Standards Definition for the Installation of Structured Cabling Systems

Flinders University
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<th>Revision</th>
<th>Date</th>
<th>Author(s)</th>
<th>Remarks</th>
<th>Reviewed By:</th>
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<td>1.0</td>
<td>October 2002</td>
<td>Gary Gilbert RCDD Anixter Australia</td>
<td>Base document</td>
<td>Steve Cox</td>
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<td>Gary Gilbert RCDD Anixter Australia</td>
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<td>Wayne Jones - Infrastructure Manager</td>
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<td>Wayne Jones - Infrastructure Manager</td>
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<td>6.0</td>
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<td>Gary Gilbert RCDD SYSTIMAX Solutions</td>
<td>OHS policy and Supplementary requirements are now found on Flinders web site. The wiring configuration for all new installations will use 568B. The A, B &amp; C installs changed to reflect less than 144 outlets will use the RJ45 design and more than 144 outlets to use the VisiPatch Cross connect design.</td>
<td>Wayne Jones - Infrastructure Manager</td>
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<td>7.0</td>
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<td>Gary Gilbert RCDD CommScope</td>
<td>Amendment and update to document, Introduced pre terminated fibre in 3.4.3 and 6.2.1.2</td>
<td>Wayne Jones - Operations Manager Simon Diss - Project Manager Phillip Rump - Project Manager John Sweeney - Project Manager</td>
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<td>Wayne Jones - Operations Manager Digital Media Services</td>
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<td>9.0</td>
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<td>Gary Gilbert RCDD CommScope</td>
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<td>Wayne Jones - Operations Manager Digital Media Services</td>
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<td>RCDD</td>
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<td>Gary Gilbert CommScope</td>
<td>RCDD</td>
<td>Updated 1.1. Includes all extra low voltage services including access control and BAS services. Updated web address in Appendix 9. Added equipment cords 1.8. Updated 1.1.4 with outlet location record 2.5 added BAS applications that cable must support. 2.5.4 change min temp to -10 degrees. 3.4.1 added consolidation points and closed racks for 3.4.2. Changed 4.7.1.d to utilize Unistrut frame as a backboard. Added Appendix C for examples of records that must be maintained within each FD. Added Appendix D for new fibre installations to comply with AIM</td>
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<td>Gary Gilbert CommScope</td>
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<td>13</td>
<td>March 2016</td>
<td>Networks Team (Cameron Maher, John Sweeney, Russ Nagel, Con Borg)</td>
<td></td>
<td>Major changes around the removal and stipulation of having to use Systimax/CommScope branded cabling. Updated terminology to reflect our environment.</td>
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</table>
# TABLE OF CONTENTS

1. DOCUMENT SUMMARY .......................................................................................................................................................... 6
   1.1. INTRODUCTION........................................................................................................................................................................ 6
   1.2. GENERAL.................................................................................................................................................................................. 6
   1.3. WORK AREA ............................................................................................................................................................................. 6
   1.4. HORIZONTAL DISTRIBUTION .................................................................................................................................................. 6
   1.5. COMMUNICATION ROOMS ......................................................................................................................................................... 7
   1.6. CABLE MANAGEMENT ................................................................................................................................................................. 8
   1.7. CABINETS .................................................................................................................................................................................. 8
   1.8. EQUIPMENT CABLES ................................................................................................................................................................. 8
   1.9. PATCH CORDS & FLY LEADS .................................................................................................................................................... 9
   1.10. BACKBONE CABLELING (ANALOGUE SERVICES) ................................................................................................................... 9
   1.11. OPTICAL FIBRE CABLELING .................................................................................................................................................. 9
   1.12. LABELLING .............................................................................................................................................................................. 9
   1.13. TESTING – COPPER ................................................................................................................................................................. 10
   1.14. TESTING – OPTICAL FIBRE .................................................................................................................................................. 10
   1.15. DOCUMENTATION .............................................................................................................................................................. 10

2. INTRODUCTION ...................................................................................................................................................................... 11
   2.1. GENERAL.................................................................................................................................................................................. 11
   2.2. USE OF DOCUMENTS ............................................................................................................................................................... 11
   2.3. DESCRIPTION OF SYSTEM ...................................................................................................................................................... 11
   2.4. TYPES OF USE ............................................................................................................................................................................. 11
   2.5. CONFORMITY WITH STANDARDS ............................................................................................................................................ 11
   2.6. ACCEPTABLE CABLELING SPECIFICATIONS AND SOLUTIONS ................................................................................................. 13
   2.7. AUTHORISED CONTRACTORS .................................................................................................................................................. 13

3. ENVIRONMENTAL SPECIFICATIONS ........................................................................................................................................ 14
   3.1. GENERAL .................................................................................................................................................................................. 14
   3.2. OCCUPATIONAL HEALTH & SAFETY ........................................................................................................................................ 14
   3.3. DETAIL DESIGN VARIATION TO STANDARDS ............................................................................................................................... 14

4. CABLELING INFRASTRUCTURE ............................................................................................................................................... 14
   4.1. CIVIL WORKS ............................................................................................................................................................................. 14
   4.2. CABLE INSTALLATION (OUTDOOR) ........................................................................................................................................... 15
   4.3. COMMUNICATIONS PITS ........................................................................................................................................................... 15
   4.4. MECHANICAL PROTECTION FOR CABLE ..................................................................................................................................... 15
   4.5. CABLELING .............................................................................................................................................................................. 18
   4.6. OUTLETS .................................................................................................................................................................................... 20
   4.7. COMMUNICATION FRAMES (COPPER) ....................................................................................................................................... 21
   4.8. LABELLING CONVENTIONS ...................................................................................................................................................... 23
   4.9. PATCHING METHODOLOGY ........................................................................................................................................................ 23
   4.10. CABLE RECORDS MANAGEMENT SYSTEM ................................................................................................................................ 24
   4.11. EARTHING ............................................................................................................................................................................... 24
   4.12. IDENTIFICATION CONVENTIONS .......................................................................................................................................... 24

5. MATERIALS ........................................................................................................................................................................... 26
   5.1. COPPER CABLES ....................................................................................................................................................................... 26
   5.2. OPTICAL FIBRE CABLES ............................................................................................................................................................ 26
   5.3. COMMUNICATIONS CABINETs .................................................................................................................................................. 27

6. QUALITY OF WORKMANSHIP ........................................................................................................................................... 29
   6.1. COMPLIANCE WITH STANDARDS ........................................................................................................................................ 29
   6.2. INSPECTIONS .......................................................................................................................................................................... 29
   6.3. CERTIFICATION ...................................................................................................................................................................... 29
1. Document Summary

1.1. Introduction

1.1.1. This Standards Document defines the minimum technical and functional parameters to be met by the Structured Cabling System in order to meet the communication requirements of FLINDERS UNIVERSITY.

1.1.2. This section shall be used as a quick reference for any person that is required to recommend, scope, design, install, terminate, test or certify any structured cabling system within any FLINDERS UNIVERSITY site.

1.1.3. This document describes the installation, termination and testing of Data cabling. The appointed Contractor shall adhere to all requirements of this Standards Document and ensure that all of their employees assigned to this project are made fully aware of their obligations under this Standards Document except where explicitly varied or excluded in supporting documentation for a specific site.

1.1.4. Elements of the horizontal cabling include the horizontal cross-connect (HC), horizontal cable, horizontal connection point (HCP).

1.1.5. This document alone will not provide a definition of a solution or a scope of works.

1.1.6. This document shall be accompanied by a detailed design document that shall provide the scope of requirement for an individual environment.

1.2. General

1.2.1. All cabling installations shall comply with Australian / New Zealand Standards as listed in Table 1-1 in section 2.5.3 Performance Standards.

1.2.2. All cabling shall comply with the current manufactures design and installation guidelines.

1.3. Work Area

1.3.1. Each workstation shall have a minimum of one category Cat6A communication data outlet installed, however AS 3080 recommends a minimum of two outlets per workstation. The contractor shall refer to the detailed design document for site installation requirement for specific site details.

1.3.2. Each outlet shall be installed with the key at the bottom of the jack and the conductors at the top to prevent dust contaminating the conductors. In a high dust environment, shuttered faceplates shall be installed.

1.3.3. All outlets shall be installed and terminated to the T568B wiring scheme.

1.4. Horizontal Distribution

1.4.1. FLINDERS UNIVERSITY require that all cabling be run be in a home run configuration;

1.4.1.1. From building / floor distributor to communication outlet, for horizontal cabling.

1.4.1.2. From building distributor to floor distributor, for backbone cabling.

1.4.2. FLINDERS UNIVERSITY have two Horizontal designs. that can be used as follows:

1.4.3. An RJ45 interconnect design shall be used on new installations Refer diagram on page 25.

1.4.4. Existing installations that use SYSTIMAX VisiPatch 360 or the Cat6 A VisiPatch 360 system which uses reverse patch leads. The contractor shall refer to the detailed
design document for site installation requirement for specific site details.

1.4.5. Vertical cable management is required to be installed on both sides of the full length of all communications cabinets.

1.4.6. All cables shall be run on standards compliant support structures, for example cable tray, Catenary wire or J Hooks. Cables shall not be laid on ceiling tiles or tied to ceiling supports in any way.

1.5. Communication Rooms

1.5.1. Communication rooms (should be designed and sized as per AS 3084). Refer to Appendix B.

1.5.2. The designer should always consider the information in AS3084 and use this as a guide.

1.5.3. Communication closet shall be able to contain communication equipment, cable terminations, and associated cable/wiring.

1.5.4. The communication closet shall be located as close as practicable to the centre of the area served and preferably in the core area. Horizontal pathways shall terminate in the communication closet located on the same floor as the area being served.

1.5.5. Communication closet space shall be dedicated to the communication function and related support facilities. Communication closet space should not be shared with electrical installations other than those for communication.

1.5.6. Equipment or services not related to the support of the communication closet (for example piping, ductwork, etc.) shall not be installed in, pass through, or enter the communication closet.

1.5.7. The preferred minimum size of a floor distributor for Flinders University should be as follows:
1.6. **Cable Management**

1.6.1. Vertical cable management is required to be installed on both sides of the full length of all communications cabinets.

1.6.2. Vertical cable management rings shall be placed at every second, horizontal cable management panel.

1.6.3. Horizontal cable management shall be at least at the rate of 1 single RU cable minder per 24 ports.

1.6.4. Side panels are to be used at the end of rows and provide a trim panel to the wall mounted panels. They secure to the end panel by locking into cut-outs on the side of the back panel and can also be secured to the wall using conventional fixings. The side panels are reversible and can be used at either end of the panels.

1.7. **Cabinets**

1.7.1. Cabinets that are used in public locations shall be of to 760 x 1080 mm construction and lockable.

1.7.2. Refer to section 5.4.2 for cabinet layout.

1.7.3. Vertical rails shall be of 19 “standard and set back 200mm from the front door.

1.7.4. The contractor shall refer to the detailed design document for site installation requirement for specific site details.

1.8. **Equipment Cables**

1.8.1. For existing installations only, equipment leads shall be used with VisiPatch 360 Cross
Connect designs. As a minimum, allow one equipment lead per work area. (RJ45/ unterminated leads).

1.8.2. The contractor shall refer to the detailed design document for site installation requirement for specific site details.

1.9. **Patch Cords & Fly Leads**

1.9.1. All patch cords and fly leads shall match the category and design of the hardware used within the structured cabling system.

1.9.2. The contractor shall refer to the detailed design document for site installation requirement for specific site details.

1.9.3. Minimum quantities of patch leads and fly leads are required for each new project. Patch cords refer to the floor distributor and fly leads refer to the outlet in the horizontal.

1.9.4. One patch cord, one equipment cord and one fly lead per single data outlet

1.9.5. One patch cord, one equipment cord and one fly lead per dual data outlet

1.9.6. Two patch cord, two equipment cord and two fly lead per triple data outlet

1.9.7. The contractor shall refer to the detailed design document for site installation requirement for specific site details.

1.10. **Backbone Cabling (Analogue Services)**

1.10.1. Category 3 cable shall be used to supply analogue services across the backbone cabling system if needed.

1.10.2. The contractor shall refer to the detailed design document for site installation requirement for specific site details.

1.10.3. All backbone cable shall be home run between the BD and FD on each floor. Cable pairs shall be terminated and tested for continuity (wire map).

1.10.4. Refer to detailed design document or scope of works for site requirements.

1.11. **Optical Fibre Cabling**

1.11.1. All optical fibre components shall be of the same manufacture of the new system that has been installed.

1.11.2. All fibre cables shall be terminated with standards compliant LC type connectors, on specific requirement per site.

1.11.3. The use of Hybrid patch cords to accommodate the connection of active equipment is allowed.

1.11.4. All fibre termination shelves shall be labelled with laser radiation warning labels.

1.11.5. All single mode fibre shall be TeraSPEED 8/125 OS 2 compliant fibre.

1.11.6. A minimum of 24-core single mode fibre shall be installed for inter-building backbone cabling.

1.11.7. Refer to the scope of works or detailed design document for specific requirements

1.12. **Labelling**

1.12.1. Each outlet shall be labelled with a unique identifier.

1.12.2. Each outlet shall be labelled All VisiPatch reverse patch leads shall be labelled with a
unique, sequential number on both ends on the front of the VisiPatch connector.

1.12.3. Refer to section 4.9 for details.

1.13. **Testing - Copper**

1.13.1. 100% of installed cables shall be fully tested.

1.13.2. All additions to existing cabling shall exceed the performance specifications of Class E/ Category 6 Permanent Link and Channel.

1.13.3. All new installations shall exceed the performance specifications of Cat 6A Permanent Link and Channel.

1.13.4. Refer to section 6.4 for further details on expected testing requirements.

1.14. **Testing – Optical Fibre**

1.14.1. 100% of installed fibre cores shall be tested.

1.14.2. ILM (Insertion Loss Measurement) shall be performed as a minimum.

1.14.3. Refer to section 6.4 for further details on expected testing requirements.

1.15. **Documentation**

1.15.1. FLINDERS UNIVERSITY expects documentation to be supplied to the IT department prior to hand-over of any structured cabling system.

1.15.2. Please refer to Appendix C of examples of records that must be maintained in each Floor Distributor.

1.15.3. As a minimum one soft copy of test results and point locations shall be supplied per site.

1.15.4. All new WAP points must be added to existing documentation.

1.15.5. It is recommended that each FD shall be supplied with a Horizontal cabling plan view of where the outlets and WAP points are located.

1.15.6. Refer to section 7.1 for Hand-over documentation requirements.
2. Introduction

2.1. General

2.1.1. This Specification Document defines the minimum technical and functional parameters to be met by the Structured Cabling System in order to meet the communication requirements of FLINDERS UNIVERSITY.

2.1.2. This document describes the installation, termination and testing of the structured cabling system. Any appointed Contractor shall adhere to all requirements of this specification document and ensure that all of their employees assigned to perform any installation tasks are made fully aware of their obligations under this document except where explicitly varied or excluded in supporting documentation for this site.

2.2. Use of Documents

2.2.1. The document provides a guideline for the minimum requirements for structured cabling system at all FLINDERS UNIVERSITY sites.

2.2.2. As a foundation document, all works performed must comply with this document unless written authorisation is obtained from FLINDERS UNIVERSITY.

2.2.3. Any works taken out which do not adhere to the guidelines contained in this document will be deemed non-compliant, and will be rectified by the Contractor responsible for the works at the Contractors expense.

2.2.4. Where reference herein is made to the “Project Manager”, this person may be a nominated employee of FLINDERS UNIVERSITY, or a nominated representative.

2.2.5. This specification is to be read in conjunction with the scope of works and sites specific drawings issued.

2.3. Description of System

2.3.1. The structured cabling system shall be comprised of the following subsystems:

2.3.1.1. Building Distributor
2.3.1.2. Backbone Cabling
2.3.1.3. Floor Distributor (Communication Room)
2.3.1.4. Horizontal Cabling.
2.3.1.5. Work Area.
2.3.1.6. Building Entrance.

2.4. Types of Use

2.4.1. The structured cabling system shall be capable of supporting but is not limited to the following services.

2.4.2. For Cat 6 installations all applications from 0 MHz to 250 MHz and as per IEEE applications for the category of cabling used.

2.4.3. For Cat 6A installations all applications from 0 MHz to 500 MHz as per IEEE applications for the category of cabling used.

2.4.4. For Singlemode OS2 fibre optic cables all IEEE applications for the category of cabling used.

2.5. Conformity with Standards
2.5.1. General

2.5.1.1. All works specified in this and related documents shall be implemented and completed in strict compliance with regulations of statutory bodies, and the applicable standards and codes. In general, standards and codes shall be those issued or endorsed by Standards Australia or ISO/IEC. Contractors shall adhere to the current applicable standards at the time of execution.

2.5.1.2. Unless otherwise stated, the equipment and installation standards shall conform in every way to the requirements of the latest issue of appropriate international and local standards (refer; 1.5.3).

2.5.1.3. Local regulatory specifications shall be complied to with due regard to the potential indirect connection of equipment to the Public Switched Telephone Network.

2.5.1.4. Quality Standards

2.5.1.5. The Contractor shall have a quality system in place that conforms to the requirements of ISO 9000 series of quality related standards, or shall provide details of progression toward accreditation to the relevant standard.

2.5.2. Performance Standards

2.5.2.1. Cabling materials, practices, testing equipment and documentation shall comply or exceed the following standards.

2.5.2.2. Local standards shall take precedence at all times, the following standards and reference documents shall be applicable to the structured cabling system, Where the local standard does not cover a given issue, rulings held within the ISO/IEC or TIA/EIA standards shall apply. All standards documentation used shall be the latest issue.

2.5.2.3. The contractor shall have in their possession a copy of all relative standards as a point of reference

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<tr>
<td>A</td>
<td>AS/NZS 3000</td>
<td>SAA Wiring Rules (latest edition)</td>
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<td>C</td>
<td>AS 3084</td>
<td>Communication Installations - Communication Pathways and Spaces for Commercial Buildings</td>
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<td>D</td>
<td>AS/NZS 3085-1</td>
<td>Communication Installations - Administration of Communications Cabling Systems (latest edition)</td>
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<td>TIA/EIA-606-A</td>
<td>Administration Standard for the Communication Infrastructure of Commercial Buildings. (Latest edition)</td>
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<td>AS 3260</td>
<td>Safety of Information Technology Equipment including Electrical Business Equipment. (Latest edition)</td>
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<td>H</td>
<td>AS 3548</td>
<td>Electrical Interference - Limits and Methods of Measurements of Information Technology Equipment. (Latest edition)</td>
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<td>J</td>
<td>AS/NZS 2053</td>
<td>Conduits and fittings for electrical installations. (Latest edition)</td>
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<td>K</td>
<td>AS 3600</td>
<td>Concrete structures. (Latest edition)</td>
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<td>L</td>
<td>AS/NZS 2648</td>
<td>Underground marking tape. (Latest edition)</td>
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2.6. **Acceptable Cabling Specifications and Solutions**

2.6.1. The Structured Cabling System for new installations shall be a Cat6A copper solution utilising an Angled RJ45 Patch panel, unless previously negotiated with Flinders ITS Networks Team.

2.6.2. On existing installations that have additions the performance specifications shall meet or exceed Category Cat 6 Permanent Link and Channel.

2.6.3. On new installations the performance specifications shall meet or exceed Cat6A permanent Link and Channel. Liaise with Flinders Project manager, on which solution will be used.

2.6.4. The contractor and its employees must have as a minimum an ACA Open Cabling Registration to install a structured cabling system.

2.6.5. Any individual contractor or employee, performing termination or testing must be fully certified and have fully completed all training requirements without exception.

2.6.6. The contractor shall submit a copy of certification status and a list of all certified personnel with response as proof of such certification if requested to do so by the Project Manager.

2.7. **Authorised Contractors**

2.7.1. Any contractor that quotes for structured cabling work at any FLINDERS UNIVERSITY location must be able to perform the design, installation, termination, testing and organise the manufacturers certification without the use of subcontractors.
3. Environmental Specifications

This section describes typical environments within any FLINDERS UNIVERSITY site and describes the minimum requirements for that environment.

3.1. General

3.1.1. It may not be appropriate that the structured cabling solution be installed the same way in all areas within FLINDERS UNIVERSITY. Environmental factors will affect the way in which the infrastructure will be installed. Contractors shall adhere to the environmental specification to prolong the life span of the system.

3.1.2. This section is to define typical environments within FLINDERS UNIVERSITY and to define minimum requirements for the installation of infrastructure within these environments.

3.2. Occupational Health & Safety

3.2.1. All Contractors that perform any work must comply with the FUSA OHS&W policy which can be downloaded from www.flinders.edu.au/whs

3.2.2. All Contractors that perform any work shall comply with FLINDERS UNIVERSITY’s SUPPLEMENTARY REQUIREMENTS OF CONTRACTORS – refer Appendix A.

3.3. Detail Design Variation to Standards

3.3.1. These Standards shall apply for all installation activity. Due to specific circumstances for a particular site, the Project Manager may approve in writing acceptable variations.

4. Cabling Infrastructure

This section describes the minimum requirements in terms of quality of workmanship for passive cabling installations.

4.1. Civil Works

4.1.1. Excavation shall be the responsibility of the Contractor unless explicitly specified to the contrary.

4.1.2. The Contractor shall be responsible for all excavation, cable protection, back fill, surface restoration and the installation of cable markers.

4.1.3. All excavation and back fill works shall be carried out with the use of hand tools. The use of mechanical or power-assisted tools shall be permitted only when specifically stated in the contract documents or authorised in writing by the Project Manager.

4.1.4. Before proceeding with any excavation work, the Contractor shall ascertain details of any underground services in the area.

4.1.5. Where excavations are required near footings, foundations, concrete floors etc, the Contractor shall ensure that the earthworks do not interfere with these structures and backfill is well consolidated.

4.1.6. Unless otherwise agreed by the Project Manager, the Contractor shall arrange the installation so that all trenches are excavated and back-filled on the same day.

4.1.7. The Contractor shall ensure that the specified safety precautions are observed at all excavations by the provision of safety barriers, warning notices, shoring, work authority requirements are obtained and any other items as deemed necessary are obtained and provided.
4.1.8. The Contractor shall ensure they comply to Flinders OHS&W policy found at www.finders.edu.au/whs

4.2. **Cable Installation (Outdoor)**

4.2.1. Cables under roadways shall be laid in roadway ducting within approved conduit. These ducts shall project at least 300mm beyond the kerb lines and unless specified otherwise, shall be supplied and installed by the Contractor. The conduits shall be heavy-duty, rigid UPVC or heavy-duty fibrous cement conduit in accordance with AS/NZS 2053.

4.2.2. All conduits shall be laid at a minimum cover depth of 500mm, in a bed of clean sand, with a minimum cover of 75mm above the top of the conduit. The trench shall be back-filled and consolidated to finished ground level.

4.2.3. If communication cable and low voltage electrical cable have to co-exist in the same trench, then a minimum distance between services of 300mm must be maintained while still meeting the requirements of (b) above.

4.2.4. Protection slabs making up the roadway ducting lids shall be pre-cast concrete having a thickness of not less than 40 mm, and a classification of not less than Grade 15 to AS 3600 shall be used unless otherwise specified in the project specification.

4.2.5. A White marker tape complying with, AS 2648.1 shall be laid continuously along the route of the cable approximately 300mm above protection slabs.

4.2.6. All underground cable will be contained within 1 x 100mm or 2 x 80mm conduits minimum. The installation of the conduit and pit system is defined in this document.

4.2.7. The Installation shall comply with the ACMA, (formerly known as AUSTEL) requirements.

4.2.8. All conduits shall be sealed to prevent rodent occupation.

4.3. **Communications Pits**

4.3.1. When required pits shall be installed every 90meters or at every change in direction. The Contractor shall install a pit having adequate dimensions to contain loops of cabling while maintaining the manufacturers, minimum bend radius requirements.

4.3.2. Pits shall be minimum 600mm X 600mm

4.3.3. Each pit shall be provided with a seepage hole cast into the bottom surface to allow the disbursement of any accumulated water.

4.3.4. Pits shall be provided with trafficable lids.

4.3.5. Pit lids should be capable of being locked to prevent unauthorised entry. Entry points shall be sealed to prevent rodent occupation.

4.3.6. All pit installation shall comply in full to the manufactures installation guide lines.

4.3.7. A minimum of 1m coil of slack shall in left in each pit.

4.3.8. Refer to detailed design.

4.4. **Mechanical Protection for Cable**

4.4.1. Guidelines for use

4.4.1.1. In addition to any general requirements specified in the Detail Design, the Contractor shall supply and install approved mechanical protection for all equipment and wiring that meets the following criteria:
4.4.1.2. Mounted within 1400mm above an operating floor or access platform.
4.4.1.3. Subject to damage during normal plant operation and maintenance.
4.4.1.4. On which scaffolding and planks may be used for means of access for abnormal plant maintenance, and as directed by the Project Manager.

4.4.2. Pathways for Cable Tray and Conduits
4.4.2.1. Cable Trays and Conduits that are installed in corridors shall be installed on either the Southern side or Western side of the corridor and below power trays. Refer to FLINDERS UNIVERSITY project manager for details. (this is to help minimise installation interference from other services i.e. air-conditioning etc.)

4.4.3. Conduits
4.4.3.1. Intermediate wiring joints are not permitted in conduit or wiring ducts.
4.4.3.2. Inspection tees, elbows and bends are permitted with approval by the Project Manager.
4.4.3.3. All conduit ends shall be reamed or filed free of burrs and conduit threads entering junction boxes or fittings shall be at least 10mm long.
4.4.3.4. Any conduit cast in-slab should protrude the surface of the slab a minimum 100mm, and located as close as practical to sidewalls, and exit the slab perpendicular to the surface.
4.4.3.5. Draw wire shall be provided in all conduits.
4.4.3.6. At least 40% of conduit capacity must remain after the initial installation is complete.
4.4.3.7. Consideration should be given to the upgrade requirements of the particular site before selecting the required numbers of conduit. The requirements shall be specified in the Detail Design document. Pull boxes shall be installed along conduit and ducting routes where there is a change in direction and at distances not exceeding 12 metres between pull boxes.

4.4.4. Cable Tray
4.4.4.1. Cable trays shall be of a size suitable for the volume of cable at any given location within the structured cabling system. This may necessitate the use of varying width cable tray within the system. All cable tray shall be a minimum of 1 mm thick with rolled or folded sides. All bends, tees and joining pieces, covers and cable retainers shall be factory manufactured. All trays shall be hot dipped galvanised, fittings and accessories will be of the same manufacturer.
4.4.4.2. All cable tray installation shall follow without exception the manufactures guidelines. Floor and vertically mounted trays shall only use Uni-Strut supporting mounts.
4.4.4.3. Where cable trays are exposed or liable to mechanical damage they shall be protected.
4.4.4.4. All cable tray installed in an outdoor environment is to be mounted vertically to prevent the build up of dirt. In cases where this is not practical and as approved by the Project Manager, tray may be installed horizontally with a peaked 45° cover.
4.4.4.5. Any cable tray that is located in an exposed location shall be enclosed unless agreed by the Project Manager. This enclosure will be determined on-site to its functionality and as such may be removable for access. The materials used for this enclosure will be made of steel and should this be removable, handles will be provided. The structure to support this enclosure can be made from metal framing and will be installed in an approved and tradesman like manner. All exposed materials shall be painted in accordance with Customers Name requirements.

4.4.4.6. Any metal covers deemed necessary for the installation to comply with segregation standards shall be of the “Peaked” type and shall be secured to the tray in a tradesman like manner. These metal covers shall have retaining chains with a minimum length of 500 mm.

4.4.4.7. All metal cable trays shall be connected to the building protective earth as specified in AS/CA S 009 (latest revision).

4.4.5. Catenaries

4.4.5.1. Catenary wire shall be minimum 3mm plastic covered stranded galvanised steel wire.

4.4.5.2. The in-ceiling cable support structure shall comprise catenary wire suitably anchored and supported to the ceiling slab and tensioned by way of turnbuckles.

4.4.5.3. The use of catenary wire for under-floor cable support is not allowed.

4.4.5.4. Where the cable loading is excessive for catenary wire or saddle type structures, cable tray as defined shall be used, mounted to be compliant with local regulatory specifications.

4.4.5.5. No more than a maximum of 48 UTP cables can be installed per one catenary wire.

4.4.5.6. Where any cables traverse electrical power cables, consideration shall be given to the appropriate regulatory requirements and adequate separation shall be provided.

4.4.5.7. Where cables traverse areas above set plasterboard ceiling (or similar) causing access difficulties, the use of fixed conduit secured to the ceiling slab shall be required. Multiple 100mm conduits are recommended so long as space permits.

4.4.6. Cable Pathway Mechanical Support

4.4.6.1. A combination of Cable Tray and Catenary wire is the preferred method of reticulation.

4.4.6.2. Other pathway products may be submitted for approval providing they comply to all applicable standards, and afford the cable runs the same amount of protection as the afore mentioned products. A sample of alternative products shall be included with any such submission.

4.4.7. Reinstatement of penetrations

4.4.7.1. The Contractor shall effectively seal all openings (made or provided) in or through building walls, floors, etc. after cable reticulation.

4.4.7.2. The Contractor shall effectively fire proof any openings (made or
provided) in or through building walls, floors, etc. with approved fire retardant materials where such sealing is deemed necessary.

4.4.7.3. The contractor must adhere to FLINDERS UNIVERSITY schedule and timeframes.

4.4.7.4. Before making a penetration through a beam or floor, liaise with Flinders University Project Manager to arrange an Engineer’s report before coring of floors or beams. Engineers will specify hole size and spacing.

4.4.7.5. The Contractor shall effectively seal all cable duct openings above ground level, and all cable entries into trenches in buildings to prevent the ingress of moisture and the entry of rodents.

4.4.7.6. The Contractor shall ensure that all spare conduit and cable entries into equipment are effectively plugged and sealed to prevent the ingress of moisture, dust, rodents and insects.

4.4.7.7. The Contractor shall ensure that all openings through roofs and external walls are made weatherproof including the installation of flashing and/or rain hoods to prevent the entry of driving rain, seepage, etc.

4.4.8. Painting and Corrosion Protection

4.4.8.1. The Contractor shall be responsible for corrosion protection and the painting treatment of all brackets, supports, cable ladders, weather shields, etc. being supplied and/or installed by the Contractor. The Contractor shall also be responsible for the restoration to the supplier’s finish (or approved matching equivalent) on any damaged paintwork to equipment and accessories.

4.4.8.2. Other painting and corrosion protection shall be in accordance with the main painting specification for the particular area.

4.4.8.3. Where no special painting procedure is specified, all metal surfaces shall be wire brushed (or equivalent) to remove all traces of rust, scale, grease, etc. and prime coated with one coat of an approved rust inhibiting paint. The finishing coats, including colour and type of paint, shall be advised by the Project Manager.

4.5. Cabling

4.5.1. General

4.5.1.1. Cables shall not be installed under residual tension or pressure except as required to secure to cable tray or catenary cable.

4.5.1.2. All cable runs shall be continuous between the termination points specified. No joints, splices, junctions, or similar are permitted. All UTP cabling terminations, jumpering, and/or patching shall be at the cross connect or interconnect distribution frames.

4.5.1.3. In addition to any general requirements covered under these specifications, the need exists to maintain the separation distances from power cables specified in AS/NZS 3080 and AS/CA S009. Cable pathways that do not meet these criteria shall not be used.

4.5.1.4. The distances referenced in 4.5.1 – clause (c) may need to be extended as per AS/NZS 2834 computer accommodation 3.4.4 in cases of induced interference. If any doubt exists then the greater separation requirement
shall apply.

4.5.1.5. All cables shall be installed in accordance with the minimum bending radii specified by the manufacture for that specific cable type and size.

4.5.1.6. All mechanical protection and cable supports shall be free of burrs and sharp edges. Additional bushing, sleeving, etc. shall be provided as required to ensure adequate bending radii and to prevent cable damage.

4.5.2. Allowance for Spare Cable Length - Copper

4.5.2.1. Due to the constraints of Cat 6A excess length in 4pair cables shall be kept to a minimum.

4.5.2.2. Slack retention at termination points shall be restricted to the amount of cable required for re-termination (less than 1 meter). The storage of cable shall comply to the minimum bend radius for that cable type as per manufactures specifications.

4.5.2.3. Slack cable shall only be allowed in skirting duct if minimum bend radius can be achieved.

4.5.3. Allowance for Spare Cable Length – Optical Fibre

4.5.3.1. To provide an allowance for fibre cable re-termination at some future time, provision is to be made for additional five 5 metres of cable to be looped at each end of each cable run. This spare cable shall be provided within the communications cabinet tray.

4.5.3.2. Cable looping shall not exceed the manufacturer’s minimum bending radius requirements.

4.5.3.3. A minimum of a 1m loop to be left in all external pits.

4.5.4. Cable Running Internal

4.5.4.1. All cables installed shall be supported via an approved cable support system.

4.5.4.2. Where cables are run through steel noggins or studs, appropriate grommet’s shall be provided to protect the cables. Cable entry into a wall cavity shall be directly above or below the physical location of the information outlet location. The cable entry hole into the cavity should be sufficient to permit free running of all cables and a minimum of 20% spare capacity for additional cable.

4.5.4.3. Cables reticulated via skirting duct shall be run in the Communications duct. Cable within the confines of skirting duct shall not be cable tied under any circumstances.

4.5.4.4. Where cables exit from skirting ducts and enter into workstation furniture, flexible conduit shall be used to reticulate cables and to afford protection.

4.5.4.5. Cables reticulated via workstation duct shall be run via the appropriate duct. Separation from workstation power shall comply with TS009.

4.5.4.6. Cables shall be fixed with cable ties they may be either Nylon or Velcro dependant on location. In all cases manufactures installation guidelines are to be followed.

4.5.4.7. The use of cable tray or cable basket with 100mm sides may be considered. In such cases cables reticulated via a Communication cable tray of this design may be left, loose (i.e. not cable tied) securing shall be required at all 90 degree
bends and where cable exits the tray.

4.6. Outlets

4.6.1. All Communication Outlets shall be Cat6 A; 8-position 8; pin RJ45.

4.6.2. All outlets shall be installed and terminated to the T568B wiring scheme. Refer to figure 1-2 below.

![T568B Wiring Scheme](image)

**Figure 1-2: T568B Wiring Scheme**

4.6.3. All flush mounting outlets shall be mounted on site approved faceplates suitable for flush mounting in standard wall boxes, skirting ducts in modular partition systems and similar. The Contractor prior to supply shall submit Sockets/connectors and mounting hardware to be used as a sample for approval. Mounting shall be arranged to minimise the risk of damage during removal and replacement of skirting ducts covers or other associated hardware.

4.6.4. Where specifically required due to the construction of a building, surface mount blocks shall be used instead of flush mount outlets.

4.6.5. Outlets shall be firmly attached to a permanent structure. Fixing to loose skirting duct covers is not acceptable.

4.6.6. Outlets shall be mounted in site-approved faceplates. Outlets in workstations shall be mounted in plates provided by workstation contractor.

4.6.7. Each faceplate shall be fitted with the appropriate number of RJ-45 outlets. This number will usually be two but may vary at specific locations.

4.6.8. Outlets shall be mounted with the keyway at the bottom and contacts at the top to reduce the risk of contamination with grit and dust.

4.6.9. Cable entry point to the outlets shall be at the bottom.

4.6.10. Faceplates shall be provided in colours that will blend with the chosen decor, or as per the Project Manager requirements. Where outlets are mounted within a faceplate, the faceplate shall be of the same colour and design as the GPO’s.

4.6.11. Outlets shall not be mounted where there is a risk of mechanical damage.

4.6.12. Outlets shall not be mounted where there is a risk of water or moisture ingress.

4.6.13. Generally, outlets shall be mounted at the following standard locations or heights. Specific requirements are detailed on site drawings.
4.6.14. Flush mounted within the skirting duct or wall duct if used. (only use a minimum of 50mm deep duct, this will allow for manufacturers bend requirements i.e. no less than 4 x diameter)

4.6.15. 300 mm above floor level (for walls without skirting ducts)

4.6.16. 100 mm above desk height where access is restricted by furniture

4.6.17. All Communication Outlets shall be flush mounted wherever possible, surface mounting is a last option and shall only be carried out after conformation by FLINDERS UNIVERSITY or their representative.

4.6.18. All outlets to be installed to the manufacturer’s specifications.

4.6.19. Each faceplate shall be fitted with a label. The label shall clearly identify the floor distributor and the outlet number. Each RJ45 jack at the work area shall have a unique identifier. The labels at the floor distributor where the communications outlets terminate shall carry the matching unique identifier.

4.7. Communication Frames (Copper)

4.7.1. The same manufacture shall be used for all copper cabling components.

4.7.2. The new Distribution Frames shall be installed in an orderly and tidy manner. They shall be designed such that progressive moves, adds and changes may be made with a minimum of disruption. Frame layout shall follow exactly the detailed frame layout schematics found in the annex of the scope of works.

4.7.3. All new horizontal installations are required to use Angled RJ45 patch panels unless pre-approved by Flinders IT staff.

4.7.4. On existing installations where a cross connect is used which utilises VisiPatch 360 reverse patching distribution hardware shall be used, wall mounted on a melamine backboard. Refer diagram on page 25.

4.7.5. Cabinet mounted systems shall use Cat 6A Angled RJ45 Patch Panel’s that can be rack mounted and configured as an interconnect direct to the active switch equipment.

4.7.6. Vertical cable management is required to be installed on both sides of the full length of all communications cabinets.

4.7.7. The above option is based on an as per site basis, exact requirements per site are to be found in the scope of works for that site, and apply to that site only.

4.7.8. Side panels are to be used at the end of rows and provide a trim panel to the wall mounted panels. They secure to the end panel by locking into cut-outs on the side of the back panel and can also be secured to the wall using conventional fixings.

4.7.9. The side panels are reversible and can be used at either end of the panels.

4.7.10. A FLINDERS UNIVERSITY delegate prior to the commencement of works shall specifically approve the layout of the distribution frames.

4.7.11. Choice of frame type.

4.7.11.1. Interconnect design shall be used for new communication outlets.

4.7.11.2. Vertical cable management is required to be installed on both sides of
4.7.11.3. Existing Cross Connect design for Communication outlets.

4.7.12. Enclosures for Optical Fibre Equipment

4.7.12.1. Cabinet mounted termination enclosures specifically designed to house optical fibre cable terminations shall be provided at each fibre termination point. This shelf to be used in all situations for large or small installations. This way Flinders University will have spares for future installations.

4.7.12.2. Where such an enclosure is required, the exact position shall be determined
in consultation with FLINDERS UNIVERSITY their Project Manager or representatives prior to any installation taking place.

4.7.12.3. Each termination enclosure shall be arranged to accommodate 48 “LC” connections. (Note that the preferred method of terminating connectors is direct field termination.)

4.7.12.4. A warning notice detailing the hazards associated with optical devices shall be affixed to each termination enclosure in a prominent position.

4.7.12.5. Each unused fibre panel location not fitted with a patch cord shall have a dust cover fitted.

4.7.12.6. All unused patch cords shall be fitted with dust caps and stored to comply with bend radius requirements.

4.7.12.7. All fibre cores shall be terminated and tested at installation, unless otherwise specified in the scope of works.

4.8. Labelling Conventions

4.8.1.1. Patch panels, distribution frames and outlets shall be prominently labelled. Labels shall be printed, not hand written, indicating the nature of the service provided, the identity of the terminated cable or that of the outlet.

4.8.1.2. For existing installations, all VisiPatch 360 reverse patch leads shall be labelled with a unique, sequential number on both ends on the front of the VisiPatch 360 connector.

4.8.1.3. The labelling convention across the whole site shall be uniform. All labelling shall follow the following convention:

- Equipment designation e.g. Switch number followed by a port number
- PABX Port, Trunk or extension number
- Tie Cable Tie to, Tie from including the pair identification

4.8.1.4. Communication outlets Unique floor distributor and ID Unique outlet number

4.8.1.5. All labelling shall comply with AS/NZS 3085.1. All labelling at distribution frames and patch panels shall also be colour coded as per the following table.

<table>
<thead>
<tr>
<th>Colour</th>
<th>Termination Type</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>Active Systems Cables</td>
<td>Run between the distribution frame &amp; active equipment.</td>
</tr>
<tr>
<td>Blue</td>
<td>Horizontal Distribution</td>
<td>Distributed cabling to workstation outlets.</td>
</tr>
<tr>
<td>Purple</td>
<td>Voice Common Equipment</td>
<td>Run between the distribution frame &amp; PABX.</td>
</tr>
<tr>
<td>Brown</td>
<td>Inter-Building Backbone</td>
<td>Backbone cabling run between buildings.</td>
</tr>
<tr>
<td>White</td>
<td>Vertical Backbone</td>
<td>Backbone cabling run between floors.</td>
</tr>
<tr>
<td>Grey</td>
<td>Inter Cabinet Ties</td>
<td>4 pair tie cables for inter cabinet patching</td>
</tr>
<tr>
<td>Yellow</td>
<td>Miscellaneous</td>
<td>AUX., Mains fail, Night alarm or Security type cabling</td>
</tr>
</tbody>
</table>

Table 2-1: Label Colour Coding

4.9. Patching Methodology
4.9.1. Patch cords shall be supplied in different lengths to reduce slack on the frame. The longest cord length shall be sufficient to interconnect the most distant cross-connection points of a distribution frame. Cords shall be installed such that the distribution frame does not become congested with excess lead lengths.

4.9.2. A quantity of spare patch cords of each type and length shall be supplied. The quantities shall be specified in the Detail Design Document.

4.9.3. Patching shall be carried out in accordance with the Structured Cabling System manufacturer’s methodology.

4.9.4. Refer to the scope of works for patch/fly lead quantity’s and lengths.

4.9.5. For existing installations, cross connect designs must utilise an appropriate VisiPatch reverse patch lead.

4.9.5.1. All VisiPatch reverse patch leads shall be labelled with a unique, sequential number on both ends on the front of the reverse patch lead connector.

4.9.6. One patch cord, one equipment cord and one fly lead per single data outlet

4.9.7. One patch cord, one equipment cord and one fly lead per dual data outlet

4.9.8. Two patch cord, two equipment cord and two fly lead per triple data outlet

4.9.9. The contractor shall refer to the detailed design document for site installation requirement for specific site details.

4.9.10. A FLINDERS UNIVERSITY delegate prior to the commencement of works shall specifically approve the patch leads for the distribution frames.

4.10. **Cable Records Management System**

4.10.1. A cable records management system shall be provided as an integral part of the Structured Cable System.

4.10.2. A full record book shall be supplied, as a minimum it shall comply to Appendix D of AS/NZS 3085. One hard copy and one soft copy shall be supplied per site. In addition a record of backbone ties, incoming services and horizontal cabling services shall be included.

4.10.3. The Scope of Works shall include the preparation and entering of all site-specific data into the cable records management system up to the point of practical completion (i.e. initial patching).

4.11. **Earthing**

4.11.1. All distribution frames, cable trays and catenary wires shall be connected to the building protective earth as, specified for each case in AS/CA S 009 (latest revision) or local equivalent, whichever is greater.

4.11.2. Sizing of earthing conductors shall be as per AS/CA S 009 (latest revision), or local equivalent, whichever is greater.

4.12. **Identification Conventions**

4.12.1. The Contractor shall identify all electrical equipment, cables and wiring as detailed below, and in accordance with project drawings.

4.12.2. All backbone cabling shall be clearly identified at both ends.

4.12.3. Where two or more equipment items perform identical function, the system of numbering shall include a unique identifier for each.
4.12.3.1. All numbering shall be configured from Top to Bottom.

4.12.4. All horizontal cable shall be identified at each termination by means of cable markers indicating a:

4.12.4.1. Unique workstation identifier and an associated Building Distributor identifier.

4.12.5. Each cable shall be identified at the time of installation.

4.12.6. Where identification details for nameplates, cable, wire and/or terminal numbers are not shown on project diagrams, wiring diagrams or schedules, etc., the Contractor shall refer to the Project Manager FLINDERS UNIVERSITY for particulars of identification.
5. Materials
This section describes minimum requirements in terms of quality and type of products and equipment used on site.

5.1. Copper Cables
5.1.1. Backbone Cable
5.1.1.1. Cable strength members and sheaths shall be connected to the building protection earth as per AS/CA S009 and AS/NZS 3000.
5.1.1.2. Cable used outdoors shall be outdoors rated and laid in conduit within a trench.
5.1.1.3. The outdoor cable shall be jelly filled to prevent water ingress.
5.1.1.4. The cable used for backbone installation shall be multipair Category 3 UTP cables for analog applications. Multiples of these cables to be used where appropriate, and identified in the specific site Detail Design document.

5.1.2. Horizontal Wiring to Outlets
5.1.2.1. All new installation cabling to outlets shall be Cat6A UTP.

5.1.3. Patch / Fly Leads
5.1.3.1. All data service patch/fly leads shall be RJ45/RJ45 Cat6A of the appropriate length. Existing installations that make use of Visi Patch should be accommodated as necessary.

5.2. Optical Fibre Cables
5.2.1. Outdoor Applications
5.2.1.1. Optical fibre cables shall be clearly marked as such to distinguish them from other cables. Such marking shall include tracer marking on the sheath and/or distinctive sheath colours.
5.2.1.2. Only cables designed and specified as suitable for a given environment shall be used in that environment. For example, any cables that may be exposed to water ingress or moisture condensation shall be specified as outside plant grade cable.
5.2.1.3. The outside plant cable shall be of dielectric construction as it may be required to be installed within close proximity to high voltage power cables.
5.2.1.4. All optical fibre cables shall be Single-mode, step index type with core/cladding diameter of TeraSPEED 8.3/125 \( \mu \text{m} \) fibre.
5.2.1.5. Optical fibre cables shall be clearly marked as such to distinguish them from other cables. Such marking may include tracer marking on the sheath and/or distinctive sheath colours.
5.2.1.6. Only cables that run in a completely water tight environment are to be specified as riser grade cable. Any cables that may be exposed to water ingress or moisture condensation shall be specified as outside grade cable with a moisture barrier.
5.2.1.7. The outside cable shall be installed within a conduit and where applicable the conduit shall be laid within a trench.
5.2.2. Indoor applications

5.2.2.1. Pre-terminated Fibre Trunk Cables, Equipment Cords, Cross-Connect Cords, and Ruggedized Fan outs.

5.2.2.2. All fibre cables shall be terminated with the High Density, Pre Terminated, modular Fibre Patching system. Utilising either single mode or multimode with LC type connectors as appropriate. All fibre termination shelves shall be labelled with laser radiation warning labels.

5.2.2.3. Where high fibre counts exist, for example the BD, the use of 72 or 144 capable fibre termination shelves is to be considered and priced as an option.

5.2.2.4. All cable used within the system shall be generally round in construction with the exception of 24-fibre, which shall be side-by-side 12-fibre subunits with a secondary jacket. Cables may not contain any splices of any kind.

5.2.2.5. The system shall allow for the same trunk cable to be utilized for both duplex and full-parallel applications.

5.2.2.6. The high-density LC shelf shall have either 48 or 24 pre-installed duplex LC adapters at the front panel routed to either 8 or 4 pre-installed 12-fibre MPO adapters at the rear of the shelf.

5.2.2.7. The 12-fibre module shall have 6 pre-installed duplex LC adapters at the front routed to a pre-installed 12-fibre MPO “aligned-key” adapter at the back.

5.2.2.8. The 24-fibre module shall have 12 pre-installed duplex LC adapters at the front routed to 2 pre-installed 12-fibre MPO “aligned-key” adapters at the back.

5.2.2.9. The duplex LC adapters shall have a single automatic shutter to minimize dust contamination and provide occupational safety. The shutter shall be spring-loaded and cover both ports of the LC adapter simultaneously.

5.2.2.10. All single mode fibre shall be 8/125 OS 2 AND G652D compliant TeraSPEED, Zero Water Peak Single Mode fibre.

5.2.2.11. Refer to the scope of works or detailed design document for specific requirements.

5.3. Communications Cabinets

5.3.1.1. Unless otherwise specified communications cabinets shall be of freestanding construction. The cabinet shall be specified with nominal dimensions and properties as follows for:

5.3.1.2. Vertical cable management is required to be installed on both sides of the full length of all communications cabinets.

5.3.1.3. APC 42RU (model AR3150) 1080 cm depth and 760 cm width.

5.3.1.4. Lockable front door.

5.3.1.5. Lockable steel rear door, lockable & removable side panels.

5.3.1.6. All locks shall be keyed alike utilizing the flinders master key system ABLOY

5.3.1.7. Moveable 19” equipment mounting rails – front and rear.

5.3.1.8. Minimum 80 mm clearance between front door and equipment.

5.3.1.9. 2 x 20-way APC I.P addressable power rails mounted as specified in detailed design document.
5.3.1.10. All power plug tops must use standard 3 pin plugs.
5.3.1.11. Power rails to be terminated with captive plug as specified in detailed design document.
5.3.1.12. Cable Tray on both sides of the cabinet for securing power services (on the right) and data services (on the left).
5.3.1.13. Clearance maintained for front and rear access.
5.3.1.14. Adjustable legs
5.3.1.15. Refer to detailed design document for details on cabinet layout, as per the scope of works.
6. Quality of Workmanship

This section describes the minimum requirements for the testing, inspection and commissioning of the installation.

6.1. Compliance with Standards

6.1.1. In addition to anything specified herein, all works and materials shall comply with all relevant International and local standards.

6.1.2. A list of some of the main applicable standards is contained in Section 2.5.

6.1.3. The Contractor shall provide all regulatory approval documents.

6.2. Inspections

6.2.1. The Flinders University Project Manager in conjunction with the Flinders Network Team shall conduct installation inspections. These inspections shall be conducted in the presence of the Project Manager and nominated data consultant.

6.2.2. The Contractor shall conduct all tests as required in this document and the attached scope of works.

6.3. Certification

6.3.1. The installation of the system is to be certified. The certificate is to be issued with the documentation.

6.4. Installation Testing

6.4.1. The installation shall be thoroughly tested to ensure the as-built performance meets the requirements specified within the Detail Design document and such other specifications referenced either explicitly or implicitly.

6.4.2. The installation shall not be deemed complete until all wiring and equipment has been checked and tested to the satisfaction of the Project Manager FLINDERS UNIVERSITY.

6.4.3. The Contractor shall supply all testing equipment.

6.4.4. At least 2 days’ notice of any compliance tests shall be given to the Project Manager FLINDERS UNIVERSITY, who shall witness such tests at their discretion.

6.4.5. Test reports must be submitted to the Project Manager within two weeks of test completion.

6.4.6. Test results shall be supplied in an unaltered format; that is as they are printed from the test equipment with no alteration.

6.5. Copper Cabling

6.5.1. The following shall be the minimum testing requirements for copper cabling:

6.5.2. 100% testing of existing horizontal cabling with compliance to Cat 6. Refer figure 6.1.

6.5.3. 100% testing of new horizontal cabling with compliance to Cat 6A. Refer figure 6.1.

6.5.4. A soft copy of all test results shall be supplied to the Project Manager.

6.5.5. An appropriate network testing tool for the category of cabling being installed must be used. The contractor prior to performing any testing must seek approval from Project Manager if any other cable tester is to be used.

6.5.6. Cat6A the test set up shall follow without variation the procedure laid down in ISO
11801 for Category 6A Permanent Link and Channel.

6.5.7. Test equipment shall be used with strict adherence to the manufactures guidelines.

6.5.8. Only manufactures certified test leads shall be used.

6.5.9. The software version installed on the test equipment shall be the most current for that test instrument.

6.5.10. The tester must have been calibrated within the last 12 Months before testing can proceed.

6.6. **Optical Fibre Cabling:**

6.6.1. Optical Fibre Cabling shall be tested as follows:

6.6.2. All Single mode fibre links shall be tested with an Optical Loss Test set, at both 1310 & 1550nm, in both directions.

6.6.3. Results shall reflect loss, length, fibre identification and the number and type of Connectors and splices used in the fibre link. The expected loss budget calculation results shall be included as a direct comparison to the actual test results.

6.6.4. **NOTE:** No actual test result shall exhibit more loss than the calculated loss budget, any fibre core exhibiting loss greater than the calculated loss budget shall be deemed to have failed and shall be repaired or replaced.

6.6.5. All single mode fibre shall be fusion spliced to pre terminated factory assembled pigtails, the fusion splices shall be subject to a standard tension pull test after splicing.

6.6.6. **NOTE:** All test results shall be included with the as-built documentation.
7. Documentation
This section describes the minimum requirements for the documentation to be submitted as part of the completed installation.

7.1. Hand-over Documentation Requirements
7.1.1. The Contractor shall maintain on site, a set of drawings including the Customers Name construction drawings and all others that the Contractor produces for installation, progressively marked up to cover the actual “as-built” installation. See examples in Appendix C
7.1.2. The following as-built documentation shall be provided in soft copy format:
7.1.3. Cable routes shall be marked on site drawings defining the exact route
7.1.4. Cabinet layout diagrams
7.1.5. Structured Cabling System frame layouts
7.1.6. Manufacturers Application Warrantee certificate
7.1.7. FD plans plus horizontal cable runs and outlets must be marked up and left in a visible location within each Floor Distributor
7.1.8. Application certificates from the manufacture.
7.1.9. Certificate of Compliance to local regulations.
7.1.10. Test reports for copper cable
7.1.11. Test reports for optical fibre cable

7.2. Structured Cabling System Patching Records
7.2.1. The minimum record requirement shall comply with the layout shown in Appendix D and E of AS/NZS 3085.1.
7.2.2. One soft copy and one hard copy shall be supplied per site.
7.2.3. Format must be in Excel
7.2.4. On larger Installations, more than 1000 communications outlets there exists the option to submit a system management software package for consideration and approval by FLINDERS UNIVERSITY.
8. Appendix A Supplementary Requirements of Contractors

8.1. General

8.1.1. In addition to matters specifically referred to in the specification contractors will be required to observe the following requirements. Failure to observe these requirements may jeopardise the award of future contracts to the contractor. The Contractor shall be responsible for all employees, subcontractors and employees of subcontractors engaged by the Contractor. The supplementary requirements of contractor’s policy can be downloaded at http://www.flinders.edu.au/campus/buildings-and-property/contractor-safety.cfm
9. Appendix 9 Communications Rooms


9.1. Communications Rooms

9.1.1. Communication rooms (Floor Distributors) shall be able to contain communication equipment, cable terminations and associated cross connect cables.

9.1.2. The communication room should be located as close as practical to the centre of the area being served and preferably in the core area. Horizontal pathways should terminate in the communications room located on the same floor as the area being served.

9.1.3. Size and spacing (see figure ZB1)

<table>
<thead>
<tr>
<th>Serving Area (sq.m)</th>
<th>Recommended Room Dimensions (mm)</th>
<th>Minimum Internal Area (sq.m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000-1500</td>
<td>3000 x 3400</td>
<td>10</td>
</tr>
<tr>
<td>800-999</td>
<td>3000 x 2800</td>
<td>8</td>
</tr>
<tr>
<td>500-799</td>
<td>3000 x 2200</td>
<td>6</td>
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</tbody>
</table>

Table ZB1 Room Dimensions

9.2. Equipment Rooms

9.2.1. An Equipment room (Building Distributor) is a centralised space for communications equipment (e.g. customer switching system, computing equipment, video switch) which serves occupants of the building.

9.2.2. An equipment room may provide any or all the functions of a communications room or building entrance facility.

9.2.3. Size and Spacing (see figure ZB2)

<table>
<thead>
<tr>
<th>Work Areas (Sq.m)</th>
<th>Area (Sq.m)</th>
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<tr>
<td>Up to 100</td>
<td>14</td>
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<tr>
<td>101 to 400</td>
<td>37</td>
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<tr>
<td>401 to 800</td>
<td>74</td>
</tr>
<tr>
<td>801 to 1200</td>
<td>111</td>
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</table>

Table ZB2 Room Dimensions

9.2.4. This Appendix provides supplementary design information and dimensioning recommendations applicable in Australia. Please refer to the complete standard AS/NZS 3084: 2003 for more information.
10. **Appendix C Examples of Patch Records**

10.1. **Hand-over Documentation Requirements**

10.1.1. The Contractor shall maintain on site, a set of drawings including the Customers Name construction drawings and all others that the Contractor produces for installation, progressively marked up to cover the actual “as-built” installation. Please refer to examples below

<table>
<thead>
<tr>
<th>24 PATCH PANEL RECORDS</th>
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<tbody>
<tr>
<td><strong>LOCATION:</strong></td>
</tr>
<tr>
<td><strong>Panel ID:</strong></td>
</tr>
<tr>
<td><strong>Room/Ext:</strong></td>
</tr>
<tr>
<td><strong>Patch:</strong></td>
</tr>
<tr>
<td><strong>Patched To:</strong></td>
</tr>
<tr>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
</tr>
<tr>
<td>13 14 15 16 17 18 19 20 21 22 23 24</td>
</tr>
</tbody>
</table>

Phone Records (if required)
10.1.2. On existing installations, VisiPatch 360 Data Record design

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<thead>
<tr>
<th>RoomExt</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<th>3</th>
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</table>
11. Appendix E References

11.1. Standards Australia “Communications Cabling Manual” Volumes 1 and 2

11.2. AS/NZS 3080 (latest edition)