Temo Consulting

Consultancy for Engineering and Project Management

Technical Specification

For

COMMUNICATION SERVICES

Prepared For

MFMR AUKI – MALAITA PROVINCE
SOLOMON ISLANDS

OCTOBER 2025

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I N D E X

1 SPECIFICATION REVISION AND QA STATUS 1

2 INTRODUCTION 2

2.1 OVERVIEW 2
2.2 SUMMARY DESCRIPTION OF THE COMMUNICATION SYSTEMS 2

3 GENERAL INSTRUCTION 3

3.1 COMMUNICATION 3
3.2 CONDITIONS OF CONTRACT 3
3.3 DEFINITIONS AND ABBREVIATIONS 3
3.4 REVIEW THE SPECIFICATION 3
3.5 COMPLIANCE 4
3.6 DESIGN RESPONSIBILITY 4
3.7 SUBCONTRACTOR'S RESPONSIBILITY 4
3.8 GENERAL RESPONSIBILITY 5
3.9 ERRORS, AMBIGUITIES AND OMISSIONS 5
3.10 SUBCONTRACTOR PRICE 5
3.11 PRE-START MEETING 6
3.12 SITE MEETINGS 6
3.13 CONTRACTOR'S REPRESENTATIVE 6
3.14 APPROVAL OF DRAWINGS AND SAMPLES 7
3.15 ALTERNATIVES 7
3.16 APPROVALS 7
3.17 SHOP DRAWINGS 7
3.18 AS INSTALLED DRAWINGS 8
3.19 PROGRAMME 8
3.20 ACTS, CODES, REGULATIONS AND STANDARDS 8
3.21 PERMITS AND FEES 9
3.22 SITE WORK 9
3.23 WORKING HOURS 9
3.24 SITE PERSONNEL 9
3.25 SITE FACILITIES 9
3.26 OCCUPATIONAL HEALTH & SAFETY 9
3.27 COORDINATION 10
3.28 HOT AND DANGEROUS WORK 10
3.29 PROGRESS PAYMENTS 10
3.30 VARIATION ORDERS 10
3.31 DOCUMENTATION PRECEDENCE 10
3.32 QUALITY ASSURANCE 10
3.33 MATERIALS FOR CONSTRUCTION AND FINISHES 10
3.34 PROTECTION OF PEOPLE AND PROPERTY 11
3.35 PROTECTION OF EQUIPMENT 11
3.36 PROTECTION OF WORKS 11
3.37 WORKMANSHIP 11
3.38 GUARANTEE 12
3.39 WARRANTY 12
3.40 AS BUILT DRAWINGS 12
3.41 DEMONSTRATION & INSTRUCTION TO CLIENT AND STAFF 12
3.42 COMMISSIONING, INSPECTION AND TESTING 13
3.43 OPERATION AND MAINTENANCE MANUALS 14
3.44 MAINTENANCE AND DEFECTS LIABILITY 14
3.45 PRACTICAL COMPLETION 15
3.46 FINAL COMPLETION 15

4 TECHNICAL INSTRUCTIONS 16

4.1 DRAWINGS 16
4.2 SCOPE OF WORKS 16

Tender Issue

I N D E X

4.2.1 Information to Be Supplied with Tender *17*
4.2.2 Works by Others *17*
4.2.3 Cabling/ Wiring/ Conduit/ Cable Tray *17*
4.2.4 Labeling *17*
4.3 COMMUNICATIONS CABLING 18
4.3.1 Related Sections *18*
4.3.2 Standards *18*
4.3.3 Quality *18*
4.3.4 Contractors Submissions *19*
4.4 PERFORMANCE GUARANTEES 19
4.4.1 Manufacturers Standards *19*
4.4.2 Certification *20*
4.4.3 System Performance Warranty *20*
4.4.4 Guarantee of Workmanship *20*
4.4.5 Guarantee of Materials *21*
4.4.6 UTP Links *21*
4.4.7 Connectors *21*
4.5 RETICULATION & DISTRIBUTION 22
4.5.1 General *22*
4.5.2 Standards *22*
4.5.3 Quality *22*
4.6 DESCRIPTION AND EXTENT OF WORKS 22
4.6.1 General *23*
4.7 CONDUITS 23
4.7.1 Minimum Sizes *23*
4.7.2 Rigid Conduits *23*
4.7.3 Galvanizing *23*
4.7.4 Set Out *23*
4.7.5 Inspection Fittings *23*
4.7.6 Draw Cords *23*
4.8 CONCEALED CONDUITS 23
4.8.1 Routes *23*
4.8.2 Conduits in Concrete Slabs *24*
4.8.3 Prohibited Floor Slabs *24*
4.8.4 Hollow-Block Floors *24*
4.8.5 Columns *24*
4.9 METALLIC CONDUITS AND FITTINGS 24
4.9.1 Standard *24*
4.9.2 Type *24*
4.9.3 Corrosion Protection *24*
4.9.4 Expansion Joints *25*
4.10 NON-METALLIC CONDUITS AND FITTINGS 25
4.10.1 Standard *25*
4.10.2 Conduits in Roof Spaces *25*
4.10.3 Conduit in Slabs *25*
4.10.4 Flexible Conduit *25*
4.10.5 Associated Fittings *25*
4.10.6 Inspection Fittings *25*
4.10.7 Joints *25*
4.11 DUCTED WIRING ENCLOSURES 26
4.11.1 Ducting *26*
4.11.2 Accessories *26*
4.12 CABLE SUPPORTS 26
4.12.1 System *26*
4.12.2 Manufacture *26*
4.12.3 Cable Trays *26*
4.12.4 Fixing To Building Structure *27*

Tender Issue

INDEX

4.12.5 Access *27*
4.12.6 Cable Fixing *27*
4.12.7 Bend Radius *27*
4.12.8 Cable Protection *27*
4.12.9 Minimum Clearances *27*
4.13 CATENARY SUPPORT SYSTEM 28
4.14 INSPECTION, TESTING, COMMISSIONING & HANDOVER 28
4.14.1 Practical Completion *28*
4.14.2 Management of Inspection, Testing, Commissioning and Handover *28*
4.14.3 Testing *29*
4.14.4 Commissioning *29*
4.14.5 Post Contract Drawings *29*
4.14.6 Installation Manuals *30*
4.15 ROUTINE MAINTENANCE & SERVICING 30
4.15.1 General Scope *30*
4.16 MAINTENANCE (DEFECTS LIABILITY PERIOD) 31
4.16.1 GENERAL *31*
4.16.2 SCOPE OF WORKS *31*
4.17 SCHEDULE OF MAINTENANCE CONTRACT 31
4.18 END OF DEFECTS MAINTENANCE 32

5 DOCUMENTATION AND DRAWINGS 33

5.1 GENERAL 33
5.2 TENDER STAGE 33
5.3 TENDER AWARD STAGE 33
5.4 CONSTRUCTION STAGE 33
5.5 HAND OVER STAGE 33
5.5.1 As-Built Drawings, Operations Maintenance Manuals *33*

6 PRICE SCHEDULES 35

6.1 TENDER PRICE 35

7 RATE PRICES, MARGINS AND SUBCONTRACTORS 36

7.1 MARGINS' PERCENTAGES 36
7.2 SUBCONTRACTORS 36
7.3 DEVIATIONS AND ALTERNATIVES 37

8 TENDER PRICE BREAKDOWN 38

8.1 MFMR AUKI - MALAITA PROVINCE, SOLOMON ISLANDS - COMMUNICATION PRICE SUMMARY 38

9 SCHEDULE OF RATES – COMMUNICATION SERVICES 40

Tender Issue

1 SPECIFICATION REVISION AND QA STATUS

Date	Rev	Issued to	No. of Copies	Approved for Issue	Comments
October 2025	0- Tender Issue	Client/ Architect	1	PAT	

Tender Issue

2 INTRODUCTION

2.1 OVERVIEW

This specification details the requirements for **COMMUNICATION SERVICES** for the **MFMR AUKI – MALAITA PROVINCE, SOLOMON ISLANDS**.

All works covered by this specification shall be subject to all provisions of the Conditions of Contract and the Preliminary and General Sections of the Architectural Specification.

The work in this Trade Section shall be carried out by a qualified and registered Communication Services Subcontractor who shall be a Subcontractor to the Main Contractor and shall be subject to the same General and Special Conditions of Contract applying to the main contractor.

All clauses of the complete specification shall apply to the Communication Installation Subcontractor and all his specialist sub-Subcontractors.

2.2 SUMMARY DESCRIPTION OF THE COMMUNICATION SYSTEMS

The Communication Services covers structured cabling of all telephone and data & CCTV System and all other works necessary to implement this specification.

This section of the work shall be carried out only by Communication Services Subcontractors who can show they have had recent and successful experience on work of a similar nature and magnitude, and evidence of this experience shall be submitted if requested.

Tender Issue

3 GENERAL INSTRUCTION

3.1 COMMUNICATION

All communication shall be in writing and shall be with the Consulting Engineer or any person appointed by him.

3.2 CONDITIONS OF CONTRACT

Refer to the Main Building Contract for details on the "**Form of Contract**" for the works specified.

The said document specifies commercial, legal and tendering conditions for these works.

Any queries regarding Conditions of Contract and its interpretations for these works shall be directed to the consulting engineer before tender closing date.

3.3 DEFINITIONS AND ABBREVIATIONS

The term **"Contract"** used herein refers to the work included in this Specification, as does the term **"Subcontract".**

The term **"Communication Services Subcontractor"** or **"Subcontractor"** used herein refers to the Communication Services Subcontractor, regardless of actual contractual relationships, e.g. Communication Services, Subcontractor, Nominated Subcontractor, engaged to complete all works described in this Contract.

"Approved" shall mean subject to the inspection and entire approval of the Engineer before being worked or fitted into the Contract works.

"Provide" and **"Install"** used separately shall be interpreted to mean **"Provide and Install"** and shall include all design installation and testing, setting to work and maintenance.

"Indicated" means as indicated on the Contract drawings, specification and by notes, figures, sketches or writing; thereon or by any combination thereof.

The terms "**Employer**", "**Client**", "**Principal**" and "**Owner**" refers to **MFMR Auki – Malaita Province, Solomon Islands.**

The terms "Architect" which are used refers to **Kearney Architect.**

The term "**Consultant**", "**Engineer**" and "**Engineers**" used here in refers to **Temo Consulting.**

3.4 REVIEW THE SPECIFICATION

The Subcontractor shall read, review, study and familiarise themselves with this specification in conjunction with Communication design tender drawings and bring anything

Tender Issue

that they do not understand or do not agree with to the attention of the consulting engineer before or at tender closing stage in their tender letter.

Tenderers are to make use of the tender period to clarify any aspects or inconsistencies of these documents that may influence the pricing or the execution of the contract. Any such inconsistencies found subsequent to the letting of the Contract shall have the interpretation placed upon them by the Engineer. The Subcontractor shall abide by this interpretation.

Requests for alternatives or changes to the specification after tender closing shall not necessarily be accepted.

3.5 COMPLIANCE

A price for a tender complying with this specification in all respects shall be compulsory.

The intent of this specification is to provide for the work herein set out and as shown on the accompanying drawings to be fully completed in every detail for the purpose designed. The Subcontractor shall allow to supply, construct and install everything reasonably necessary for such construction to comply with the intent of the specification and drawings not withstanding any omissions in the drawings and/or specifications.

The Contract includes all work incidentals to the work shown and specified and as necessitated by the conditions of the site or of the works or of the materials as apparent or as discovered during the progress of the Works.

The intent is that all systems supplied under this contract are complete in every respect, and all items and work necessary to this shall be deemed to be included whether specifically indicated or not.

3.6 DESIGN RESPONSIBILITY

The design responsibility for the installation shall be with the engineer.

3.7 SUBCONTRACTOR'S RESPONSIBILITY

The Communication Services Subcontractor shall be deemed to have carefully examined the Contract Documents, the Specification and Drawings. If the Communication Subcontractor has any doubt as to the meaning of any portion of these documents, he shall inform the engineer in writing before tendering on the project. The engineer shall provide clarifications to the query in a notice to tenderers.

The Communication Services Subcontractor must carefully consider local conditions, visit the site of the proposed work, and make any field survey necessary for proper planning and execution of the work. Failure to do so shall in no way relieve the Communication Services Subcontractor of responsibility for changes or unanticipated costs due to field conditions.

After a tender has been accepted the responsibility for any misunderstanding or error shall rest with the Communication Services Subcontractor. The Communication Services Subcontractor shall examine carefully the Architectural, Structural and other trade's

Tender Issue

drawings and satisfy himself that the work under his contract can be satisfactorily carried out without changes to the building as shown on drawings. Before commencement of his work, he shall examine the progress of other trades and report at once any defect or interference affecting his own work or the warranty of same. No extras will be allowed subsequently for his omission to make adequate inspection or take adequate precaution.

The Communication Services Subcontractor shall arrange his own work in co-operation with other trades so that all work is installed to the best advantage. Where equipment is installed by the Communication Services Subcontractor without due regard to other trades, relocation of such equipment shall be performed by the Communication Services Subcontractor at his own expense.

3.8 GENERAL RESPONSIBILITY

The Subcontractor shall comply with all proper instructions issued by the Engineer or the Main Contractor in relation to this Contract.

The Subcontractor shall be responsible for the adequacy, stability, and safety of all its site operations and method of construction.

The Subcontractor shall respect the rights of the adjoining areas occupants and shall advise the main contractor when access to areas out of construction areas is requires for the purposes of carrying out the Contract Works.

The Subcontractor warrants that at all times shall be suitably qualified and experienced, and shall exercise due skill, care and diligence in the carrying out and completion of Works under Subcontract (WUS)

The Subcontractor shall carry out and complete WUS in accordance with the design documents so that the Subcontract Works, when completed, shall:

a. be fit for their stated purpose; and
b. comply with all the requirements of the Subcontract

3.9 ERRORS, AMBIGUITIES AND OMISSIONS

Errors, ambiguities and omissions in drawings or specifications shall be reported to the Engineer for correction before any part of the work involved is started. Unless otherwise expressly stipulated, no additional allowance shall be made because of errors, ambiguities or omissions which should reasonably have been discovered during the preparation of the tender or which may become evident later and which should have been directed to the attention of the Engineer in timely manner. The written decision of the Engineer shall be final.

3.10 SUBCONTRACTOR PRICE

A lump sum fixed price excluding taxes is required. The price shall not be subject to variation for the duration of the contract period.

Tender Issue

The Contract includes all work shown and specified and as necessitated by the conditions of the site or of the works or of the materials as apparent or as discovered during the progress of the Works.
By submission of a tender the Tenderer warrants that he is expert in understanding the systems, capable of both design and construction, and that all work will be suitable for its intended function where located, and will comply with all requirements of statutory and other authorities having jurisdiction.

3.11 PRE-START MEETING

The Subcontractor shall prior to commencing the Subcontract Works on site, attend a pre-start meeting to be held at the address and time mutually agreed with the Main Contractor.

The meeting may address the following matters:

a. construction and site-specific issues;
b. lines of communication and authority levels;
c. possession of the site;
d. frequency and venue of site meetings;
e. progress payments;
f. working hours;
g. safety requirements;
h. insurance;
i. scope of works;
j. programs; and
k. Resources.

3.12 SITE MEETINGS

A senior and responsible representative of the Communication Services Subcontractor's staff with powers of making binding decisions on behalf of the Communication Services Subcontractor shall attend all site meetings called by the Construction Manager or Project Manager.

3.13 CONTRACTOR'S REPRESENTATIVE

The Subcontractor shall provide all necessary supervision during the Contract. He shall be at site at all working times a competent representative whose name shall be notified to the Main Contractor and Engineer in writing and who shall be authorised to receive on behalf of the Subcontractor any instructions from the Main Contractor, Engineer or Engineer's Representative.

All works shall be carried out under the supervision of the Subcontractor's representative.

Tender Issue

3.14 APPROVAL OF DRAWINGS AND SAMPLES

Within ample time to prevent construction delay, the Subcontractor shall submit to the Engineer samples of all major plant and equipment for approval. The Communication Subcontractor shall also submit 2 sets of final shop drawings detailing all aspects of proposed work for approval.

The Communication Subcontractor shall not enter into any commitment or commence any work without the approval of the shop drawings and materials samples by the Engineer.

Consent shall not relieve the Subcontractor from his obligation to comply with this specification. Supply without delay, any samples, information or drawings requested by the Engineer.

3.15 ALTERNATIVES

The Subcontractor is encouraged to forward alternatives for both the design and specified equipment and the installation, provided that full details of these alternatives and prices are forwarded with their tender under cover of their tender letter.

Nomination of particular manufacturer, reference, or source of supply shall be taken, unless specifically noted otherwise, to indicate type and quality required.

Any alternative equipment shall meet or exceed the specified equipment and installation in all respects as follows but not limited to the following: -

- Performance and duty.
- Maintenance and spare parts.
- Durability.
- Energy efficiency.
- Life cycle costs analysis.

All costs associated to prove the above shall be borne out by the Subcontractor.

3.16 APPROVALS

All approvals of documents and site work shall be performed by the consulting engineer or any person appointed by them.

3.17 SHOP DRAWINGS

The Subcontractor shall prepare shop drawings for shop fabrication and working drawings for installation on site. All dimensions and locations shall be verified on site. Shop drawings shall be submitted for review by the Engineer before manufacture. The review of any drawings by the Engineer in no way affects the Subcontractor's responsibility for the satisfactory completion of the work.

The Communication Services Subcontractor shall review all relevant drawings, including architectural, structural, other services and co-ordinate and co-operate with the main Subcontractor and the relevant Subcontractors to avoid conflict with the building structure

Tender Issue

and other building services. Any changes required due to this co-ordination shall be provided at no extra cost.

The installation drawings shall include all details necessary for the proper accommodation of the plant as a whole. This includes all foundation, and fixing bolts details, access details etc. Accurate shop drawings are to be provided for the penetration and cast in requirements for the pre-cast concrete panels for both walls and floor panels.

Should any alterations be necessary due to errors in, or late availability of information from the Subcontractor, all charges incurred in the correction or alteration shall be to the Communication Services Subcontractor's expense.

3.18 AS INSTALLED DRAWINGS

The Communication Services Subcontractor shall provide installation and record drawings to be kept on site throughout the construction phase. All deviations from the shop drawings shall be marked clearly in red ink. The marked up set of shop drawings shall form the basis of the production of the as installed drawings.

3.19 PROGRAMME

The Tenderer shall submit a programme of works with their tender in Gantt Chart Form, specifying Tasks, Duration, Resources and dependencies between scheduled tasks. The critical path activities and milestones shall be identified. This programme shall be kept updated at all times for the entire duration of the project.

3.20 ACTS, CODES, REGULATIONS AND STANDARDS

The standards, codes, and specifications referenced below and elsewhere in this Specification shall be of the latest editions.

Similar codes or standards used in the home country of the manufacturer may, however, be used if applicable, subject to the acceptance of the appropriate the authorities and utilities; in such case it shall be the responsibility of the manufacturer to prove to the satisfaction of the Project Manager that such codes are essentially equal to the one specified.

The Contract Works shall comply with all relevant statutory regulations and any special requirements and Telecom Standards including:

- The Solomon Building Code.
- The requirements of the Local Authorities.
- The requirements of Internet Service Provider.
- The requirements of the Occupational Health and Safety Department.
- The requirements of the Dangerous Goods Regulations.
- The requirements of Telecom Authority Solomon.

Where a New Zealand or Australian standard is not available, the relevant American standard shall be used and the standards shall take precedence in the above stated order.

Tender Issue

Where standards are not available, acceptable engineering standards shall be forwarded for approval.

Equipment suppliers and manufacturers' recommendations shall be closely followed with respect to both the installation and commissioning.

The latest issue/revision of all the above documents at the time of tender shall apply in each instance.

3.21 PERMITS AND FEES

The Communication Services Subcontractor shall give all necessary notices, obtain all necessary permits and pay all fees in order that the work may be carried out, and shall furnish all certificates as evidence that the works installed comply with laws and regulations. Bring to the attention of and clarify any unusual aspects of the installation with the relevant Authority during the permit application period.

Pay all fees and costs relating to patent rights, trademarks, or other protected rights and fully indemnify the Owner against any claims arising there from.

3.22 SITE WORK

Site work shall be performed in a workman like manner and the site shall be kept neat and tidy.

3.23 WORKING HOURS

For the duration of the contract works, the official working hours shall be coordinated with the main contractor.

3.24 SITE PERSONNEL

The work shall be performed by people with the necessary experience, qualifications and registration to perform the work.

Documentation to this effect shall be submitted to the client's representative before any workmen will be allowed on to the site.

3.25 SITE FACILITIES

All site facilities shall be supplied by the Subcontractor inclusive of communication, storage, office and ablutions.

3.26 OCCUPATIONAL HEALTH & SAFETY

The Contractor shall ensure that all personnel are fully trained in matters relating to work safety. The Contractor shall ensure that their personnel are fully equipped with safety equipment and that a strict regime of safety is followed on site that complies with local OHS (Labour Department) Authority requirements.

Tender Issue

3.27 COORDINATION

The Subcontractor shall allow for full co-ordination between all the trades both in the preparation of shop drawings as well as on site.

All routes of piping, ducting and cables and location of all equipment shall be agreed in advance, shown on shop drawings and not varied during the installation.

3.28 HOT AND DANGEROUS WORK

All minor and major hot work and work that could cause bodily harm or work that is a fire hazard for example grinding, sawing, cutting, welding, soldering and brazing shall not proceed without the consulting engineer's permission.

3.29 PROGRESS PAYMENTS

Progress payments for sectional completion shall be based on work completed and commissioned less retention moneys.

3.30 VARIATION ORDERS

Variation orders shall be based on the price schedules that shall be completed by the Subcontractor.

3.31 DOCUMENTATION PRECEDENCE

This specification shall take precedence over other documents except in the case where it contravenes a Solomon law or local authority regulation.

In case of document discrepancy or ambiguity, the matter shall be referred to the consulting engineer for a ruling which shall be final and binding to all parties.

3.32 QUALITY ASSURANCE

The Subcontractor shall submit with his tender a draft quality assurance plan indicating his quality control plan with hold points to be signed off by his personnel as well as the consulting engineer to ensure the quality of the installation.

The consulting engineer may add additional hold points or procedures if required.

3.33 MATERIALS FOR CONSTRUCTION AND FINISHES

The materials used in the construction of the equipment are to be of the highest quality of their respective kinds.

All parts liable to rust, including screws, bolts and nuts shall be cadmium plated or hot dipped galvanised. All metalwork in this Contract including switchboards, distribution boards, cable tray, trunking, cable ladder, support brackets etc. shall be protected against corrosion, to the satisfaction of the Engineer.

Tender Issue

3.34 PROTECTION OF PEOPLE AND PROPERTY

Insofar as compliance with the Subcontract permits, the Subcontractor shall:

a. Take measures necessary to protect people and property;

b. Avoid unnecessary interference with the passage of people and vehicles; and

c. Prevent nuisance and unreasonable noise and disturbance.

If the Subcontractor damages property, the Subcontractor shall promptly rectify the damage and pay any compensation which the law requires the Subcontractor to pay.

3.35 PROTECTION OF EQUIPMENT

All equipment delivered to the site for the Contract works shall be adequately protected during transport and adequately protected during storage on site and elsewhere. Damaged equipment shall be totally replaced with new items.

3.36 PROTECTION OF WORKS

3.36.1.1 General

The Subcontractor shall be responsible for taking all reasonable steps to avoid other trades or environmental conditions from damaging or disfiguring equipment or materials of this Contract by protecting the works adequately at appropriate stages of the Contract programme. The Subcontractor shall liaise with the Main Subcontractor and other trades in this regard.

The Subcontractor shall adequately protect equipment and incomplete works in areas exposed to the weather.

The Subcontractor shall arrange site access with the Construction Manager. The Subcontractor shall comply with all site security provisions set by the Construction Manager.

3.37 WORKMANSHIP

3.37.1.1 General

Carry out all work in a neat and serviceable manner. Follow best trade practices and comply with any manufacturer's recommendations.

Confirm positioning of all fixtures with the Engineer before installation. Confirm mounting height and location of all fittings before installation.

3.37.1.2 Finish & Cleaning

The completely erected installation shall be handed over in a perfectly clean condition with all rust and dirt removed paintwork in good clean condition with erection scratches and other damage marks made good and bright parts properly cleaned and polished.

Tender Issue

Keep the work areas clean and tidy at all times. Remove all rubbish as it accumulates. On completion, remove all debris and waste caused directly or indirectly by the work and leave the installation and surrounding areas completely clean

3.38 GUARANTEE

The Communication Subcontractor shall provide a written guarantee in respect of all materials supplied under the Contract against defects which may occur or be found in workmanship, materials and design for a period of twelve (12) calendar months in service after the date of Practical Completion Certificate as detailed below.

All defects, fair wear and tear excepted, shall be made good free of all costs to the Owner, whether or not the workmanship and materials have been previously inspected and accepted.

3.39 WARRANTY

The complete installation shall be guaranteed free of defects and faulty workmanship for a period of 12 calendar months after the date of issue of Practical Completion Certificate.

Any defects during this 12 month shall be repaired/replaced free of charge inclusive of parts and labour.

Any equipment attended to during this period shall have an extended guarantee period of another 12 months from date of repair.

Where equipment supplier's offer extended warrantees in excess of 12 months, they shall be passed unto the client for their benefit.

3.40 AS BUILT DRAWINGS

A draft of the As Built documents shall be provided to the Engineer four weeks prior to Practical Completion for approval. Provision and acceptance of final as-built, commissioning, and maintenance documentation shall be a prerequisite for Practical Completion.

"As Built" drawings, to the approval of the Engineer shall be provided for the Contract Work. These shall be in similar detail to the installation drawings, but shall also include any amendments and any additional detail necessary to show the functioning or installation, or particular items of plant.

The approval of any drawings by the Engineer in no way affects the Communication Services Subcontractor's responsibility for the satisfactory completion of the Contract.

3.41 DEMONSTRATION & INSTRUCTION TO CLIENT AND STAFF

The Communications Subcontractor shall provide all instructions to members of the Client's organisation as necessary for them to recognise defective conditions in the Contract plant. Formal instruction shall be coordinated with the Client via the Main Subcontractor and shall take place following provision and acceptance of final as-built, commissioning, and maintenance documentation, and prior to Practical Completion.

Tender Issue

The Subcontractor shall also provide such informal instruction as may be required prior to the formal instruction. The Communication Subcontractor shall assign a person thoroughly familiar with the Contract plant for the purpose of such instruction for a period of 2 complete days during which period his time shall be completely given over to instruction. Instruction shall be given as follows:

- Explain the function and operation of all equipment, and indicate where these items are dealt with in the Operating and Maintenance instructions.
- Demonstrate all indicating instruments, gauges and settings of equipment and indicate the current readings of such items.
- Indicate where and how any item of Contract equipment can be disconnected or isolated.

3.42 COMMISSIONING, INSPECTION AND TESTING

Four weeks prior to carrying out any inspections, testing and commissioning, submit details of the test procedures proposed, together with Test/Report Sheet formats for the Engineer's review. These procedures and formats, once acceptable to the Engineer, shall be used as the basis of all Inspections, Testing and Commissioning.

Prior to inspection/commissioning of the Works by the Engineer for the purposes of certifying Practical Completion, provide the Engineer with completed, signed Communication Certificate of Compliance, Test/Inspection/Commissioning Reports on the equipment, services, etc., indicating that the Works are now ready for inspection. The contents and results of these Reports must be acceptable to the Engineer, and are an essential prerequisite to the Engineer proceeding with inspection/commissioning of the work for the purposes of the issue of the Certificate of Practical Completion.

The Certificate of Practical Completion does not become due until site testing and commissioning is complete to the satisfaction of the Engineer, and the completed Certificate of Compliance issued to the Engineer.

Arrange for Subcontractors to be in attendance where inspection testing and/or commissioning of the installation involves their equipment and where specifically requested herein.

Repair or replace as instructed by the Engineer, at no charge, any item or features not complying with these Documents.

Allow the Engineer and any relevant local bodies the opportunity of attending and witnessing the tests and commissioning. Include the following in the test procedures as a minimum:

- Check complete installation visually for compliance with the Specification.
- Check all control panels for operation of switches, circuit protection, contactors, controls etc.
- Continuity and insulation resistance checks on all wiring and cabling. Ensure sensitive equipment is disconnected. Check and test all RCD equipment for correct operation.
- Check all labeling.

Tender Issue

- Check fixings of all equipment and systems installation to ensure stability under possible seismic conditions.
- Test and commission all components, items and systems both independently and in association with the complete installation.
- Allow to employ the manufacturers of any specialist equipment installed to test and commission that equipment.
- After commissioning give at least two weeks' notice in writing to the Engineer that the installation is ready for final demonstration.
- Demonstrate the satisfactory operation of the installation and all component parts to the satisfaction of the Engineer.
- Provide all equipment and apparatus necessary for this demonstration.
- Carry out any tests the Engineer may require to demonstrate that the installation functions as specified or intended.

3.43 OPERATION AND MAINTENANCE MANUALS

Provide 3 sets of Maintenance Manuals bound and indexed in Black A4 ring binders labelled with the project name and purpose on the front cover and spine. The manuals shall include the following information:

- Brief outline description of systems and principal design details.
- System schematics.
- Operating instructions for the equipment installed.
- Schedule of all equipment showing location, maker's name and details of local agent.
- Provide spare parts lists, manufacturers' technical information, with detailed wiring diagrams for all composite equipment.
- A description of recommended maintenance procedures and the desirable frequency thereof, recommended lubricants, and recommendations for locating faults and isolating equipment.
- Commissioning results, copies of works test certificates.
- A set of As-built drawings in A3 shall be provided for inclusion in each copy of the Manual.

3.44 MAINTENANCE AND DEFECTS LIABILITY

The Maintenance and Defects Liability Period shall extend for a period of twelve (12) calendar months from the date of Practical Completion. During the maintenance and defects liability period the Contract Plant shall be under the control of the Owner but the Subcontractor shall be in attendance and shall carry out all maintenance work as maybe required at no cost to the Owner.

Repair any defect which does not compromise the effectiveness of any system, excluding fair wear and tear within 7 days during the maintenance period specified.

Defects which do comprise the effectiveness of the system shall be repaired within 24 hours. Failure to do so will result in the work being done by others at the Communication Subcontractors expense.

Tender Issue

3.45 PRACTICAL COMPLETION

After all test adjustments and commissioning have been completed to the satisfaction of the Project Manager and provided all the requirements of the specification have been met to the satisfaction of the Engineer a certificate of Practical Completion will be issued.

3.46 FINAL COMPLETION

Final completion shall be considered achieved when the Maintenance and Defects Liability Period has been satisfactorily completed and all specified requirements have been met to the Engineers satisfaction.

Tender Issue

4 TECHNICAL INSTRUCTIONS

4.1 DRAWINGS

The following drawings, including all the architectural drawings and site layout drawings forms part of this specification and shall be read in conjunction with this specification: -

Drawing No.	Details
	Structured Cabling Layout
C0000	Drawing Schedule, Legends & Symbols & Abbreviation
C0010	Overall Site Plan
C0100	Proposed First Floor Plan - Structured Cabling Layout
C0200	Proposed Second Floor Plan - Structured Cabling Layout
C0300	Proposed Roof Plan – Antenna Layout
C0400	Schematic Diagram

4.2 SCOPE OF WORKS

The following is to be read in conjunction with the detailed requirements for each system, which are contained within the relevant detailed section of the specification and the drawings.

The work to be carried out by the Communication Contractor comprises but is not limited to:

STRUCTURED CABLING

- Supply & Installation of conduit (with draw wires) to the boundary, for the incoming fibre optic cable from the ISP. Contractor to coordinate these works with building contractors for the cable route.
- Supply and installation of Communication rack with top mounted built-in fan, complete with Patch Panels, Management Bars, socket PDU, grounding cable (6mm2) and grounding bar for the grounding on the communication equipment's.
- Supply and installation of fibre trays at both ends of the fibre optic cables.
- Supply and installation of fibre optic transceivers/ media converters at both ends of the fibre optic cables.
- Supply and installation of CAT6 cable from communication rack to outlets as indicated in the drawings.
- Supply and installation of RJ45 outlets complete with keystones, faceplate, mounting box. All external RJ45 outlets shall be weatherproof type and come with dust & water proof covers/flips.
- Supply and installation of HDMI cable for meeting rooms, etc.
- Supply and installation of any other structured cabling item not mentioned above.

- **GENERAL**
- Supply and installation of cable containments: cable tray, conduits etc. as indicated in the drawings.
- Supply and installation of fire rated sealant for all penetrations on walls and floors as shown drawings.
- Builders Works to make good and reinstate building fabric.
- Provision for Shop Drawings.
- Instruction of the Principal.
- Testing and Commissioning.
- Maintenance (defects liability) for 12 months.

Tender Issue

- As-built drawings and operation & maintenance manual
- Any other item not mentioned above

4.2.1 Information to Be Supplied with Tender

The Tenderer is responsible for supplying all information to Manufacturers, Suppliers and specialist Subcontractors for items, equipment, work, etc. covered within these Documents for which he requires prices for the completion of his Tender.

4.2.2 Works by Others

Associated works by other trades/disciplines are as follows:

- **CIVIL AND BUILDERS WORKS**
  - Provision of trenches for conduit installation.
  - Provision of penetrations and built in conduits.
  - Connection to the Lift Control Panels

4.2.3 Cabling/ Wiring/ Conduit/ Cable Tray

Allow for full detailed co-ordination with the Contractor and all other Subcontractors.

Extra high impact PVC conduit and fittings shall be used in accordance with NZS 6207. Wiring shall be minimum 1.5mm2 TPS.

All conduits shall be adequately sized to allow cables to be easily withdrawn and replaced at a later date. Minimum diameter shall be 20 mm. All elbows, tees, etc. for high impact PVC conduit shall be of the inspection type with rustproof screws being used for the fixing of lids. All joints shall be solvent welded. Saddles shall be screw fixed with corrosion resistant screws. Saddles shall be provided at intervals not exceeding 1000 mm. Capped conduit shall be provided with all proprietary couplings, elbows, tees, etc.

Cabling or conduit shall not be secured to pipework or ductwork or supports for other services. All cable cores of all wiring shall be terminated and these terminations shall be done using the appropriate tools.

All terminations shall be neat and tidy with minimal removal of the outer sheath.

4.2.4 Labeling

All terminals of Communication equipment and accessories shall be numbered using an approved proprietary numbering system as indicated in the drawing. All cables and individual cable cores shall be labelled at both ends with an approved proprietary labelling system as indicated in the drawing. Ensure cable and cable wire labelling accessories are correctly selected for diameter. Trim carrier strips neatly.

Label lettering heights shall be as follows:

Letter Height	**Equipment**
10 mm	Distribution frame designation
5 mm	Frame labelling identifying function, coding, cable destination.

A proposed labelling system shall be submitted to the Engineer for approval.

Tender Issue

4.3 COMMUNICATIONS CABLING

4.3.1 Related Sections

Refer to the Reticulation and Distribution section.

4.3.2 Standards

4.3.2.1 Installation:

AS/NZS 3080:2003:	Integrated Telecommunications Cabling for Commercial Premises
AS/NZS 3084:2003	Telecommunications and Pathways for Commercial Buildings (Mandatory Requirements)
AS/NZS 3085.1:2004:	Administration of Communications Cabling Systems: Basic Requirements
ISO/IEC 11801:2002:	Information Technology - Generic cabling for customer premises

4.3.2.2 Materials and Performance:

AS/NZS 3080:2003;	Integrated Telecommunications Cabling for Commercial Premises (Note: references in this Specification to cable categories are for information only. Compliance will be assessed to this standard.)
AS/NZS 3084:2003:	Telecommunications and Pathways for Commercial Buildings (Mandatory Requirements only)
AS/NZS 3085.1:2004:	Administration of Communications Cabling Systems: Basic Requirements
ISO/IEC 11801:2002:	Information Technology - Generic cabling for customer premises

4.3.2.3 Testing:

SAA/SNZ HB27:	Handbook for testing Backbone Cable installations
AS/NZS 3087.1:2003:	Telecommunications Installations - Generic cabling systems - specification for the testing of balanced communications cabling in accordance with values set in AS/NZS 3080:2003

4.3.3 Quality

4.3.3.1 Communication Provider Qualifications

a) Installation and Testing-shall be by an experienced specialist voice and Data Cabling Contractor authorised by the selected Structured Cabling (System manufacturer to install, warrant and certify cabling systems of the type used.

b) The Communication Provider shall have local support for ongoing maintenance and back-up for components used.

Tender Issue

4.3.4 Contractors Submissions

Submit details of the-following:

4.3.4.1 Certification and Performance Documents

a) Detailed product component data, including details of statutory approvals (as necessary) and evidence of components being satisfactory to the Structured Cabling System manufacturer.

b) Evidence of the Structured Cabling System manufacturer's approval of the Communications Provider, and their agreement to warrant the Communication Provider's work, provided installation practices are met.

4.3.4.2 Coordination Documents

a) Schedule of labels

b) Schedule of requirements for power and other services, where there is inadequate or no provision.

c) Submit details of dimensions, cut-out requirements and installation requirements for equipment and accessories.

d) Submit calibration certificates for all test equipment prior to use.

e) Submit certified test results for all cables in approved electronic format.

4.3.4.3 Shop Drawings

Submit shop drawings of:

a) Indoor infrastructure drawings, complying with AS/NZS 3085.1:2004, Appendix C

b) Typical cable management arrangements

c) Sizes and locations of any access panels required for servicing equipment, or future cable additions.

4.3.4.4 Samples

Submit samples following items, with product data sheets and sufficient information to assess compliance:

a) Telecommunications outlets

b) 2m of each horizontal cable and fibre optic cable (backbone)

4.4 PERFORMANCE GUARANTEES

4.4.1 Manufacturers Standards

a) Use a proprietary Structured Cabling System, (e.g. Commscope, 3M Volition, Belden “Category6/Class E” or a system approved by the engineer as compatible or equivalent).

Tender Issue

b) Use only components supplied by or approved by the Structured Cabling System manufacturer.

c) Comply with the cabling system manufacturer's design and installation standards. Do not use a Structured Cabling System where these are in conflict with any of the requirements specified

d) Only use a Structured Cabling System where the manufacturer will physically inspect the Communication Providers works at least twice to ensure the manufacturer's installation standards are met. The manufacturer should provide the Contractor with a written inspection report. The Communications Provider shall facilitate these inspections.

e) Only use a Structured Cabling System where the manufacturer backs the warranties provided. That is, if the originally warranty is offered through the Communication Provider, and the Communication Provider becomes unwilling or unable to fulfil warranty provisions, the Client can require the manufacturer of the Structured Cabling System to fulfil the warranty provisions.

4.4.2 Certification

At Practical Completion, provide a certificate from the Structured Cabling System manufacturer or his authorised representative or agent certifying that the system has been designed, supplied, installed, tested and documented in accordance with all of the requirements of the Cabling System manufacturer for the particular cabling system offered.

4.4.3 System Performance Warranty

System Performance Warranty period: Minimum 25 years from practical completion.

Provide a Warranty that the cabling system supplied and installed under these works will for the duration of the System Performance Warranty period:

a) Meet or exceed the minimum performance requirement

b) Meet or exceed the Structured Cabling System manufacturer's minimum performance specifications,

c) Support all data transmission standards which the cabling system manufacturer currently or at any time during the System Performance warranty period states that this type of cabling system will support

d) Should the system not meet the specified performance requirements, provide all labour and materials (including transport, duties and taxes or similar) required to analyse and rectify faults on-site during the System Performance warranty period.

4.4.4 Guarantee of Workmanship

a) Guarantee the complete Structured Cabling System installation against faulty installation workmanship of any kind, for the duration of the System Performance Warranty period.

b) During the System Performance Warranty Period, perform all work necessary to ensure that the system is in proper order.

Tender Issue

c) Provide all labour and materials (including transport, duties and taxes or similar) required to analyse and rectify any faults on-site during the System Performance Warranty period.

4.4.5 Guarantee of Materials

a) Material Warranty period: Minimum 25 years from Practical Completion

b) Guarantee the complete Structured Cabling System installation against faulty materials and failure materials (except where due to maltreatment after Practical Completion) of any kind for the duration of the Material Warranty period.

c) Provide manufacturer Guarantee(s) against faulty materials and failure of materials (except where due-to maltreatment after Practical Completion) of any kind for the duration of the Material Warranty period.

d) During the Material Warranty period replace with new equipment all parts or equipment which fail under normal use or which are found to not provide performance as specified herein or which do not meet the manufacturer's published performance figures, or any combination of these.

e) Provide all labour and materials (including transport, duties and taxes or analyse and rectify any faults on-site during the Materials Warranty period.

4.4.5.1 Communications Outlets

a) Surface mounted outlets: Use faceplates as specified by the architect, 1 -way, 2-way, 3-way and 4-way outlet plates as required. Blank off unused positions. Recess outlets into walls wherever possible.

b) UTP Terminations: 8-way Class D Modular Socket.

c) Wiring scheme: T568A.

4.4.6 UTP Links

a) To Cat 6 Class E.

b) Minimum Length: Permanent Link greater or equal to 15 m.

c) Cables run as part of a bundle of more than 5 cables shall be de-rated by 3db. Test results should be interpreted to the resulting benchmark.

d) Mark cable with indelible printing at not less than 1500 mm intervals

e) Manufacturer's name

f) Model number

g) Batch number.

h) Mark cable at each end with the cable ID Approved labelling system.

i) Cable shall be suitable for external and in ground conduit use.

4.4.7 Connectors

Tender Issue

4.4.7.1 Modular Sockets

a) Terminal strips: Provide insulation displacement type terminal strips permanently connected to modular sockets. Do not connect terminal strips to sockets using discrete flexible wiring.

b) Mechanical performance: To AS/NZS 3080 Class D.

c) Electric performance: To AS/NZS 3080 Class D.

d) Submit independent test laboratory test results to verify conformity with performance requirements. Test Methods: IS011801:2000 and standards referenced by IS011801:2000.

e) Colour code to indicate performance category.

f) Pair assignments: To T568B

4.4.7.2 Punch Down Termination Modules

Provide insulation displacement wire termination modules.

4.5 RETICULATION & DISTRIBUTION

4.5.1 General

Abbreviations

PVC	Polyvinyl Chloride
AS	Australian Standard
NZS	New Zealand Standard Standards

4.5.2 Standards

To AS/NZS 3084:2003 Buildings	Telecommunications Pathways
To NZ Building Code	
To AS/NZS 3000:2000	Electrical Installations

4.5.3 Quality

4.5.3.1 Tests

a) Test electrical continuity of all metallic cable support structures.

b) Test electrical continuity between metallic cable support, structures and the earth terminal at the electrical distribution board.

4.5.4 Communications Services Provider's Submissions

Shop Drawings: Submit shop drawings of Cable support layouts

4.6 DESCRIPTION AND EXTENT OF WORKS

Tender Issue

4.6.1 General

The works comprise the supply, delivery, installation, commissioning and maintenance of the Reticulation and Distribution installation and includes, but is not limited to:

a) Cat 6 cabling, outlets and patch panels as shown on the drawings.

b) Cabling support and Protection as required to carry out the communication works, specified.

c) Cabling support and protection systems as required by AS/NZS 3084:2003.

4.7 CONDUITS

4.7.1 Minimum Sizes

Metallic and non-metallic conduits: 25mm nominal bore unless noted otherwise.

4.7.2 Rigid Conduits

Provide straight long runs, smooth and free from rags, sharp edges and burrs. Set conduits to minimise the number of fittings.

4.7.3 Galvanizing

Galvanise mild steel wiring enclosures and support systems.

4.7.4 Set Out

If exposed to view, install conduits in parallel runs with right angle changes of direction.

4.7.5 Inspection Fittings

Locate in accessible positions, where such access will not overly disrupt the operation of the Client.

4.7.6 Draw Cords

a) General: Provide draw cords in conduits not in use and in conduits with remaining spare capacity. Leave 1 m of cord coiled and fixed at each end.

b) Material: Insulated stranded earth wire, 2.5mm minimum size.

4.8 CONCEALED CONDUITS

4.8.1 Routes

Tender Issue

Conduits concealed in wall chases, embedded in floor slabs or installed in inaccessible locations: Run directly between points of termination minimising the number of sets. Do not use inspection fittings.

4.8.2 Conduits in Concrete Slabs

a) Route: Do not run in concrete toppings. Do not run within pre-tensioning cable zones; cross pre-tensioning cable zones at right angles. Route to avoid crossovers and minimise the number of conduits in any location. Space parallel conduits at least 50mm apart. Seek approval of conduit routes from Builder.

b) Minimum Cover: Conduit diameter or 20mm.

c) Conduit: Use only heavy-duty conduit.

d) Conduit size: 25mm maximum diameter.

e) Fixing: Fix directly to top of the bottom layer of reinforcing. Where there is only one layer of reinforcing seek fixing instructions from the Builder.

4.8.3 Prohibited Floor Slabs

Do not run conduits in the floor slabs of boiler rooms, plant rooms and tank rooms.

4.8.4 Hollow-Block Floors

Locate conduits in the core-filled sections of precast hollow-block type floors.

4.8.5 Columns

a) General: Do not place more than four 25mm (maximum) diameter conduits in each column.

b) Bends: Enter columns via bends with minimum radius of 150mm.

c) Chasing: Do not chase columns.

4.9 METALLIC CONDUITS AND FITTINGS

4.9.1 Standard

Metallic conduits and fittings: AS/NZS 2053:1995.

4.9.2 Type

Galvanised, screwed steel.

4.9.3 Corrosion Protection

For steel conduits, paint ends and joint threads with zinc rich organic binder.

Tender Issue

4.9.4 Expansion Joints

a) General: Provide flexible couplings consisting of flexible conduit and fittings at structural expansion joints and in long straight runs if the ambient temperature varies by more than 40°C.

b) Conductivity: Maintain electrical conductivity between the two ends of rigid metallic conduit.

c) Movement: Provide conduit support saddles close to flexible couplings to permit free movement for expansion and contraction.

4.10 NON-METALLIC CONDUITS AND FITTINGS

4.10.1 Standard

a) Non-metallic conduit fittings: AS/NZS 2053:1995

b) Underground conduit: use rigid UPVC to AS/NZS 2053:1995. Colour white.

4.10.2 Conduits in Roof Spaces

a) Locate below roof insulation and sarking.

4.10.3 Conduit in Slabs

a) Use high compression heavy duty, conduit and restrain at regular intervals to achieve a nominally straight run.

4.10.4 Flexible Conduit

a) Use for equipment and plant subjected to vibration. If necessary, use for adjustment or ease of maintenance. Provide the minimum possible length.

4.10.5 Associated Fittings

a) General: Use fittings of the same type and material as the conduit.

b) Wall boxes on UPVC conduits: For special size wall boxes not available in UPVC, use prefabricated earthed metal boxes.

4.10.6 Inspection Fittings

a) Use inspection-type fittings only in accessible locations and where exposed to view.

4.10.7 Joints

a) General: Use cemented or snap on joints.

b) Expansion couplings: If encased in concrete, do not use bellows type.

Tender Issue

4.11 DUCTED WIRING ENCLOSURES

4.11.1 Ducting

Provide purpose-made ducts, skirting ducts and floor ducts incorporating segregation where used for multiple services, and rigidly supported. Round off sharp edges and provide PVC bushes for cable entries into metallic ducting.

4.11.2 Accessories

a) General: Provide purpose-made accessories and covers to match the duct system. Use screw-fixed covers or clip-on covers removable only with the use of tools.

b) Cable support: Except for horizontal where the covers are on top, loosely support wiring runs using retaining clips at intervals of not more than 1 metre.

4.12 CABLE SUPPORTS

4.12.1 System

Provide a complete cable support system consisting of trays or ladders, or a proprietary Communications cable support system such as Burndy, and including brackets, fixings and accessories. Fabricate brackets, racks and hangers using structural steel sections or other materials in sections of equivalent strength.

4.12.2 Manufacture

a) Use proprietary trays, ladders and accessories from a single manufacturer in the same application.

b) Follow all manufactures recommendations relating to communications cabling installations.

4.12.3 Cable Trays

a) Materials:

.1 Interior: Zinc coated steel, or steel with two-pack liquid coating, air-drying enamel or stoving enamel finish.

.2 Exterior: Hot dip galvanised steel.

b) Minimum thickness:

.1 Trays < 150 mm wide: 1mm.

.2 Trays > 150 mm, < 300 mm wide: 1.2mm.

.3 Trays > 300 mm wide: 1.6mm.

c) Perforations: To Admiralty pattern, reverse stamping.

Tender Issue

d) Identification: Tray not painted shall be identified by a 50mm band in applied across the width of the tray (and cover, if present). Colour band or an approved stick-on system.

e) Colour: Harbour Blue.

4.12.4 Fixing To Building Structure

a) General: Fix supports to the building structure or fabric using direct fixing, hangers or brackets. Adhesive fasteners are not acceptable

b) Spacing: Space supports at maximum intervals of 1.5m for trays and 3m for ladders

c) Conform to requirement of NZ building Code for seismic restraint and/or wind performance.

4.12.5 Access

a) Provide a minimum of 150 mm free space above and 600mm free space on one side of trays and ladders.

4.12.6 Cable Fixing

a) Provide slats or rails suitable for fixing cable ties, strapping or saddles.

b) Fix cables only with Velcro-type cable ties. Fix cables only as absolutely necessary to avoid movement and creep.

4.12.7 Bend Radius

a) Provide bends with a minimum inside radius of 12 times the outside diameter of the largest diameter cable carried.

4.12.8 Cable Protection

a) Provide rounded support surfaces under cables where they leave trays or ladders.

4.12.9 Minimum Clearances

a) Minimum clearances between the support system, and the following shall be:

1. Hot water pipes: 200mm.
2. Boilers or furnaces: 500mm.
3. Fluorescent light fittings: 100mm.
4. Electrical: 300mm.

Tender Issue

4.13 CATENARY SUPPORT SYSTEM

a) Loomed cable bundles shall be suspended from steel wire, galvanised, or PVC coated galvanised catenary systems using Velcro-type cable ties. No more than 20 4-pair cables per loom and no more than 4 looms per catenary.

b) Care shall be taken not to over tighten the cable ties supporting cables on catenary, to prevent excessive de-rating of the cable.

c) Catenaries shall be supported by galvanised steel screw eyes fastened to buildings structural elements at intervals not exceeding 2000mm.

d) Catenary systems shall be bonded to earth.

4.14 INSPECTION, TESTING, COMMISSIONING & HANDOVER

4.14.1 Practical Completion

Acceptance of practical completion will require at least the following:

a) Certification of compliance with requirements of Statutory Authorities.

b) Testing and commissioning finalised. Signed off testing and commissioning schedules to confirm that systems operate in a stable and automatic manner under all conditions of full and partial load - full commissioning data.

c) Certification that capacities and efficiencies of equipment and systems satisfy specified requirements

d) Manufacturer's certification of systems and installation

e) Authority approvals obtained as required.

f) Witnessed, satisfactory completion of failure mode tests for critical systems.

g) Stable operating conditions of all plant.

h) Preliminary instruction of the building owner or representative in safe operation of the plant.

i) Updates for existing building manual and “as built” drawings provided.

j) Submission of correctly and completely executed Inspection Test Plans including test results.

k) Certification that works comply with the contract documents and are ready for granting of Practical Completion

4.14.2 Management of Inspection, Testing, Commissioning and Handover

a) Commissioning Management: Commissioning is to be organised and managed so as to verify the operation of individual items of plant and equipment, sub-systems, systems and the interfaces with other building services systems provided by others.

b) Management of commissioning to include: -

1. Programming and scheduling of commissioning and handover activities in conjunction with the Head Contractor and in consultation with other relevant parties.

Tender Issue

2. Liaison with other services, trades and coordination of commissioning activities associated with system interfaces and interaction between systems.
3. Liaison with and briefing of Authorities and certifying manufacturers to ensure that the commissioning procedures and resultant-data provided for their approval is consistent with their requirements and records.

4.14.3 Testing

a) Provide the following information prior to start of testing:
   1. Inspection, testing and commissioning plan.
   2. Evidence currency of calibration of equipment to be used in testing and commissioning procedures. Calibration to be in accordance with AS3912.
   3. Evidence of qualification of all personnel proposed for carrying out any commissioning related activities.

b) Records of all pre-commissioning checks and commissioning data be certified as being conducted in accordance with agreed and approve

c) Manufacturers' certificates for all proprietary items, e.g. circuit breakers etc. to confirm that the installation complies with their installation requirements prior to start-up of equipment. Certificates shall also be provided at commencement of equipment installation to confirm their requirements with respect to installation are being provided for

4.14.4 Commissioning

a) Operate the installation to prove the performance, capabilities and ability to provide the required service.

b) Commissioning to include: -
   4. Performance of individual plant items and components.
   5. Operating sequences, interlocks and interfaces
   6. Inter-system operation and correct interfacing connections under all operating conditions including power failure and under simulated fire conditions.
   7. Rectification and correction of any defects and deficiencies.

c) Continue commissioning until achievement of correct performance and operation.

4.14.5 Post Contract Drawings

a) Supply 3 full set of CD-ROM disks and hard copies of all directories (Drawing format to be AutoCAD 2006 .dwg), and 4 sets of A3 format drawings in separate bound folders of all construction drawings which have been correctly brought up to date to reflect all field changes and are a true and accurate representation of the actual installations. Include the following:

Tender Issue

8. Complete power and communications layout drawings, showing the actual locations and outlet types and the final circuiting arrangements, complying with AS/NZS 3085.1:2004 Appendix C.
9. Complete schematic diagrams of all systems incorporated in the installation.
10. Complete outdoor infrastructure drawings showing the actual locations of outlets and accessories complying with AS/NZS 3084:2003 Appendix B.
11. Complete Communications Rooms and/or equipment layout drawings with full identification of each and every item of equipment.

b) Installed wiring diagrams and rack frame layouts shall be supplied laminated and located in Communication Room cupboards. Drawings shall be kept up to date with any changes during the Maintenance and Defects Liability Period, and at the end of this period

c) All drawings shall include all alterations made up to and including the end Period.

4.14.6 Installation Manuals

a) On completion of satisfactory performance tests prior to practical completion submit one draft copy of building manual pages to the Consulting Engineer for review.

b) The manual shall include "As Constructed" specification and a full description of the installation and functioning of the various systems involved and instructions to cover every action necessary for the efficient operation and maintenance of the installations.

c) All aspects of the style and quantity of the pages shall be consistent with the existing building manual, including folders and contents shall be to submitted for review prior to completion

d) After the draft copy has been approved, supply 4 copies of the manual pages to the builder for issue.

4.15 ROUTINE MAINTENANCE & SERVICING

4.15.1 General Scope

a) Routine maintenance

b) Maintenance and servicing is to be carried out on a monthly basis for a period of 12 months from the date of Practical Completion to the end of the Maintenance and Defects Liability Period.

c) Monthly maintenance and servicing in accordance with maintenance schedules recommended by equipment manufacturers.

d) Maintenance, testing and inspections in accordance with regulatory requirements and relevant New Zealand standards.

e) Rectification of defects at Providers cost.

f) Replacement of consumables at Providers cost.

g) Provision and filling out logbook which must on site detailing all visits.

Tender Issue

h) Service personnel to be available for call out on a 24-hour per day, 7-day per week basis. Response time for emergency and corrective maintenance must not exceed 2 hours.

4.16 MAINTENANCE (DEFECTS LIABILITY PERIOD)

4.16.1 GENERAL

Maintain the work for a period terminating 12 months from the date of Practical Completion of the whole of the Contract Works, replacing or repairing any faulty equipment or materials, or the results of incompetent workmanship, free of charge.

4.16.2 SCOPE OF WORKS

i) Routine maintenance and servicing is to be carried out on a monthly basis for a period of 12 months from the date of Practical Completion to the end of the Maintenance and Defects Liability Period without cost to the Owner.

j) Monthly maintenance and servicing in accordance with maintenance schedules recommended by equipment manufacturers.

k) Maintenance, testing and inspections in accordance with regulatory requirements and relevant New Zealand standards.

l) Rectification of defects at Providers cost.

m) Replacement of consumables at Providers cost.

n) Provision and filling out logbook which must on site detailing all visits.

o) Service personnel to be available for call out on a 24-hour per day, 7-day per week basis. Response time for emergency and corrective maintenance must not exceed 2 hours.

4.17 SCHEDULE OF MAINTENANCE CONTRACT

The contractor shall provide a price to carry out preventative maintenance of all systems installed on the expiry of the Defects & Liability Period. A brief summary of the minimum maintenance scope follows;

GENERAL

a. **The provision of skilled personnel fully conversant with the structured cabling and equipment and competent to attend the same shall be included.**
b. **Attendance upon the plant and equipment for the purpose of routine cleaning and inspection at specified intervals shall be included.**
c. **All periodic maintenance services requiring system shutdown shall only be carried out after the normal operating hours and with authorization from the Employer's representative. The frequency of maintenance shall be as per Schedule of Maintenance Works of this Specification or the operations and maintenance manual.**
d. **All replacement of parts and components shall be included in the comprehensive Maintenance Contract.**

Tender Issue

4.18 END OF DEFECTS MAINTENANCE

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The contractor shall carry out the following at the end of the defects and liability period to ensure that the systems installed are operational.

1. **Communication**
   - **Check for damage that may be caused by improper plugging of line cords /patch Cords.**
   - **Ensure that the termination is done correctly without any loss in signal.**
   - **Test all RJ45 outlets using a calibrated fluke meter and provide test results**

2. **CCTV System**
   Check that the CCTV System installed are intact and fully functional. For the system's camera and housing, the contractor shall verify the following:

- Camera/lens focus and auto iris is adjusted properly.
- Camera field of view is adjusted to customer's requirements.
- Camera/housing viewing window is clean, inside and out.
- Camera lens is dust free.
- Interior of camera enclosure is clean and dry.
- Check operation of pan tilt and zoom focus. Use controller in control room to check all these operations
- For the system's wiring and cables, the contractor shall verify the following:
- Check wiring and cable harnesses for wear and fray.
- Check to make sure cable is dressed properly.
- Check connectors and cable entry points for loose wiring.
- Check that the Ethernet cable is transmitting an adequate video signal to the NVR. Signal should be free of distortion, tearing, hum-bars, EMI, and rolling.
- Make sure all RJ45 connectors are insulated from conduit and pull boxes.
- For the system's control equipment, the contractor shall verify the following:
- Monitors are free from picture burn-in and distortion.
- Monitors have proper contrast and brightness.
- NVR's are functioning properly and providing distortion free recording.
- Clean all monitor screens, control panels, and keyboards with a diluted cleaning solution.
- Check all power connections to ensure AC plugs are not loose

Tender Issue

5 DOCUMENTATION AND DRAWINGS

Documentation and drawings shall be provided for as follows: -

5.1 GENERAL

Drawings and documents for approval by the client's representative and the local authority, shall be provided for at the stages as indicated and work shall not proceed with the next stage until the drawings, documents and samples have been approved and the various actions have been taken as required.

5.2 TENDER STAGE

Submit at the time of tender the completed price, rate prices and deviations schedules, draft quality control plan as well as a tender letter with any deviations.

5.3 TENDER AWARD STAGE

Within three weeks of tender award, issue the following documents: -

Issue building consent documentation to the local authority.

Issue 5 sets of paper copies of the shop drawings detailing the extent of the installation.

The shop drawings shall be drawn with AutoCAD ver. 2006 minimum or later versions to a 1:100 scale in general and 1:50 scale for plant and equipment layouts.

The shop drawings shall contain all the technical information, all air flow rates and equipment model numbers shall be shown on the drawings. It is preferable that technical information is shown on drawings rather than in the owner's manuals.

5.4 CONSTRUCTION STAGE

The Q/A plan shall be updated and signed off as and when required.

5.5 HAND OVER STAGE

5.5.1 As-Built Drawings, Operations Maintenance Manuals

Provide 3 sets of Maintenance Manuals bound and indexed in Black A4 ring binders labelled with the project name and purpose on the front cover and spine.

Issue 3 sets of 1:100 paper copies and a CD with the electronic version of the as built drawings.

The as built drawings shall show the actual commissioned flow rates and equipment details and capacities.

A draft of the As Built documents shall be provided to the Engineer four weeks prior to Practical Completion for approval. Provision and acceptance of final as-built, commissioning, and maintenance documentation shall be a prerequisite for Practical Completion.

`As Built' drawings, to the approval of the Engineer shall be provided for the Contract Work. These shall be in similar detail to the installation drawings, but shall also include any

Tender Issue

amendments and any additional detail necessary to show the functioning or installation, or particular items of plant.

The approval of any drawings by the Engineer in no way affects the Electrical Services Subcontractor's responsibility for the satisfactory completion of the Contract.

Acceptance of these drawings shall be required as a pre-requisite for Contract Completion.

All costs incurred for correction or alteration work due to failure of the Subcontractor to seek approval, or error in late submission of information supplied by the Subcontractor shall be to the Subcontractor's account.

Tender Issue

6 PRICE SCHEDULES

The Communications contractor shall complete the pages of the section and forward a completed copy to the client's representative together with their tender letter.

6.1 TENDER PRICE

(Tenderer's company name) _____

(Street address) _____

(City) _____

(Tel.) _____

(Fax.) _____

(Email) _____

We, as per above, tender for the installation as per this specification inclusive of all provisional sums for the total sum of

$_____ (VIP)

And in words

_____

_____Dollars

Responsible person's first and last names _____

Signature _____

Date _____

Tender Issue

7 RATE PRICES, MARGINS AND SUBCONTRACTORS

The rate prices below are for the purpose of calculating variation to the contract in addition to the work in this specification: The prices shown and the percentages shall include all the margins, P & G's as a selling price to the client and shall also be applicable to all subcontractors.

Hourly charges: -

Installation technician	…… $/hour excl VAT normal time from 7h00 to 17h00 weekdays
Commissioning	…… $/hour excl VAT normal time from 7h00 to 17h00 weekdays
Electrician	…… $/hour excl VAT normal time from 7h00 to 17h00 weekdays
Engineer	…… $/hour excl VAT normal time from 7h00 to 17h00 weekdays
Overtime	…… % additional to normal time.
Travelling charges	…… $/per round trip excl VAT to site

7.1 MARGINS' PERCENTAGES

The margins below are for the purpose of calculating variations to this contract in addition to the work in this specification: The prices shown and the percentages shall include all the margins, P & G's as a selling price to the client and shall also be applicable to Subcontractors.

Margin on bought out equipment and materials …… % on invoice value excl VAT.

7.2 SUBCONTRACTORS

No work shall be performed by staff other than the tenderer's own staff except as nominated below – written permission shall be obtained from the client's representative prior to using any other Subcontractors than nominated below.

The tenderer shall complete the following table and name either their own company staff or a sub contracted company they intend to use for any work not performed by their own staff:

Sub contractor's company name	Work description
……..	……
……..	……
……..	……

Tender Issue

7.3 DEVIATIONS AND ALTERNATIVES

The tenderer shall complete this page and forward a completed copy to the client's representative together with his/her tender letter.

Tenderers are welcome to offer valid savings with alternative equipment satisfying the same standard to those scheduled, subject to approval by the client's representative.

Tender Issue

8 TENDER PRICE BREAKDOWN

8.1 MFMR Auki - Malaita Province, Solomon Islands - Communication Price Summary

Item No.	Description	Price ($)
	Structured Cabling System	
1.	Supply & Installation of conduit (with draw wires) to the boundary, for the incoming fibre optic cable from the ISP. Contractor to coordinate these works with building contractors for the cable route.	$
2.	Supply and installation of Communication rack with top mounted built-in fan, complete with Patch Panels, Management Bars, socket PDU, grounding cable (6mm2) and grounding bar for the grounding on the communication equipment's.	$
3.	Supply and installation of fibre trays at both ends of the fibre optic cables.	$
4.	Supply and installation of fibre optic transceivers/ media converters at both ends of the fibre optic cables.	$
5.	Supply and installation of CAT6 cable from communication rack to outlets as indicated in the drawings.	$
6.	Supply and installation of RJ45 outlets complete with keystones, faceplate, mounting box. All external RJ45 outlets shall be weatherproof type and come with dust & water proof covers/flips.	$
7.	Supply and installation of HDMI cable for meeting rooms, etc.	$
8.	Supply and installation of any other structured cabling item not mentioned above.	
	General	
9.	As-built drawings and operation & maintenance manual	$
10.	Supply and installation of cable containments: cable tray, conduits etc. as indicated in the drawings.	$
11.	Supply and installation of fire rated sealant for all penetrations on walls and floors as shown drawings	$
12.	As-built drawings and operation & maintenance manual	$
13.	Builders Works to make good and reinstate building fabric	$
14.	Provision for Shop Drawings	$
15.	Instruction of the Principal	$
16.	Testing and Commissioning	$
17.	Maintenance (defects liability) for 12 months	$
18.	Supply and installation of fire rated sealant for all penetrations on walls and floors as shown drawings	$
19.	Any other item not mentioned above	$
20.	As-built drawings and operation & maintenance manual	$

Tender Issue

	Sub-Total (VEP)	$
	Value Added Tax	$
	Total Communication Services (VIP)	$

Total Fixed Lump Sum Price. $_____

Amount in Words: _____

_____ Dollars

The prices to be set out in this schedule are to provide a breakdown of the tender sum and shall be inclusive of all incidentals in accordance with the specifications. This is a comprehensive supply and installation contract and the tenderer shall take all responsibility for all items required to complete the Contract Works in accordance with the Contract Documents.

Tender Issue

9 SCHEDULE OF RATES – COMMUNICATION SERVICES

Item No.	Description	Unit	Unit Cost
1.	Single RJ45 Outlet complete with faceplate, mounting box	Ea.	$
2.	Double RJ45 Outlet complete with faceplate, mounting box	Ea.	$
3.	Quad RJ45 Outlet complete with faceplate, mounting box	Ea.	$
4.	Patch leads	Ea.	$
5.	50 pair krone block intermediate distribution frame (IDF)	Ea.	$
6.	100 pair krone block main distribution frame (MDF)	Ea.	$
7.	Cat6 Cable	M	$
8.	Cat6 cable box (305 meters)	Ea.	$
9.	50 pair Cat3 Cable	M	$
10.	24 port patch panel	Ea.	$
11.	Management Bars	Ea.	$
12.	Junction Box(s)	Ea.	$
13.	Cable Tags	M	$
14.	Catenary Wire	Ea.	$
15.	20mm Conduits	Specify standard length	$
16.	25mm Conduits	Specify standard length	$
17.	40mm Conduits	Specify standard length	$
18.	Ducting	Ea.	$
19.	12U Communication Rack	Ea.	$
20.	42U Communication Rack	Ea.	$
21.	Emergency Glass Break Door release Switch	Ea.	$
22.	Touch to exit switch	Ea.	$
23.	Biometric Reader (with integrated PIN code and proximity card reader)	Ea.	$
24.	Door Release Switch	Ea.	$
25.	Magnetic Door Lock	Ea.	$
26.	Master PC (database) for Access Control System	Ea.	$
27.	8 port POE Switch	Ea.	$
28.	16 port POE Switch	Ea.	$
29.	24 port POE Switch	Ea.	$
30.	48 port POE Switch	Ea.	$
31.	Weather & vandal proof CCTV Camera	Ea.	$
32.	Audio/ Video type CCTV Camera	Ea.	$
33.	8 channel NVR (1 month Storage hard drive) – RAID option	Ea.	$
34.	16 channel NVR (1 month Storage hard drive) – RAID option	Ea.	$
35.	32 channel NVR (1 month Storage hard drive) – RAID option	Ea.	$

Tender Issue

36.	32” LED Screen	Ea.	$
37.	Ceiling Recessed Speaker	Ea.	$
38.	Wall mounted High Power Speaker	Ea.	$
39.	Sound System cabling	M	$
40.	Amplifier	Ea.	$
41.	Mixer	Ea.	$
42.	Rack mounted UPS (Specify rating)	Ea.	$

Tender Issue