribution networks - Plastics pipe systems <a href="http://infostore.saiglobal.com/store/details.aspx?ProductID=1089795">http://infostore.saiglobal.com/store/details.aspx?ProductID=1089795</a>
AS/NZS 60079.10.1:2009	Explosive atmospheres - Classification of areas - Explosive gas atmospheres <a href="http://infostore.saiglobal.com/store/details.aspx?ProductID=1137925">http://infostore.saiglobal.com/store/details.aspx?ProductID=1137925</a>
HB198:2014	Guide to the specification and testing of slip resistance of pedestrian surfaces <a href="http://infostore.saiglobal.com/store/Details.aspx?ProductID=1730849">http://infostore.saiglobal.com/store/Details.aspx?ProductID=1730849</a>

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**Industry Codes**

C524:2013	External Communication Cable Networks <a href="http://commsalliance.com.au/Documents/all/codes/c524">http://commsalliance.com.au/Documents/all/codes/c524</a>
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**Industry Guidelines**

G591:2006	Telecommunications in Road Reserves - Operational Guidelines for Installations <a href="http://commsalliance.com.au/Documents/all/guidelines/g591">http://commsalliance.com.au/Documents/all/guidelines/g591</a>
Release 1, May 2010	Fibre To The Premises Planning – Express Conduit <a href="http://commsalliance.com.au/Documents/Publications-by-Topic/NBN">http://commsalliance.com.au/Documents/Publications-by-Topic/NBN</a>

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**Legislation**

<i>Telecommunications Act 1997</i> <a href="http://www.comlaw.gov.au/Series/C2004A05145">http://www.comlaw.gov.au/Series/C2004A05145</a>
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## APPENDIX

### A CONDUIT COMBINATIONS AT PIT END

Refer to Table 5 for the maximum allowable combinations of Conduit at one end of a Pit. These combinations do not change with the addition of a collar (i.e. riser).

Any combinations that exceed the content of Table 5 should not be installed without express written approval from the Carrier, including agreement that the Carrier will accept ownership of the Pit and Pipe following any required inspection or certification.

*NOTE: Refer to section 4.8 for more information on maximum allowable combinations of Conduits for a given Pit size.*



**TABLE 5**  
**Conduit combinations at Pit end**

Pit Size	Maximum allowable Conduit combinations at one end of a Pit; including Pit with collar (i.e. riser)		
	P100	P50	P20
2	0	1	2
	0	0	2
5	1	2	0
	1	1	2
	1	0	4
	0	3	0
	0	2	2
	0	1	4
	0	0	4
6	2	0	0
	1	2	0
	1	0	4
	0	4	0
	0	2	2
	0	1	4
	0	0	6
8	4	0	0
	3	2	0
	3	0	4
	2	4	0
	2	2	4
	1	4	4
9	4	0	0
	3	2	0
	3	0	4
	2	4	0
	2	2	4
	1	4	4

## APPENDIX

### B STARTER CONDUIT TERMINATION METHODS

Refer to Table 5 for links to examples of Starter Conduit termination methods.

**TABLE 6**

**Examples of Starter Conduit termination methods**

Company	Document title	URL
nbn™	New Property Developments	<a href="http://www.nbnco.com.au/develop-or-plan-with-the-nbn/new-developments.html">http://www.nbnco.com.au/develop-or-plan-with-the-nbn/new-developments.html</a>
	nbn™ residential preparation and installation guide: SDUs and MDUs	<a href="http://www.nbnco.com.au/content/dam/nbnco/documents/preparation-and-installation-guide-for-sdus-and-mdus.pdf">http://www.nbnco.com.au/content/dam/nbnco/documents/preparation-and-installation-guide-for-sdus-and-mdus.pdf</a>
	Builders and designers – Design guidelines	<a href="http://www.nbnco.com.au/content/dam/nbnco/documents/preparation-and-installation-guide-for-sdus-and-mdus.pdf">http://www.nbnco.com.au/content/dam/nbnco/documents/preparation-and-installation-guide-for-sdus-and-mdus.pdf</a> and <a href="http://www.nbnco.com.au/content/dam/nbnco/documents/new-developments-mdu-building-design-requirements.pdf">http://www.nbnco.com.au/content/dam/nbnco/documents/new-developments-mdu-building-design-requirements.pdf</a>
	Pit and pipe design guidelines	<a href="http://www.nbnco.com.au/develop-or-plan-with-the-nbn/new-developments/design-build-install/pit-and-pipe-build-process.html">http://www.nbnco.com.au/develop-or-plan-with-the-nbn/new-developments/design-build-install/pit-and-pipe-build-process.html</a>
OptiComm	Cable Entry Guide	<a href="https://www.opticomm.net.au/support/documents/">https://www.opticomm.net.au/support/documents/</a>
Telstra Smart Community	Cabling of New Homes for Telstra FTTP	<a href="https://www.telstra.com.au/smart-community">https://www.telstra.com.au/smart-community</a>

## **PARTICIPANTS**

The Working Committee that developed the Guideline consisted of the following organisations and their representatives:

<b>Organisation</b>	<b>Membership</b>	<b>Representative</b>
nbn	Voting	Haydn Dale
nbn	Non-Voting	Sam Dawe
nbn	Non-Voting	Dave Newland
Individual	Voting	Chris McKeachie
OptiComm	Voting	Phil Smith
Telstra	Voting	Craig Hedges
Telstra	Non-Voting	Herc Paoli

James Duck of Communications Alliance chaired this Working Committee and provided project management support.

Communications Alliance was formed in 2006 to provide a unified voice for the Australian communications industry and to lead it into the next generation of converging networks, technologies and services.

In pursuing its goals, Communications Alliance offers a forum for the industry to make coherent and constructive contributions to policy development and debate.

Communications Alliance seeks to facilitate open, effective and ethical competition between service providers while ensuring efficient, safe operation of networks, the provision of innovative services and the enhancement of consumer outcomes.

It is committed to the achievement of the policy objective of the *Telecommunications Act 1997* - the greatest practicable use of industry self-regulation without imposing undue financial and administrative burdens on industry.



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**Level 12  
75 Miller Street  
North Sydney  
NSW 2060 Australia**

**Correspondence  
PO Box 444  
Milsons Point  
NSW 1565**

**T 61 2 9959 9111  
F 61 2 9954 6136  
TTY 61 2 9923 1911  
E [info@commsalliance.com.au](mailto:info@commsalliance.com.au)  
[www.commsalliance.com.au](http://www.commsalliance.com.au)  
ABN 56 078 026 507**

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